



AYRES
ASSOCIATES

EVERS BOULEVARD ROAD REHABILITATION 35% DESIGN PLAN

Prepared for: Cheyenne Metropolitan
Planning Organization

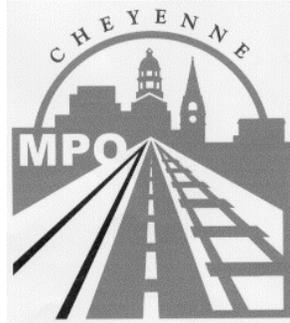


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Final DRAFT Report

Prepared for:

Cheyenne Metropolitan Planning Organization



October 2015

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Table of Contents

INTRODUCTION.....	1
EXISTING CONDITIONS.....	2
Existing Facilities.....	2
Right-of-Way.....	4
PUBLIC OUTREACH.....	4
Corridor Walk.....	4
Comment Forms: Jessup Elementary School.....	5
Meeting with Jessup Elementary PTO.....	5
Public Open House.....	5
Interaction with Landowners.....	6
PRELIMINARY CORRIDOR ANALYSIS.....	7
DATA COLLECTION.....	7
POTENTIAL IMPROVEMENTS.....	9
DESIGN ALTERNATIVES.....	9
Drainage Design Alternatives.....	9
First Steps.....	10
Concept 1: Normal Crown Roadway with Curb Inlets.....	10
Concept 2: Inverted Crown Roadway with Median Bio-Swale.....	10
First Step Results – Concepts 1 and 2.....	11
Second Step – Concept 3.....	11
Concept 3 Results.....	12
Roadway Design Alternatives.....	12
Bicycle Provisions.....	12
Sidewalks.....	13
Gateway Entrance - Center Median and Bio-Swale.....	13
Intersection Improvement Alternatives.....	16
<i>Ranger Drive</i>	16
<i>Deer Avenue</i>	17
Safety Improvements Near Jessup Elementary School.....	17
CONCLUSION.....	19
Recommended Street Cross-Sections.....	19
Drainage.....	20
Traffic & Safety.....	20

Table of Figures

Figure 1 - Evers Boulevard at Jessup Elementary School.....	2
Figure 2 - Existing Facilities	2
Figure 3 - Evers Boulevard Corridor (not to scale).....	3
Figure 4 - Public Open House April 28, 2015	5
Figure 5 - Existing Narrow Sidewalks Along the Corridor	7
Figure 6 - Existing Drainage Issues at Deer Avenue and Evers Boulevard	7
Figure 7 - Evers Boulevard Bio-Swale.....	11
Figure 8 - Proposed Normal Crown Street Section	13
Figure 9 – Proposed Street Section with Bio-Swale.....	14
Figure 10 - Bio-Swale Locations	14
Figure 11 - Ranger Drive Existing Alignment.....	16
Figure 12 - Existing Deer Avenue Alignment.....	17
Figure 13 - Deer Avenue Realignment	17
Figure 14 - Jessup Elementary School at Morning Drop-off	18
Figure 15 - Proposed Jessup Curb Extensions.....	18
Figure 16 - Evers Boulevard Overview Map.....	22

Appendices

Appendix A: Public Outreach

- Corridor Walk, September 13, 2014
 - Summary of Comments
 - Handout for MindMixer web address
 - Corridor Walk Comment Form
- Public Meeting, April 28, 2015
 - Summary of Comments
 - Public Meeting Comment Form
 - Sign in Sheets
 - Power Point Slides
 - Displays
- MindMixer Survey Summaries

Appendix B: Evers Boulevard Traffic Data

- Technical Memo
 - Appendix A: Speed Spot Study Data
 - Appendix B: Crash Data
 - Appendix C: Turning Movement Counts & Future Traffic Forecasts
 - Appendix D: Synchro Analysis

Appendix C: Drainage Analysis

Appendix D: Conceptual Plans

- 35% Plan and Profiles (Storm sewer outfall to Vandehei Avenue)
- 35% Plans (Vandehei Avenue to Brittany Drive)
- 35% Cross Sections (Bishop Boulevard to Vandehei Avenue)
- Preliminary Engineer’s Opinion of Probable Cost

Appendix E: Complete Streets Checklist

INTRODUCTION

Evers Boulevard is a collector roadway in the Western Hills neighborhood in northwest Cheyenne, Wyoming. The existing roadway is approximately 1.2 miles long, from Bishop Boulevard to Sterling Drive, south to north. Evers Boulevard provides access into the established Western Hills neighborhood from Bishop Boulevard and Vandehei Avenue. This neighborhood has been built out with no room available for further expansion as it is bordered by Interstate 25 to the east, Warren Air Force Base on the west, platted and developed Laramie County land to the north and development to the south. The existing roadway section from Bishop Boulevard north to Brittany Drive is 60 feet from back of curb to back of curb. The roadway then narrows to 40 feet north of Brittany Drive to Sterling Drive. For the purposes and goals of this project, the older, 1-mile portion of Evers Boulevard from Bishop Boulevard to Brittany Drive was chosen to be the focus for all evaluations.

On November 4, 2014 Laramie County voters renewed the Laramie County 1% Sales Tax. Money for both the final engineering design and the reconstruction of Evers Boulevard will come from the 1% Sales Tax funds.

Ayres Associates was hired to prepare the Evers Boulevard Rehabilitation 35% Design Plan. The key issues to be addressed with the plan include the following:

- Roadway improvements that create a safe and more inviting environment for pedestrians and bicyclists.
- Safety improvements near Jessup Elementary School at the south end of the project.
- Traffic improvements along the corridor that increase safety for vehicular travel.

During the very early stages of this planning initiative it was identified that one of the main reasons the roadway was deteriorating was because of the poor storm water drainage along the corridor. The planning effort was expanded such that the plan would:

- Provide drainage improvements that decrease the amount of storm water on the surface of Evers Boulevard, make better use of the existing storm water culverts beneath Interstate 25, and remove all structures along the corridor from the 100-year effective floodplain.

The Cheyenne Board of Public Utilities (BOPU) was involved throughout the planning effort because of their extensive facilities buried in the Evers Boulevard Corridor. These facilities include dual sanitary sewer mains, a single water main from Sterling Drive to Ridgeland Street, and dual water mains from Ridgeland Street to Deer Avenue. Maintaining dual pipe networks is not ideal and the existing infrastructure is aging. Brad Brooks, Operations and Maintenance Manager for the BOPU, indicated that approximately \$350,000 for design and \$1.8 million for construction of the water and sanitary sewer improvements has been set aside in their Transportation Improvement Projects (TIP) list for fiscal year 2015 and 2017 respectively, for the Evers Boulevard corridor.

A project Steering Committee was formed to help guide the project. The Steering Committee included: Nathan Beauheim, City Engineering; Frank Strong, BOPU; Brandon Cammarata, City Planning; Dennis

Auker, Laramie County School District #1 Planning and Construction Office; Tom Mason, MPO; Ed Fritz, Wyoming Department of Transportation Planning Department; Mike Vinson, City Engineering; Anna Lane, neighborhood resident; and Dr. Barbara Leiseth, Principal of Jessup Elementary School. The Steering Committee met two times and was sent e-mail updates as the plan progressed.

