Final Adopted Plan

AYRES ASSOCIATES

EVERS BOULEVARD ROAD REHABILITATION 35% DESIGN PLAN

Prepared for: Cheyenne Metropolitan Planning Organization

CHEYENNE MPO

January 2016

Evers Boulevard Road Rehabilitation 35% Design

Final Report

Prepared for:
Cheyenne Metropolitan Planning Organization

Adopted January 11, 2016

"The preparation of this report has been financed in part through grant[s] from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 [or Metropolitan Planning Program, Section 104(f)] of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation."

Approved as to form only:
Akh
Date: 10/21/15

RESOLUTION NO. 5741

ENTITLED: "A RESOLUTION ADOPTING THE EVERS BOULEVARD ROAD REHABILITATION 35% DESIGN PLAN."

WHEREAS, Evers Boulevard is a collector roadway in the Western Hills neighborhood of northwest Cheyenne, Wyoming; and

WHEREAS, Evers Boulevard needs a design plan to address the concerns of the surrounding property owners, improve drainage and promote safety for all transportation users; and

WHEREAS, the Cheyenne Metropolitan Planning Organization (MPO) retained Ayres Associates on July 29, 2014 to develop the *Evers Boulevard Road Rehabilitation 35% Design Plan;* and

WHEREAS, the project was reviewed by the following agencies and organizations: the Cheyenne MPO, the City of Cheyenne Planning and Engineering Departments, Laramie County School District No. 1, the City of Cheyenne Board of Public Utilities, WYDOT, a resident of the corridor and other public input; and

WHEREAS, the *Evers Boulevard Road Rehabilitation 35% Design Plan* provides design criteria and recommendations for vehicular travel lanes, bicycle and pedestrian facility improvements, intersection realignment at Deer Avenue, roadway reconstruction, drainage infrastructure and safer crosswalks at Jessup Elementary; and

WHEREAS, funding for the final engineering design and the reconstruction of Evers Boulevard will come from the 1% sales tax funds renewed by Laramie County voters on November 4, 2014; and

WHEREAS, the Cheyenne MPO Technical and Citizens' Advisory Committees reviewed the *Evers Boulevard Road Rehabilitation 35% Design Plan* and recommended adoption by the MPO Policy Committee; and

WHEREAS, the City of Cheyenne Planning Commission held a public meeting on December 7, 2015, accepted public comments, and recommended that the City of Cheyenne Governing Body approve the *Evers Boulevard Road Rehabilitation 35% Design Plan.*

NOW, THEREFORE, BE IT RESOLVED BY THE GOVERNING BODY OF THE CITY OF CHEYENNE, WYOMING:

THAT, the City of Cheyenne Governing Body hereby acknowledges receipt of and approves the "*Evers Boulevard Road Rehabilitation 35% Design Plan*" dated October, 2015 and recommends that it be used as the guideline for the design and reconstruction of Evers Boulevard.

PRESENTED, READ AND ADOPTED THIS 11th **DAY OF** January **, 2016.**

Richard L. Kaysen, Mayor

(Seal)

ATTEST:

Carol Intlekofer
Carol Intlekofer, City Clerk

Table of Contents

Table of Figures

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: 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