EXISTING CONDITIONS

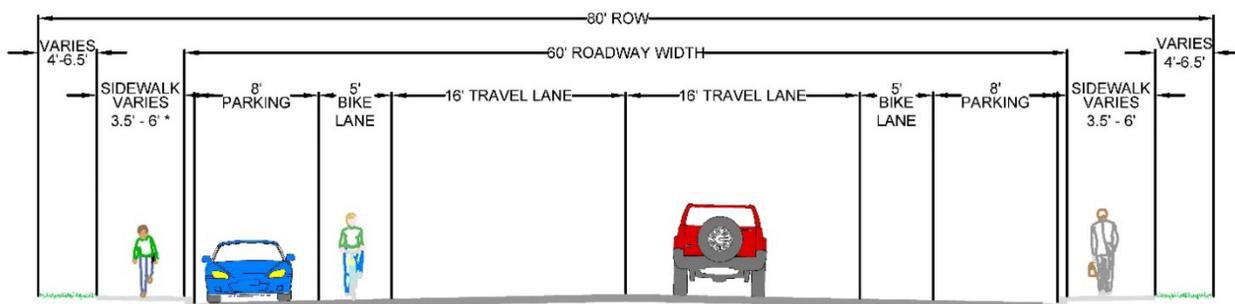
Existing Facilities

Evers Boulevard is a two-lane collector roadway with bike lanes and adjacent parking for the extent of the study area. The speed limit along the corridor is 30 mph with a school zone speed reduction to 20 mph at Jessup Elementary on the south end of the corridor. The majority of the intersections along the corridor are stop-controlled for the minor street; north of Silver Sage Avenue to Brittany Drive intersections are yield-controlled for the minor street.

The corridor does not have consistent sidewalks throughout; there are a variety of sidewalk widths within the corridor, and the sidewalk is absent in some locations. The corridor has one marked crosswalk on the north side of Creighton Street near Jessup Elementary school.



Figure 1 - Evers Boulevard at Jessup Elementary School



*THERE IS NO SIDEWALK BETWEEN GOLDEN HILL STREET AND THE ALLEY

Figure 2 - Existing Facilities

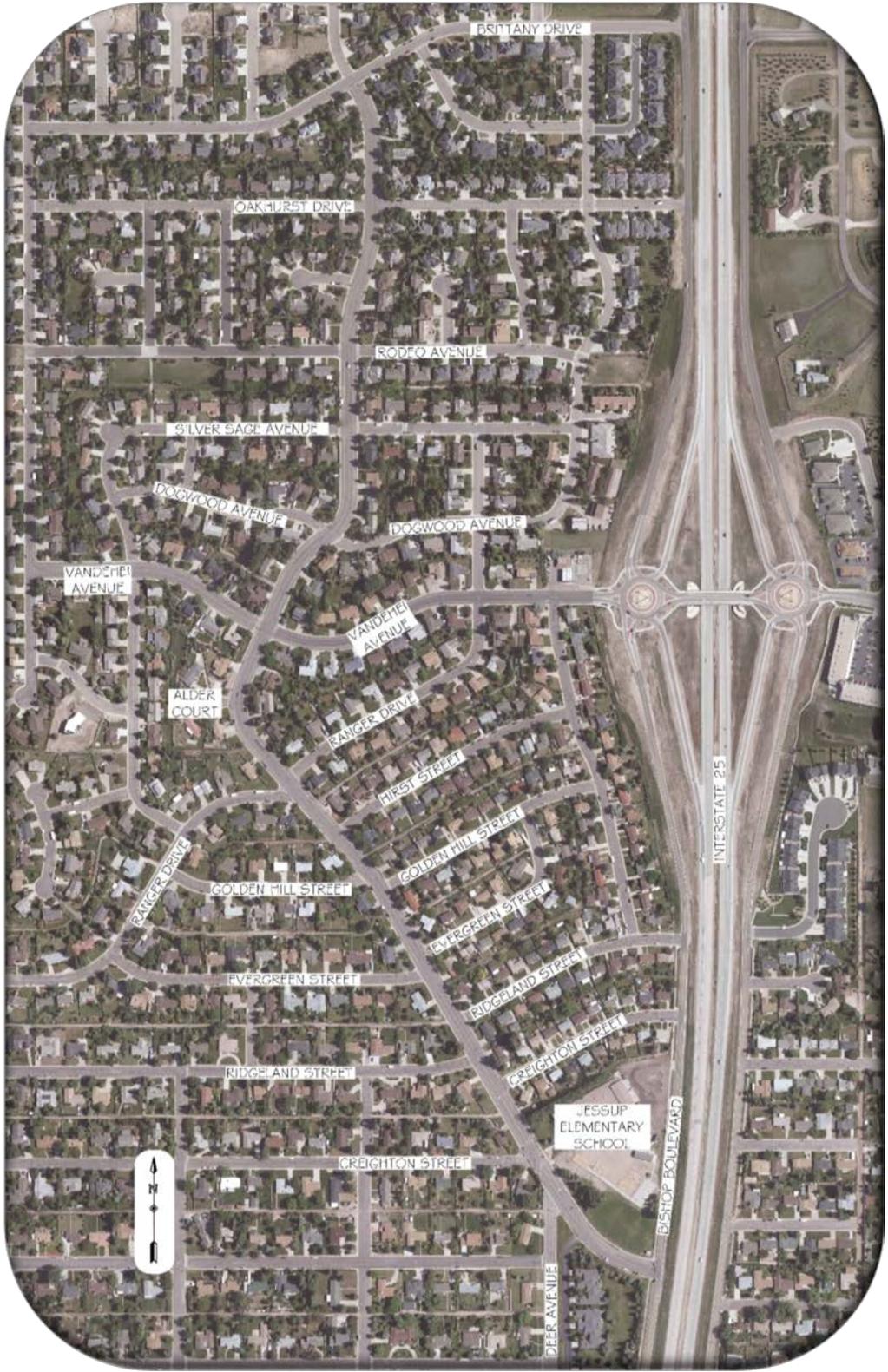


Figure 3 - Evers Boulevard Corridor (not to scale)

Right-of-Way

The existing right-of-way through the corridor is 80' wide. The existing street cross section consists of two 16' travel lanes with a 5' bike lane and 8' parking on either side. The sidewalk is inconsistent throughout; where present it varies from 3.5' to 6' in width. The existing cross section does not use the entire right-of-way width.

PUBLIC OUTREACH

Ayres Associates worked with the Cheyenne MPO staff to conduct a comprehensive public outreach program for this project beginning in September 2014. The outreach included conducting a corridor walk, distributing informational flyers and questionnaires at Jessup Elementary during morning drop-off, conducting a meeting with the Jessup Elementary PTO, placing informational posts and public opinion surveys on the City of Cheyenne's MindMixer website, and holding a public open house. The corridor walk and various meetings are detailed below. Sign-in sheets, a summary of comments, and other public outreach documents are provided in Appendix A.

Prior to Ayres Associates' involvement with the Evers Boulevard Project, the City of Cheyenne held a meeting in June 2014 at Jessup Elementary School at the request of the residents along the corridor to discuss concerns with the storm water and drainage along the corridor.

Corridor Walk

A corridor walk was held on Saturday, September 13, 2014 from 9 a.m. – 12 p.m. During the corridor walk, members from the project team went door-to-door on Evers Boulevard to talk with residents about their concerns and suggestions for improvements to the corridor. All residents with property frontage along the corridor were contacted via U.S. mail alerting them of the corridor walk. Along with being asked specific questions about the corridor, these residents were given the Evers Boulevard project MindMixer web site address and asked to look for updates on the site as the project progressed. A variety of comments were provided, which are summarized in Appendix A. The comments that were received the most frequently included:

- 1. Residents recognized there was significant flooding on the south end of Evers Boulevard. This flooding has caused damages to the curb and gutter, sidewalk, and asphalt over time.*
- 2. Residents noted significant ice buildup on the pavement as well as on the sidewalk at the south end of Evers Boulevard near Jessup Elementary, making walking dangerous.*
- 3. Residents seem to enjoy the bike lanes that currently exist on the roadway and do not want that to change with a new design.*
- 4. Residents would like the drainage issues on Evers Boulevard addressed before any aesthetic aspects are included. Drainage is the main concern, and if that cannot be fixed then residents do not want anything done to the roadway.*
- 5. Sidewalk width is too narrow.*
- 6. Speed of vehicles is a concern.*

Comment Forms: Jessup Elementary School

Ayres Associates handed out comment forms for the Evers Boulevard project on September 24, 2014, at Jessup Elementary School during the morning drop-off period. Those dropping off students were given comment forms and a brief explanation of the project goals. All who received comment forms were encouraged to submit the filled-out forms so their input and concerns could be taken into consideration during design. Additionally, the MindMixer web address for the project was provided.

Meeting with Jessup Elementary PTO

Ayres Associates attended the Jessup Elementary School PTO meeting October 8, 2014, to discuss the Evers Boulevard project. A small presentation was made to the PTO group explaining the purpose, progress, and next steps for the project. Comment forms were handed out to all PTO members present. Overall, the Jessup PTO had a general concern with the safety of students at Jessup Elementary School during pickup and drop-off times.

Public Open House

On April 28, 2015, an open house was held in the Jessup Elementary School cafeteria to present and review the Evers Boulevard project progress. A series of exhibits was displayed throughout the space, including the following:

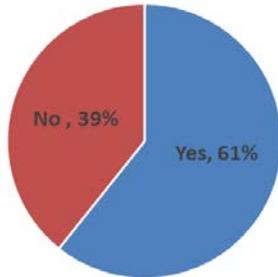
- Tabulated results from questions asked via MindMixer as well as from the Corridor Walk.
- Aerial display of the FEMA effective 100-year floodplain to reference which homes are currently in the regulatory floodplain
- Cross sections for Evers Boulevard from Bishop Boulevard to Vandehei Avenue
 - Existing Cross Section
 - Cross Section with Proposed Bio-Swale
- Cross sections for Evers Boulevard from Vandehei Avenue to Brittany Drive
 - Cross Section with 8' Landscape Buffer
 - Cross Section with 2' Stamped Concrete Buffer
 - Cross Section without Buffer
- Rendering of Evers Boulevard at Jessup Elementary School with a bio-swale median
- Aerial photograph of potential bio-swale locations along the corridor
- Display of potential realignment of Deer Avenue
- Display of safety improvements at Jessup Elementary School
- Aerial display of the roadway collisions reported along Evers Boulevard
- Existing turning movement counts at three intersections along the corridor



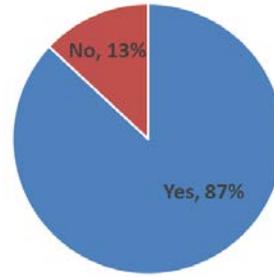
Figure 4 - Public Open House April 28, 2015

Approximately 100 people from the community attended the Open House. An informational presentation of the issues being addressed by the project and the progress thus far was conducted during the meeting. The presentation was followed by a question-and-answer session, and attendees were given the opportunity to vote on specific aspects of the Evers Boulevard project. The questions posed during the presentation along with the results collected are summarized below:

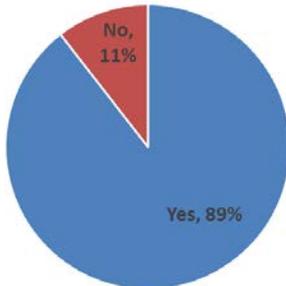
Are you in favor of having a bio-swale in the middle of Evers Boulevard to capture more storm water?



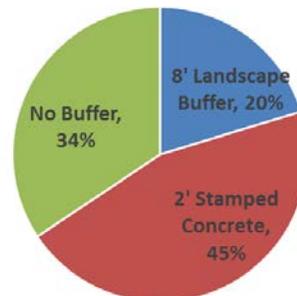
Do you agree with the need for the safety improvements planned at Jessup Elementary School including dual crosswalks, wider sidewalks to shorten crossing distance, and no parking between the crosswalks?



Do you agree with the improvements to realign Deer Avenue to meet Evers Boulevard at a 90-degree angle?



Which roadway section option do you prefer from Vandehei Avenue to Brittany Drive?



Comment forms were handed out during the Open House. The displays presented at the meeting are included in Appendix A.

Interaction with Landowners

Throughout the planning project several landowners contacted the City of Cheyenne, the MPO, and/or Ayres Associates directly to discuss their concerns about the project. These interactions include the following:

- Ayres Associates met with some of the homeowners and members of the North West Condominium Association to discuss the detention pond at the southwest corner of Bishop Boulevard and Evers Boulevard.
- Ayres Associates, the MPO, and the City Engineer’s Office received letters from and met face-to-face with Kenneth and Pamela Moran to discuss their concerns with the proposed improvements for the project.
- Ayres Associates corresponded via email with several interested residents including Brett Maret, Brant Christensen, Brianna Wheeler, Ed Heffern, and Dan Peel.

PRELIMINARY CORRIDOR ANALYSIS

To begin the project, the team conducted an analysis of the corridor to identify the items that needed addressing through this study. Potential improvements identified in the preliminary analysis included:

- Consider narrowing the roadway; the existing roadway is much wider than is necessary.
- Widen sidewalks where currently present and add sidewalks in locations that are currently lacking.
- Evers Boulevard is subject to flooding during both major and minor rainfall events; address the drainage issues and find solutions that will remove adjacent structures from the 100-year floodplain.
- Provide a safer crossing alternative to the existing configuration at Jessup Elementary School.

The improvements identified in the preliminary analysis must be contained within the existing 80 foot right-of-way along Evers Boulevard in order to minimize the cost of the roadway reconstruction. The existing roadway cross section does not use the full right-of-way width. Potential improvements may require widening the roadway footprint to the full right-of-way width.

DATA COLLECTION

A speed and traffic safety evaluation was conducted on Evers Boulevard from Bishop Boulevard to Brittany Drive. Hi-Star traffic counters were used to collect speed and volume data along the corridor. Previously collected turning movement counts were provided by the MPO. Recent crash data was obtained from the Wyoming Department of Transportation. The complete traffic analysis is contained in Appendix B. The following is a summary of the findings and conclusions:

The following data was obtained from the spot speed study:

- At the speed data location at Creighton Street northbound traffic is traveling at an 85th percentile speed of 21 mph, which is below the posted speed limit of 30 mph. Southbound



Figure 5 - Existing Narrow Sidewalks Along the Corridor



Figure 6 - Existing Drainage Issues at Deer Avenue and Evers Boulevard

traffic was traveling near the posted speed limit at an 85th percentile speed of 35 mph with 13.4% of vehicles exceeding the speed limit.

- At the speed location of Ranger Drive, southbound vehicles were traveling near the speed limit at an 85th percentile speed of 32 mph, and northbound vehicles were traveling under the posted speed limit at an 85th percentile speed of 24 mph. Northbound traffic had 8.2% of vehicles exceeding the speed limit.
- At the speed location of Rodeo Avenue both northbound and southbound traffic were traveling under the posted speed limit of 30 mph with 85th percentile speeds of 22 mph and 20 mph, respectively. At this location, 5.5% of northbound vehicles and 4.6% of southbound vehicles were exceeding the speed limit.

The following conclusion was drawn from the spot speed study:

- The average observed speeds from the spot speed study varied from 20 mph to 35 mph, with the higher speeds recorded on the lower portion of corridor, which is to be expected due to the vertical grade of the roadway. Retaining the statutory speed limit of 30 mph, as currently posted throughout the corridor, is recommended.