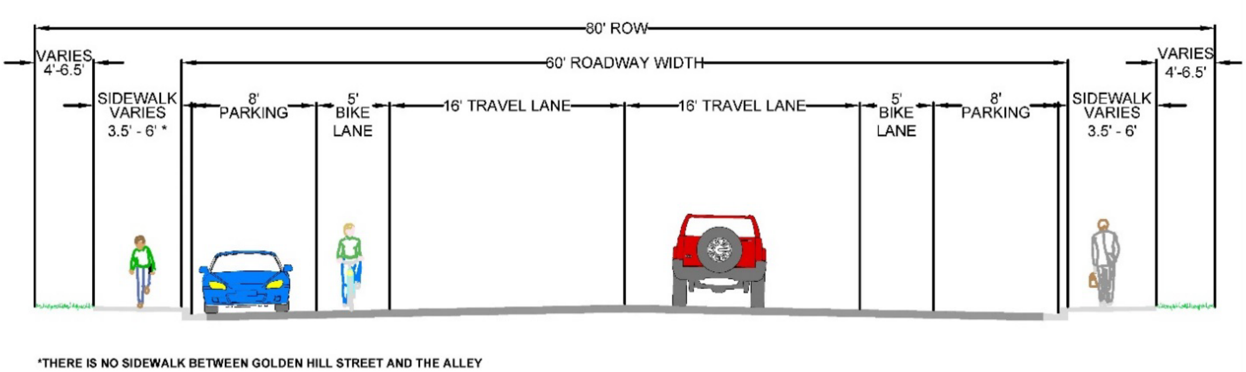


Figure 2 - Existing Facilities

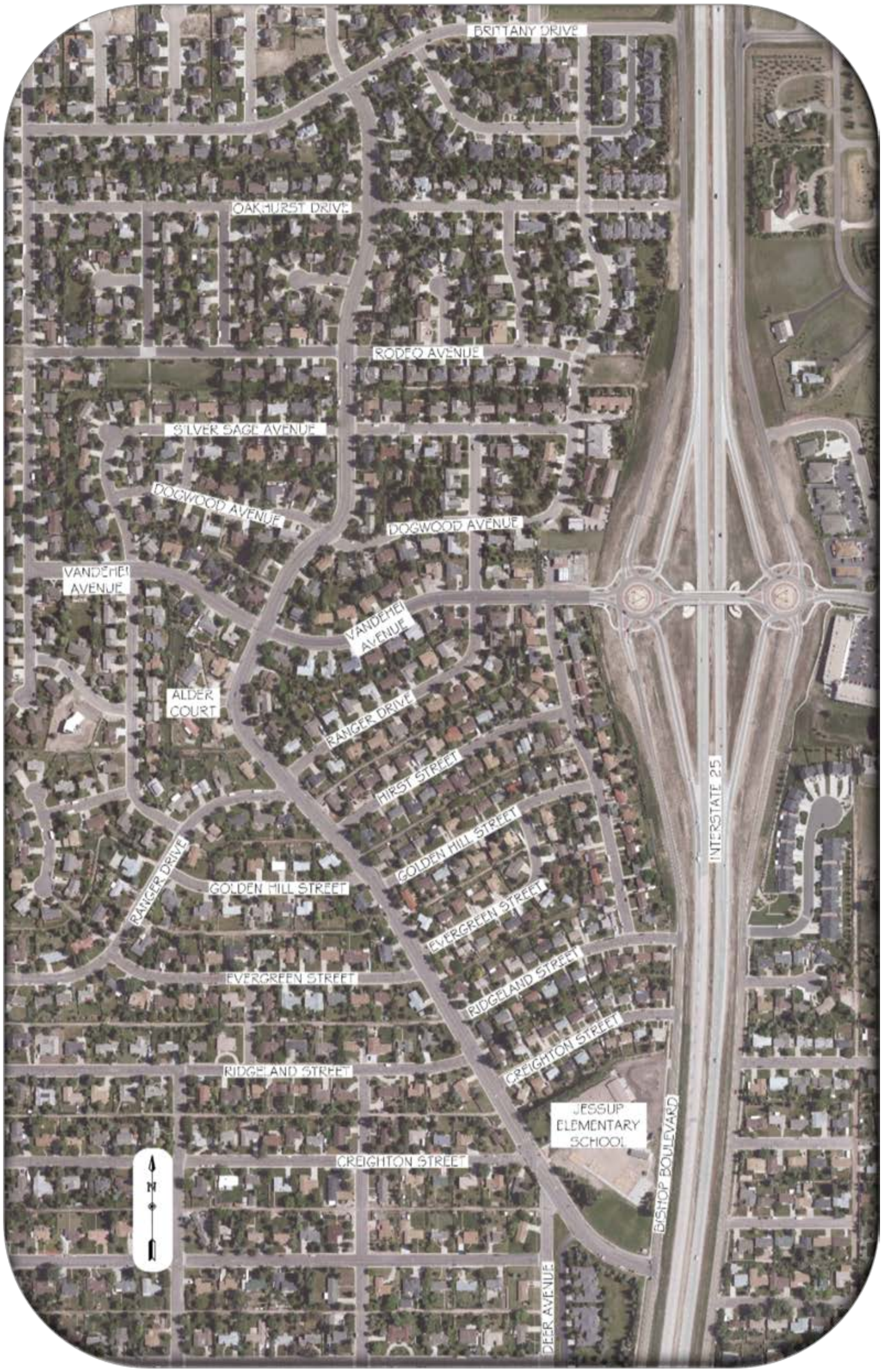


Figure 3 - Evers Boulevard Corridor (not to scale)

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 & CONTEXT SENSITIVE DESIGN

This project was undertaken with a Context Sensitive Design approach. This means that the design team involves the users of the corridor in the design process. The users are asked by the design team what they like about the corridor and what improvements they would like to see. This information is then evaluated for incorporation into the development of the design. Engineering judgement and adherence to City code are guidelines for how and if the comments are incorporated.