The following data was obtained from the crash history study:

- Over the 5.5-year time period from January 1, 2009 to August 1, 2014, 19 crashes were reported within the study segment, resulting in an annual crash rate of 514 crashes per 100 million vehicle miles traveled.
- Of the 10 crashes reported, two were injury crashes. No fatal crashes were recorded.
- Five of the 10 crashes occurred during inclement weather conditions with either snow or ice reported on the roadway.

There are no significant problem areas identified through the crash data analysis. However, there is concern from residents along the corridor with the absence of stop signs at several intersections. Stop signs are present on the minor approach at all intersections from Bishop Boulevard to Silver Sage Avenue. North of Silver Sage Avenue all intersections are yield-controlled on the minor approach. It is recommended that the existing yield signs from Rodeo Avenue to Brittany Drive be replaced with stop signs consistent with the rest of the corridor.

The following data was obtained from the intersection capacity analysis:

- The existing traffic conditions on Evers Boulevard at Vandehei Avenue, Oakhurst Drive, and Bishop Boulevard are all operating at an LOS B or better during both the AM and PM peak periods.
- The 2017 forecasted conditions are expected to operate at an LOS B or better with the exception of westbound traffic on Vandehei during the PM peak, which is operating at an LOS C. The delay was increased from 12.3 seconds with existing traffic to 17.4 seconds with the projected traffic.

- The 2037 forecasted conditions have all movements operating at an LOS B or better with the exception of westbound vehicles at Vandehei during both the AM and PM peaks. These movements are operating at an LOS C. The delay during the PM peak further increased from 17.4 seconds in 2017 to 24.3 seconds in 2037. The AM peak period delay for westbound Vandehei increased from 14.3 seconds in 2017 to 17.5 seconds in 2037.

There are no roadway capacity improvements, such as turn lanes, proposed for intersections along this corridor based on the level of service for future traffic volumes. The projected traffic volumes have all movements during the AM and PM peaks operating at an LOS C or better. A LOS C or better is acceptable for all traffic operations.

POTENTIAL IMPROVEMENTS

Based on the results from the preliminary analysis and public outreach process a number of potential improvements were identified.

- Improve sidewalk quality
 - Widen existing sidewalks and construct sidewalks where currently lacking.
 - Provide bulbouts at high pedestrian traffic intersections including Bishop Boulevard and Creighton Street.
- ADA Accessibility
 - Sidewalks should have a cross slope no greater than 2%. Many of the existing sidewalks have steep cross slopes at driveways and approaches.
 - Provide ADA ramps with detectable warning plates at all intersection corners.
- Intersections
 - Realign skewed intersections whenever possible to provide better sight distance and increase the overall safety of the intersections.
- Drainage
 - Increase storm water storage and conveyance capacity.
- Crossings
 - Add additional crosswalks at Creighton Street for access to Jessup Elementary School.
 - Restrict parking near crosswalks to improve pedestrian visibility.

DESIGN ALTERNATIVES

Drainage Design Alternatives

For many years Evers Boulevard has experienced flooding even during a minor storm event. The only underground storm sewer collection system within this corridor is a single set of curb inlets between Deer Avenue and Bishop Boulevard. These curb inlets, along with a single area drain behind the sidewalk, collect storm water and direct it underground to an existing 48-inch culvert crossing beneath Interstate 25 (I-25). Storm water collected in that pipe network ultimately outfalls into Dry Creek on the east side of I-25. A minor storm event along Evers Boulevard currently causes flooding in the gutters,

which often overtops the sidewalk. A number of the structures in this corridor are within or adjacent to the FEMA-regulated floodplain.

One of the initial goals of this project was to provide as much protection from a flood event as possible with \$2 million worth of storm sewer improvements. This goal was later refined to provide a storm sewer system that would remove all of the structures along Evers Boulevard, between Vandehei Avenue and Bishop Boulevard, from the 100-year event floodplain. Complete details are contained within the drainage report, Appendix C.

First Steps

Ayres Associates explored two concepts that would provide a storm sewer system for greater flood protection to the Evers Boulevard corridor. Each concept had an estimated construction cost of \$2 million. Each concept was evaluated using EPA SWMM to analyze the storm sewer and HEC RAS to analyze the floodplain remaining on the roadway. Existing ground topography was based on City of Cheyenne 1-foot aerial contours. Proposed ground topography was based on a conceptual level proposed plan and profile generated by Ayres Associates as a part of this study.

Concept 1: Normal Crown Roadway with Curb Inlets

The first concept was a roadway with a normal crown section with inlets placed along the curb and draining to an underground storm sewer collection system. A roadway with a normal crown means that the center of the roadway is at a higher elevation than the gutter such that storm water flows toward the gutter and then downhill to a curb inlet. In this concept, storm water runoff is collected in curb inlets that are located at intervals such that storm water depths do not overtop the curb in a minor storm event. A storm sewer trunk line is located under the roadway and ultimately conveys storm water under I-25 via two existing 60-inch equivalent storm sewer pipes, and discharges into Dry Creek.

Concept 2: Inverted Crown Roadway with Median Bio-Swale.

This concept was based on an inverted crown roadway section meaning that the elevation of the gutter is higher than the elevation at the center of the roadway; storm water flows toward a bio-swale located in the center of the roadway. The bio-swale is a depression that collects storm water and directs it to an inlet located at the low point of the swale. In a large storm event the bio-swale will also detain storm water until the storm sewer trunk line has the capacity to accept the runoff. The bio-swale at the center of the right-of-way becomes the point of lowest elevation along the roadway such that storm water is further away from structures than in a normal crown roadway section. A swale also is more efficient at collecting storm water because each inlet is located in a sump condition rather than collecting storm water as it flows over the inlet in the gutter. To allow for turning movements at all side streets, the bio-swale was discontinued at intersections. In these intersection locations the width of the swale, 12 feet, would be paved.

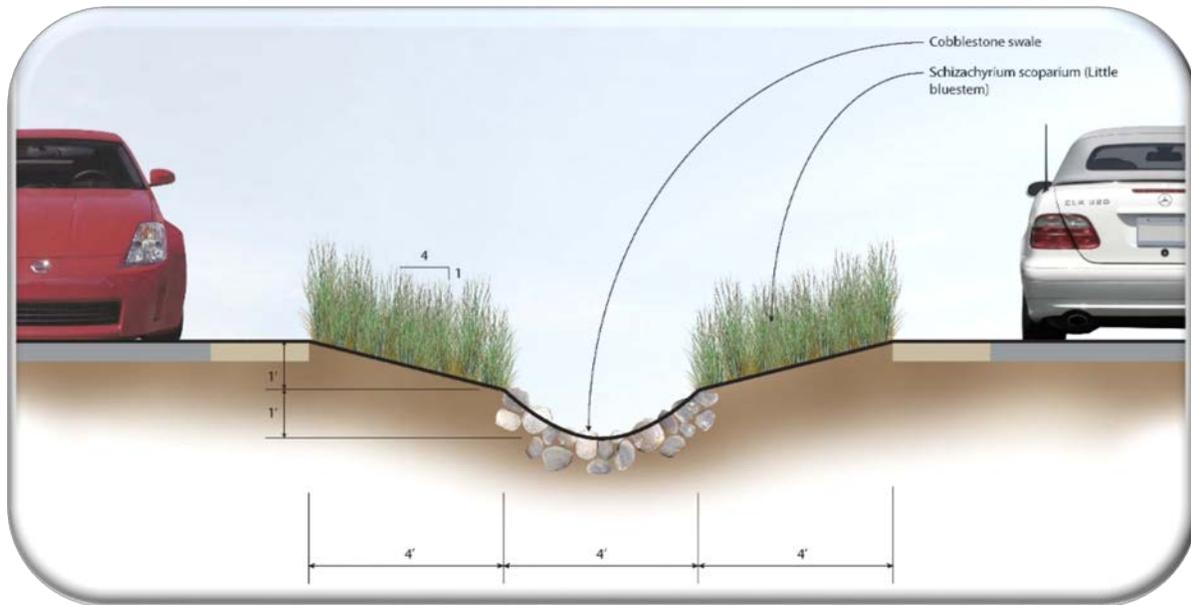


Figure 7 - Evers Boulevard Bio-Swale

First Step Results – Concepts 1 and 2

Both concepts reduced the amount of flooding expected in a 100-year event, but they did not remove all of the structures from the floodplain. Each concept was generated to have an expected construction cost in storm sewer infrastructure improvements of \$2 million. This means that each concept had \$2 million worth of inlets, pipe laterals, trunk line pipe, and manholes.