Ayres Associates worked with the Cheyenne MPO staff to conduct a comprehensive public outreach program for this project beginning in September 2014. The first step in a context sensitive design is to let the users know about the plan and to ask for their thoughts about the corridor. This was done by conducting a corridor walk, distributing informational flyers and questionnaires at Jessup Elementary during morning drop-off, and conducting a meeting with the Jessup Elementary PTO.

The design team evaluated the comments and concerns of the corridor users and developed a collection of ideas for the conceptual plan. As the second step in a context sensitive design, these ideas were formulated into questions and placed on the City of Cheyenne’s MindMixer website. The purpose of this step is to let the corridor users know what the design team has heard and how those comments are developing into a plan for the corridor. The MindMixer website also allows users to comment on the ideas. Again those comments are evaluated by the design team and used to shape the design. The design concept was then presented at a public open house. Comments received at the open house were again incorporated into the final conceptual plan.

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.*
7. *A landscaped median or gateway entry is not desired for aesthetic purposes, the money could be better used to address drainage concerns.*

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

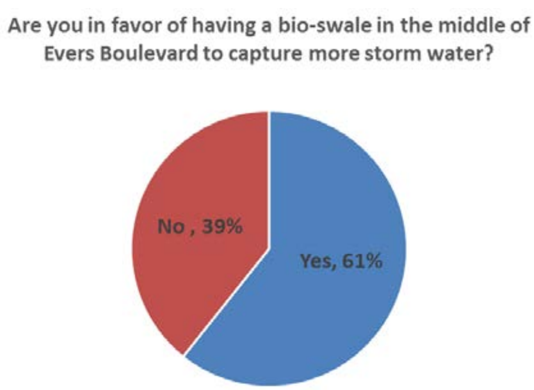
On April 28, 2015, an open house was held in the Jessup Elementary School cafeteria to present and review the Evers Boulevard project progress. A series of exhibits was displayed throughout the space, including the following:

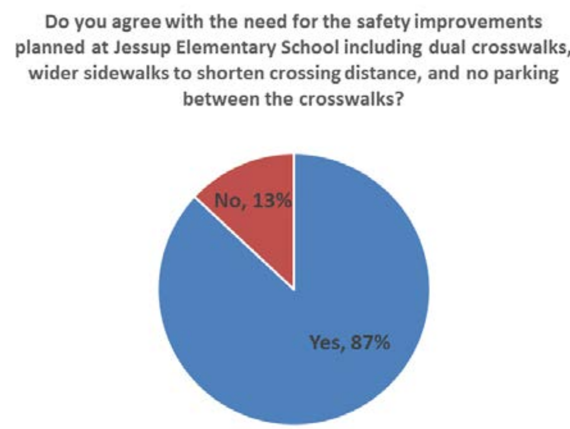
- Tabulated results from questions asked via MindMixer as well as from the Corridor Walk.

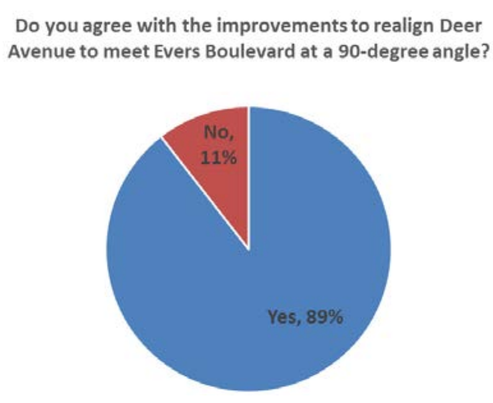
Figure 4 - Public Open House April 28, 2015

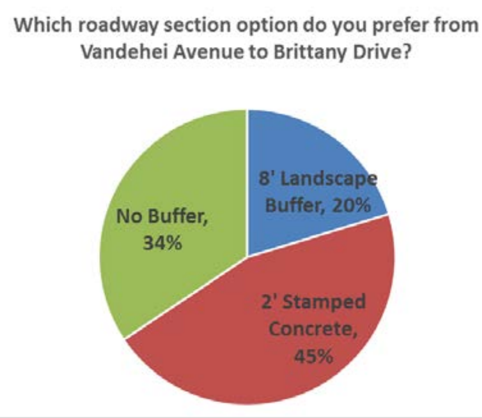
- Aerial display of the FEMA effective 100-year floodplain to reference which homes are currently in the regulatory floodplain
- Cross sections for Evers Boulevard from Bishop Boulevard to Vandehei Avenue
    - Existing Cross Section
    - Cross Section with Proposed Bio-Swale
- Cross sections for Evers 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

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:









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

Concerns of residents included: loss of landscaping, maintaining additional sidewalk width, adequately addressing storm water concerns, the swale prohibiting left turns out of driveways, and the swale making it difficult to back campers and trailers into driveways.

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.

Figure 5 - Existing Narrow Sidewalks Along the Corridor

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.

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

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 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.

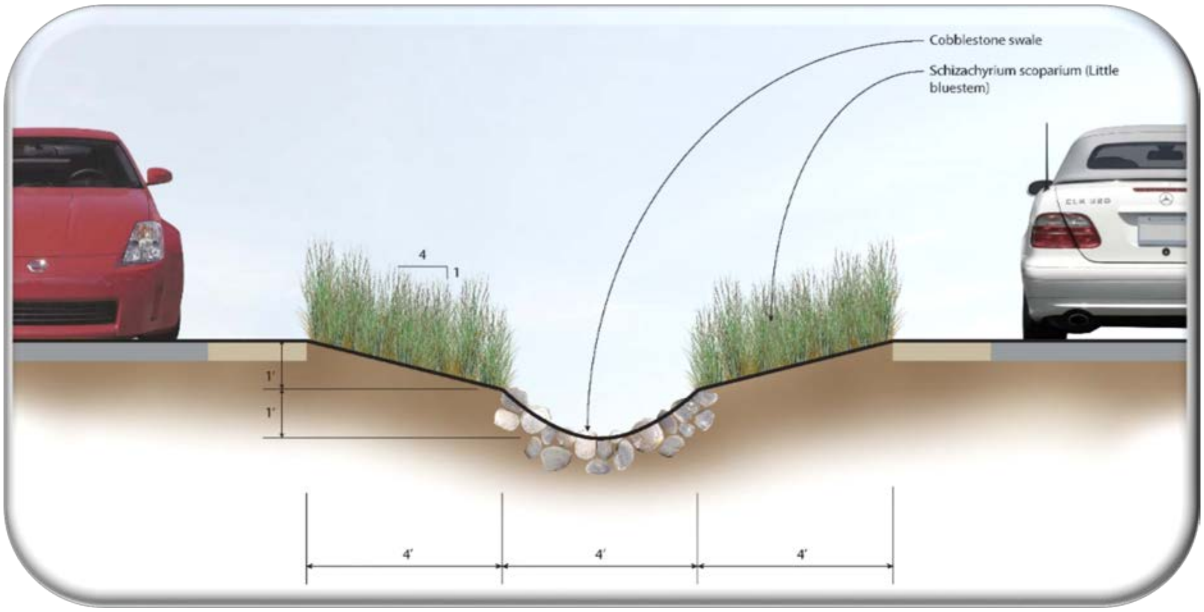


Figure 7 - Evers Boulevard Bio-Swale

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.

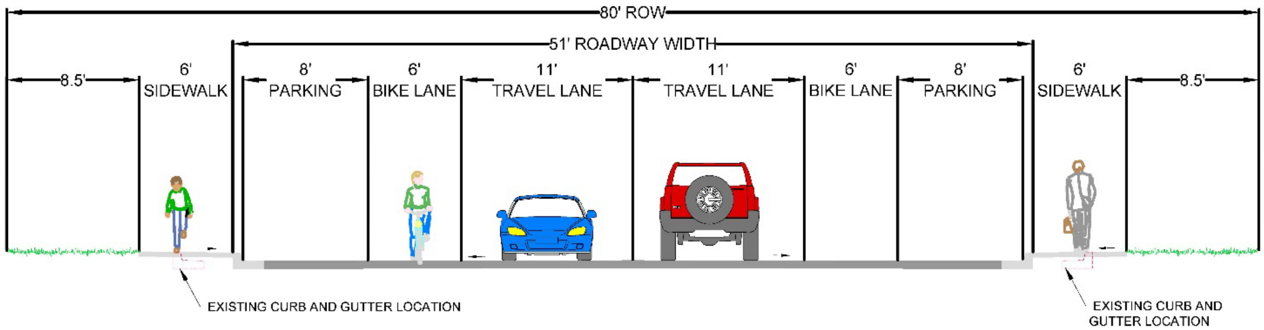


Figure 8 - Proposed Normal Crown Street Section

Sidewalks

Sidewalk width varies along Evers Boulevard from 3.5-feet-wide to 6-feet-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.