Concept 1, with curb inlets, requires more inlet boxes and pipe laterals than Concept 2, with the bio-swale. Therefore, Concept 1, with curb inlets, does not have as much large diameter storm sewer trunk line pipe as more money was needed for inlets and laterals. For this reason, Concept 2, the swale option, reduced the width of the floodplain along the corridor as this system had greater capacity due to the large diameter storm sewer trunk line pipe. However, the total cost of the roadway improvements, including paving, bio-swale components, and storm sewer improvements, cost more for Concept 2 because of the increased amount of paving at each side street location where the swale was discontinued to allow for turning movements.

Second Step – Concept 3

Ayres Associates was directed to provide a solution that would remove all structures along Evers Boulevard, from Vandehei Avenue to Bishop Boulevard, from the 100-year floodplain. In this step the storm sewer improvements would not be held to an estimated construction cost of \$2 million. This was accomplished by combining Concepts 1 and 2. Between Vandehei Avenue and Creighton Street, the roadway would be constructed as a normal crown section with inlets placed in the gutter at the curb. A bio-swale at the center of the roadway would be constructed between Creighton Street and

Bishop Boulevard. This combined concept places the bio-swale at the existing sump location of the corridor – the location which has the deepest standing water during a rainfall event. The bio-swale at the sump provides a place to store runoff until the trunk line has the capacity to accept the flow.

Concept 3 Results

This concept appears to remove all structures from the 100-year floodplain at a conceptual construction cost estimate of \$2.3 million worth of drainage improvements including inlets, pipe laterals, trunk line pipe, and manholes. It should be noted that two structures on the east side of Evers Boulevard, just south of Vandehei Avenue (779 Vandehei Avenue and 6835 Evers Boulevard) appear to be very close to the limits of the conceptual floodplain. It is recommended that threshold elevations of these structures and existing ground topographic data be collected as part of the final engineering design for this corridor and that the floodplain be evaluated using final design topography and storm sewer design to ensure that all structures will be out of the floodplain.

Roadway Design Alternatives

Evers Boulevard between Brittany Drive and Bishop Boulevard is currently 60 feet wide from back of curb to back of curb. The travel lanes, one in each direction, are 16 feet wide. Wider streets tend to encourage higher vehicle speeds. Wider streets are also costlier to maintain because of the additional pavement. Evers Boulevard is classified as a Collector roadway from Bishop Boulevard to Oakhurst Drive; it is classified as a local street from Oakhurst Drive to Brittany Drive. On-street parking is permitted along the entire corridor with the exception of the no parking zone adjacent to the existing crosswalk at Jessup Elementary School. The corridor has a dedicated on-street bicycle lane from Deer Avenue to Oakhurst Drive. The block between Oakhurst Drive and Brittany Drive is a Bicycle Route without a painted bicycle lane.

The City of Cheyenne *Unified Development Code* classifies Collector roadways as Types A, B, and C. A Type A Collector has no on-street parking; a Type B Collector has no on-street parking with a center turn lane; a Type C Collector has on-street parking. Evers Boulevard is a collector roadway in a residential neighborhood with on-street parking. This corridor is a Type C Collector roadway. In accordance with the *Unified Development Code*, a typical Type C Collector has two 11-foot travel lanes and an 11-foot-wide parking lane that is also a shared bike lane. Further, a Type C Collector has an 8-foot tree lawn and 5-foot sidewalks.

Bicycle Provisions

The existing cross section has a dedicated on-street bicycle lane that is 5-feet-wide. Public comments received indicated that this bicycle lane is heavily used by riders of all abilities. Many riders use this bicycle lane to access Jessup Elementary School as well as a route to the I-25 overpass to access McCormick Junior High school, Central High School, and the Dry Creek Greenway. A shared bicycle/parking lane is permitted on a Type C Collector. Type A and B Collector standards require a 6-foot bike lane. The AASHTO (1999) *Guide for the Development of Bicycle Facilities*, recommends a

minimum bike lane width of 5 feet. Where parking is permitted adjacent to a bicycle lane, and parking turnover is high, wider bicycle lanes are desirable. Parking turnover is high adjacent to Jessup Elementary School during drop off and pick up times. A 6-foot bike lane is recommended for Evers Boulevard.

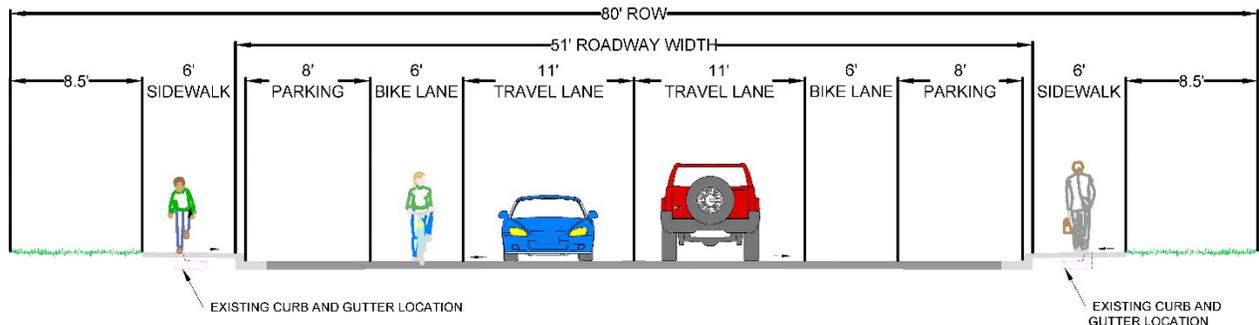


Figure 8 - Proposed Normal Crown Street Section

Sidewalks

Sidewalk width varies along Evers Boulevard from 3.5-foot-wide to 6-foot-wide. In some locations there is no sidewalk. Comments from the public outreach efforts indicate that some residents believe that the existing sidewalk width is adequate, while others believe that the sidewalk is too narrow. Observations were made during site visits where several people were walking in the roadway rather than on the sidewalk. The *Unified Development Code* requires a 5 foot sidewalk and a 6 foot tree lawn for a Type C Collector. The older homes along this corridor were built in the 1950’s. Many of the homes have established landscaping that consists of large diameter trees. A tree lawn between the roadway and the sidewalk would adversely affect many of the established trees. Where a tree lawn is not provided and the sidewalk is placed adjacent to the curb, the *Unified Development Code* requires a 6 foot wide sidewalk. A 6-foot sidewalk placed adjacent to the curb is recommended for Evers Boulevard.