Schizachryium 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.

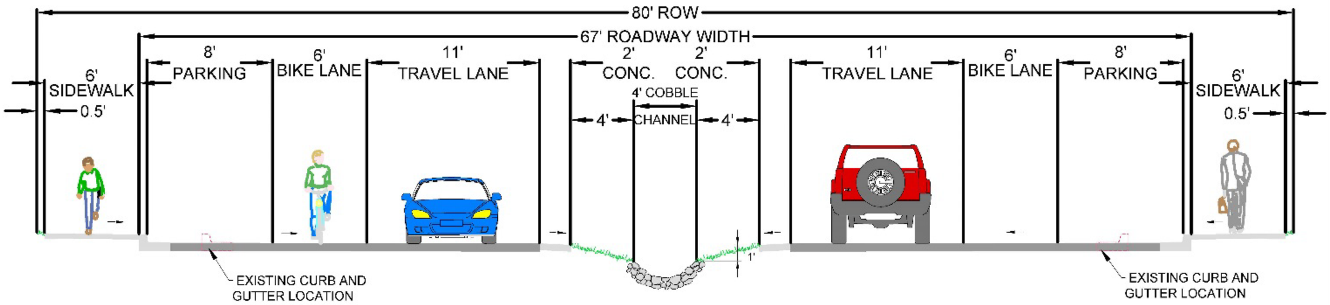


Figure 9 – Proposed Street Section with Bio-Swale

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.

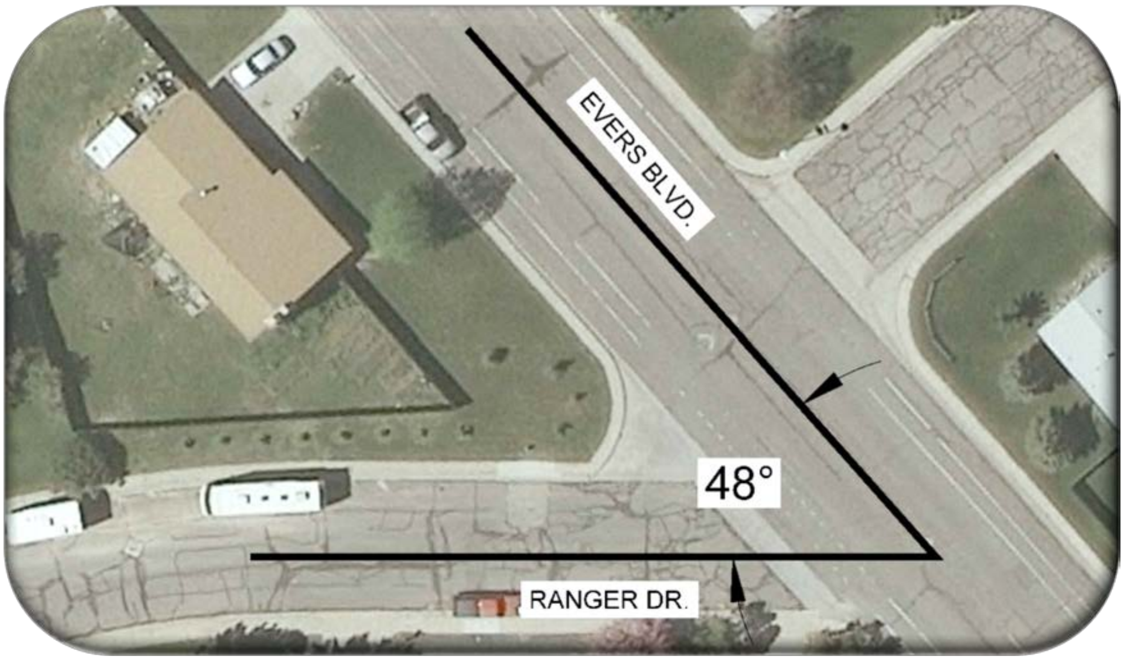


Figure 11 - Ranger Drive Existing Alignment

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.