Gateway Entrance - Center Median and Bio-Swale

During the early public involvement phase of this project, the corridor walk and MindMixer surveys, the public was asked if they would like to see a gateway entrance into the Western Hills neighborhood such as more green area or a median. Most of the feedback indicated that a median was not desired for strictly beautification purposes. Comments were made suggesting that the money could be better spent addressing more pressing issues such as drainage. For this reason a raised center landscape median was not considered.

A swale median provides a place to store storm sewer runoff during a storm event, as previously discussed. A bio-swale is a storm water runoff conveyance system that is designed to improve water quality by filtering large storm flows. The bio-swale considered for the Evers Boulevard corridor has a cobble lined channel rather than a concrete channel. The cobbles act as a filter for sediment. The side slopes of a bio-swale are made up of natural grasses that do not require regular watering.

Schizachyrium scoparium, Little bluestem, has been considered for this planting area because it is tolerant of drought and poor soils. Tolerance to poor soils is imperative because of the substances that will flow into the bio-swale during a storm event. These substances can include salt, sand, oil, and fertilizer, to name a few. Little bluestem is also tolerant of short-duration flooding that will occur during a large storm event as storm water is retained in the bio-swale until the storm sewer trunk line has the capacity to accept the water in the swale.

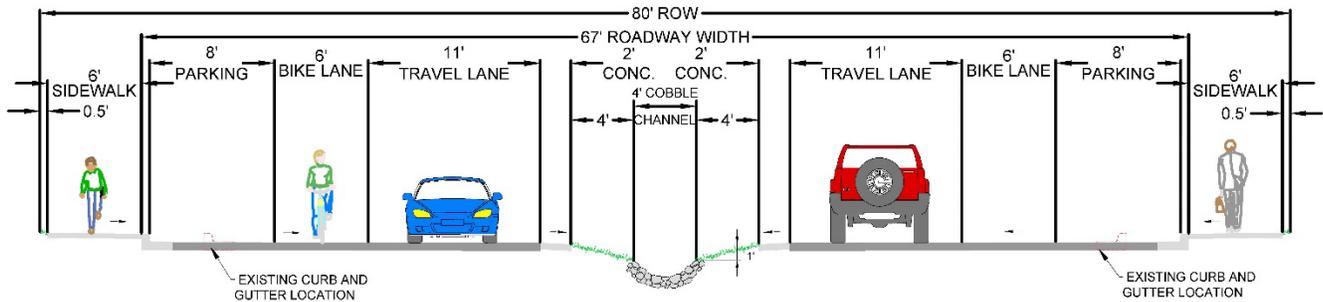


Figure 9 – Proposed Street Section with Bio-Swale

Maintenance and construction of the bio-swale should be considered during final design. The bio-swale will not function properly as part of the storm sewer system if snow is plowed into the bio-swale. Snow plowing is to be done such that the snow is directed toward the curb, as is typical within the City of Cheyenne. When snow melts from these piles it will be directed across the roadway and into the bio-swale. The bio-swale is to be designed such that infiltration of storm water into the surrounding ground does not adversely affect the adjacent roadway pavement. Maintenance will be required for the plant material in the bio-swale. A plant material such as Little bluestem needs to be trimmed once a year and may require occasional weeding depending on the density it is planted at. Storm sewer inlets will be located at the bottom of the bio-swale. Periodic maintenance of the inlets will be required, as with any



Figure 10 - Bio-Swale Locations

storm sewer inlet, to ensure that the inlet is not blocked with trash and debris such that its capacity is diminished during a storm event. Inlets at the bottom of the swale are to be a riser type or similar that will continue to accept storm water when debris, snow, or ice is present in the bio-swale.

Consideration should be given in the final design of the bio-swale to alert drivers of its presence. A curb head cannot surround the bio-swale because it will only function as a swale if runoff is allowed to freely flow into it. The cross section of Evers Boulevard at the bio-swale contains a ribbon curb, a 2-foot-wide strip of concrete paving between the travel lane and the edge of the bio-swale. This concrete strip adjacent to black asphalt paving acts as a visual indicator to drivers to define the limits of the travel way.

During adverse weather conditions drivers may not be able to see the roadway clearly. Other indicators or warning measures can be taken to alert drivers to the swale such as tubular markers and rumble strips ground into the concrete strip. The bio-swale will terminate at all intersection locations to allow for turning movements at the side streets. Concrete noses placed at the ends of the swale will provide a physical barrier as well as a visual indicator as to the limits of the bio-swale.

A bio-swale at the center of the roadway will prohibit left turning movements out of adjacent properties. There are two single-family residential properties adjacent to the proposed bio-swale between Creighton Street and Bishop Boulevard. With the proposed storm sewer improvement these two single-family residential properties will receive the benefit of being removed from the 100-year floodplain. Additionally there are two alley accesses, and one access to a condominium complex adjacent to the proposed bio-swale.

Intersection Improvement Alternatives

Two existing intersections meet Evers Boulevard at undesirable angles. These intersections are Ranger Drive and Deer Avenue, both on the west side of Evers Boulevard. Ideally intersections intersect at or close to ninety degrees, which allows for a better view of oncoming traffic and reduces the crossing distance for pedestrians.

Ranger Drive

Ranger Drive intersects Evers Boulevard at a 48-degree angle.

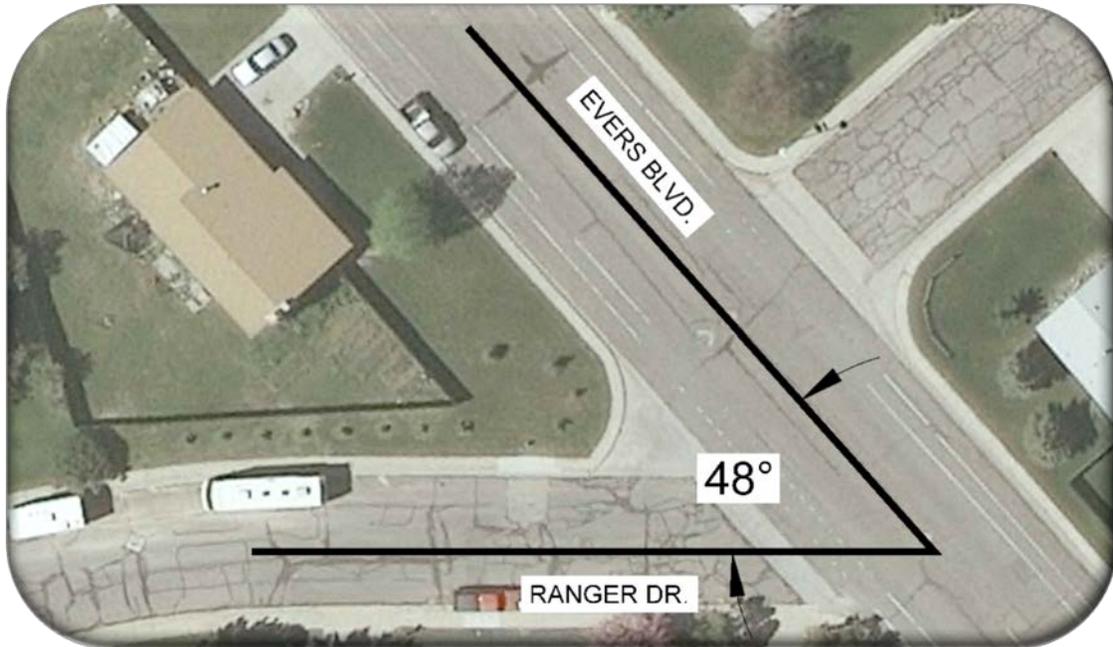


Figure 11 - Ranger Drive Existing Alignment

Ranger Drive has a 60 foot right-of-way. Given the right-of-way constraints, reconfiguring the intersection to 90 degrees within the existing right-of-way will not result in an improvement to the configuration.

Deer Avenue

Deer Avenue intersects Evers Boulevard at a 32-degree angle.

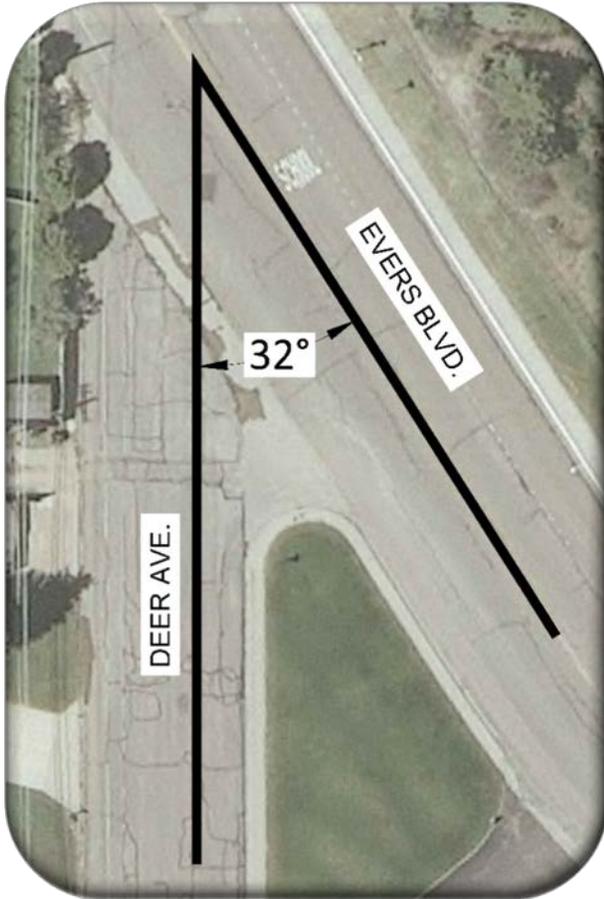


Figure 12 - Existing Deer Avenue Alignment



Figure 13 - Deer Avenue Realignment

Deer Avenue has an 80 foot right-of-way, which allows room to reconfigure the intersection within the existing right-of-way. Reconfiguring the intersection to the design shown in Figure 12 reduces the pedestrian crossing distance from 112 feet to 45 feet. The proposed centerline radius is only 42.6 feet as Deer Avenue approaches Evers Boulevard. This is a less than desirable centerline radius. However, this is a low volume, low speed urban roadway approaching a stop controlled tee intersection.

Safety Improvements Near Jessup Elementary School

Current conditions have a single crosswalk at the north corner of Creighton Street to Jessup Elementary School on the east side of Evers Boulevard. The school zone has speed reduction flashers including back flashers. During drop-off and pick-up times there are many vehicles parked on both sides of Evers Boulevard. Frequently students cross Evers Boulevard at the south corner of Creighton Street rather than crossing Creighton Street and then using the crosswalk to cross Evers Boulevard. The only on-street parking restrictions are a yellow painted curb approaching the crosswalk and a single “No Parking” sign. Vehicles often crowd this no parking area during peak times.



Figure 14 - Jessup Elementary School at Morning Drop-off

The Wyoming Department of Transportation's *Pedestrian and School Traffic Control Manual*, January 2014, recommends that roads with on-street parallel parking restrict parking 50 feet in advance of the crosswalk and 20 feet beyond the crosswalk (section 2.14, p.21). Parking restrictions can be done with signage and curb markings or physical barriers. Installing curb extensions at the intersection corners will narrow the roadway and remove the on-street parking lane. Likewise, a curb extension on the east side of Evers Boulevard, opposite of Creighton Street, will narrow the roadway and remove the on-street parking lane between the two crosswalks, 50 feet in advance of the crosswalk, and 20 feet beyond the crosswalk. Eliminating on-street parking in this manner will improve sight distance at the crossing locations for both the pedestrians and drivers.

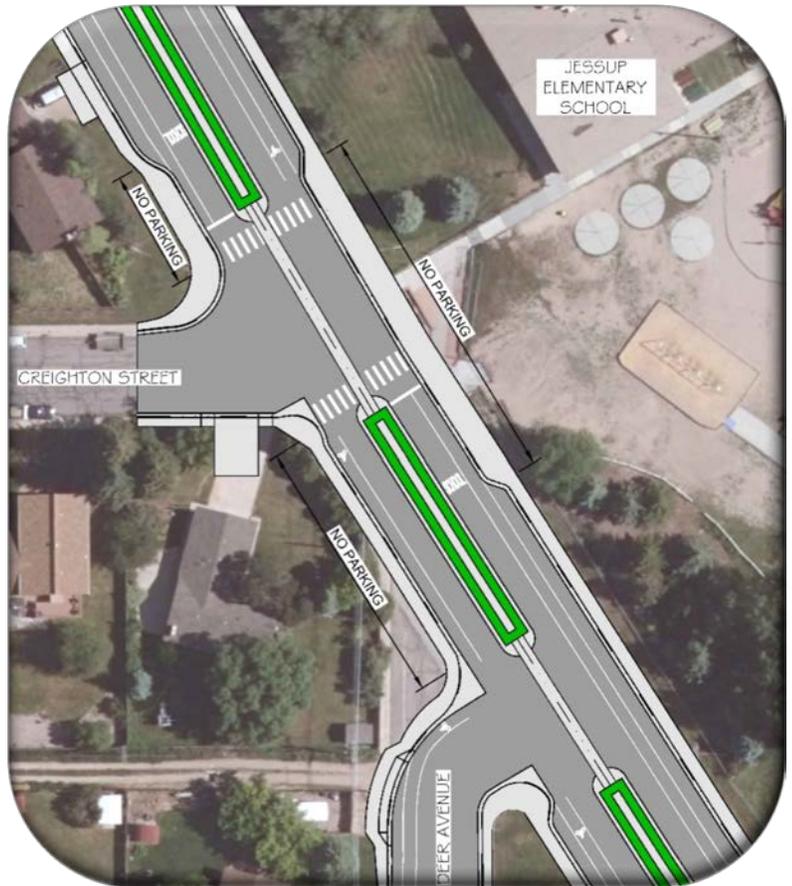


Figure 15 - Proposed Jessup Curb Extensions

Jessup Elementary School is one of several elementary schools in Laramie County School District Number One (LCSD#1) scheduled to be reconstructed. No time frame has been given for this work; funding and timing will be determined by the School Facilities Department and LCSD#1.

Observations of student pedestrian traffic show that many students are crossing Evers Boulevard at Bishop Boulevard. There is an existing pedestrian bridge over I-25 north of McCormick Junior High School and Central High School, and south of Jessup Elementary School. Many students were observed using this pedestrian bridge and walking north on Bishop Boulevard across Evers Boulevard. Bulbouts and a marked crosswalk at this location would make this a dedicated pedestrian crossing.

CONCLUSION

Goals of the Evers Boulevard Corridor included:

- Improving pedestrian safety
- Creating a street cross section that is appropriate and desirable for this gateway collector street into Western Hills
- Addressing storm water drainage by providing a system to convey storm water keeping it from ponding on the pavement for frequent storm events; and by narrowing the existing 100-year floodplain through the corridor where feasible given budget and hydraulic constraints

Recommended Street Cross-Sections

a. Brittany Drive to Creighton Street

Between Brittany Drive and Creighton Street it is recommended to construct Evers Boulevard with two 11-foot travel lanes, two 6-foot bike lanes, two 8-foot parking lanes, and attached 6-foot wide sidewalks; a 51-foot back of curb to back of curb roadway width. This improvement will more closely resemble the Collector roadway section in the City of Cheyenne *Unified Development Code* and is expected to enhance pedestrian safety, promote walkability, and reduce the average vehicle speeds by narrowing the available driving width from the current 16-foot wide travel lane. Dedicated bike lanes are recommended rather than a joint parking/bike lane for the entire corridor due to the existing dedicated bike lane. No additional right-of-way will be required for this street section.

Providing a buffer between pedestrians and traffic is desirable for a walkable corridor. The City of Cheyenne *Unified Development Code* recommends placing an 8-foot tree lawn/landscape buffer between the back of curb and the sidewalk. The recommended cross section provides 14 and a half feet between the edge of the sidewalk and the edge of the vehicle travel lane, in the form of a parking lane and a bicycle lane. Additionally, many of the homes in this corridor were constructed over 50 years ago and as such have established large trees and well maintained landscaping. For these reasons a tree lawn/landscape buffer is not recommended between the back of curb and the sidewalk. A 6-foot wide sidewalk is recommended where no tree lawn/landscape buffer is provided, as in this case.

Between Brittany Drive and Creighton Street the proposed roadway would have a normal crown section with surface water draining away from the center of the roadway and towards the gutter section. Curb inlets would be located in the gutter.

b. Creighton Street to Bishop Boulevard

Between Creighton Street and Bishop Boulevard it is recommended to construct a bio-swale centered within the roadway section. The proposed bio-swale would be 12-feet-wide with a 2-foot ribbon curb on either side to create distance between the travel lane and the swale. All other aspects of the roadway cross section, including lane widths and configuration, would match the Brittany Drive to Creighton Street recommendations. The Creighton Street to Bishop Boulevard section will have a 67-foot back of curb to back of curb width. No additional right-of-way will be required for this street section.

Drainage

A pavement drainage analysis was completed from just north of Vandehei Avenue to the existing inlet vault south of Western Hills Boulevard at Bishop Boulevard. The drainage report is located in Appendix C. It is recommended that a traditional roadway, with a normal crown section draining toward the gutter, be constructed from Vandehei Avenue to Creighton Street. Inlet configuration and spacing shall be as recommended in the Drainage Design Report. Storm water collected in the inlets will be directed to a large diameter storm sewer and ultimately directed to multiple existing large diameter culverts crossing beneath I-25.

Beginning just south of Creighton Street it is recommended that the crown of the roadway be inverted such that storm water drains to the center of the roadway. Between Creighton Street and Bishop Boulevard a bio-swale with inlets at the low points is recommended which would provide a location to capture storm water and store it until the storm sewer trunk line has the capacity to discharge the storm water into Dry Creek. The bio-swale at the center of the right-of-way would become the point of lowest elevation along the roadway such that floodwater would be further away from the structures than with a normal crown roadway section.

Traffic & Safety

To increase pedestrian visibility and provide a safer crossing of Evers Boulevard at Jessup Elementary School, it is recommended that bulbouts be installed on both the east and west sides of Evers Boulevard to shorten the crossing distance. A painted crosswalk is recommended on both corners of Creighton Street. On the Jessup Elementary School side of Evers Boulevard a curb extension is recommended beginning 50 feet before the crosswalk and extending to 20 feet after the crosswalk. The curb extension provides an area where parking is not allowed creating more visibility for pedestrians using the crosswalk.

It is recommended that the intersection of Deer Avenue and Evers Boulevard be reconfigured to a 90-degree intersection. This would allow for a better view of oncoming traffic and reduce the crossing distance for pedestrians.

It is recommended that turn warning signs and advisory speed plaques be placed at two horizontal curves within the corridor, between Silver Sage Avenue and Ranger Drive.

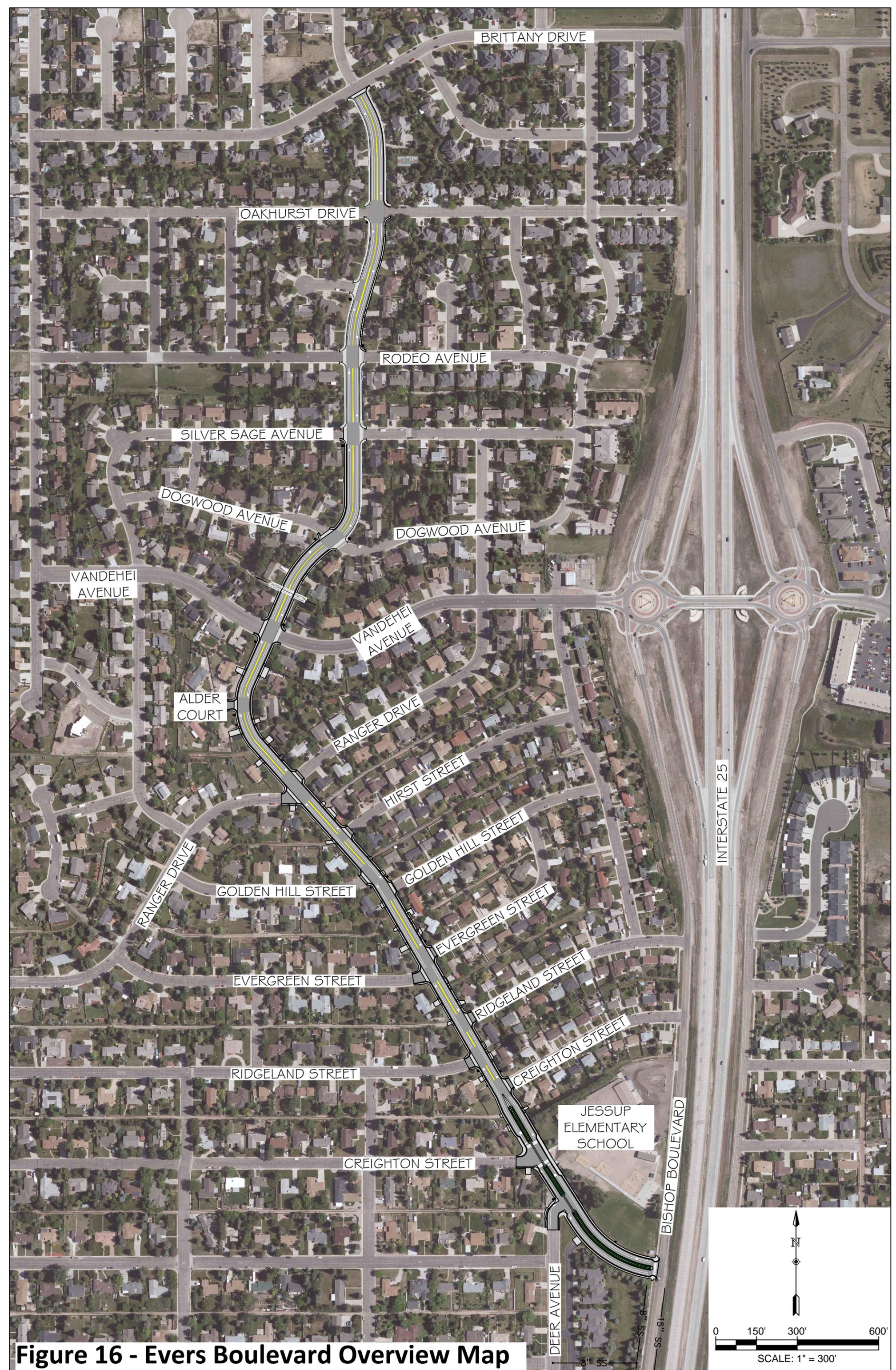


Figure 16 - Evers Boulevard Overview Map