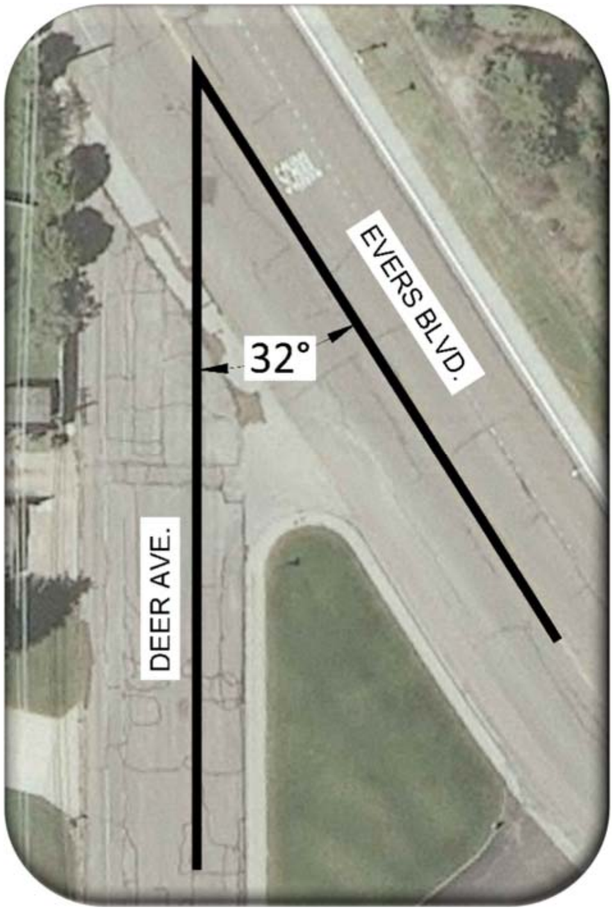


Figure 12 - Existing Deer Avenue Alignment

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 13 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.

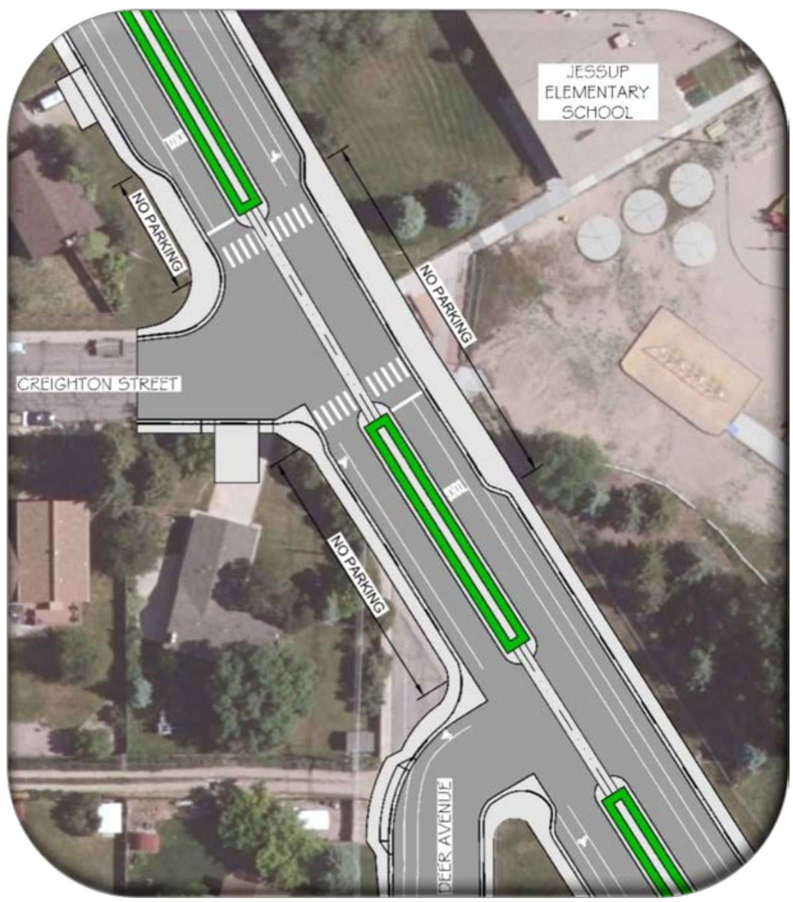


Figure 15 - Proposed Jessup Curb Extensions

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.

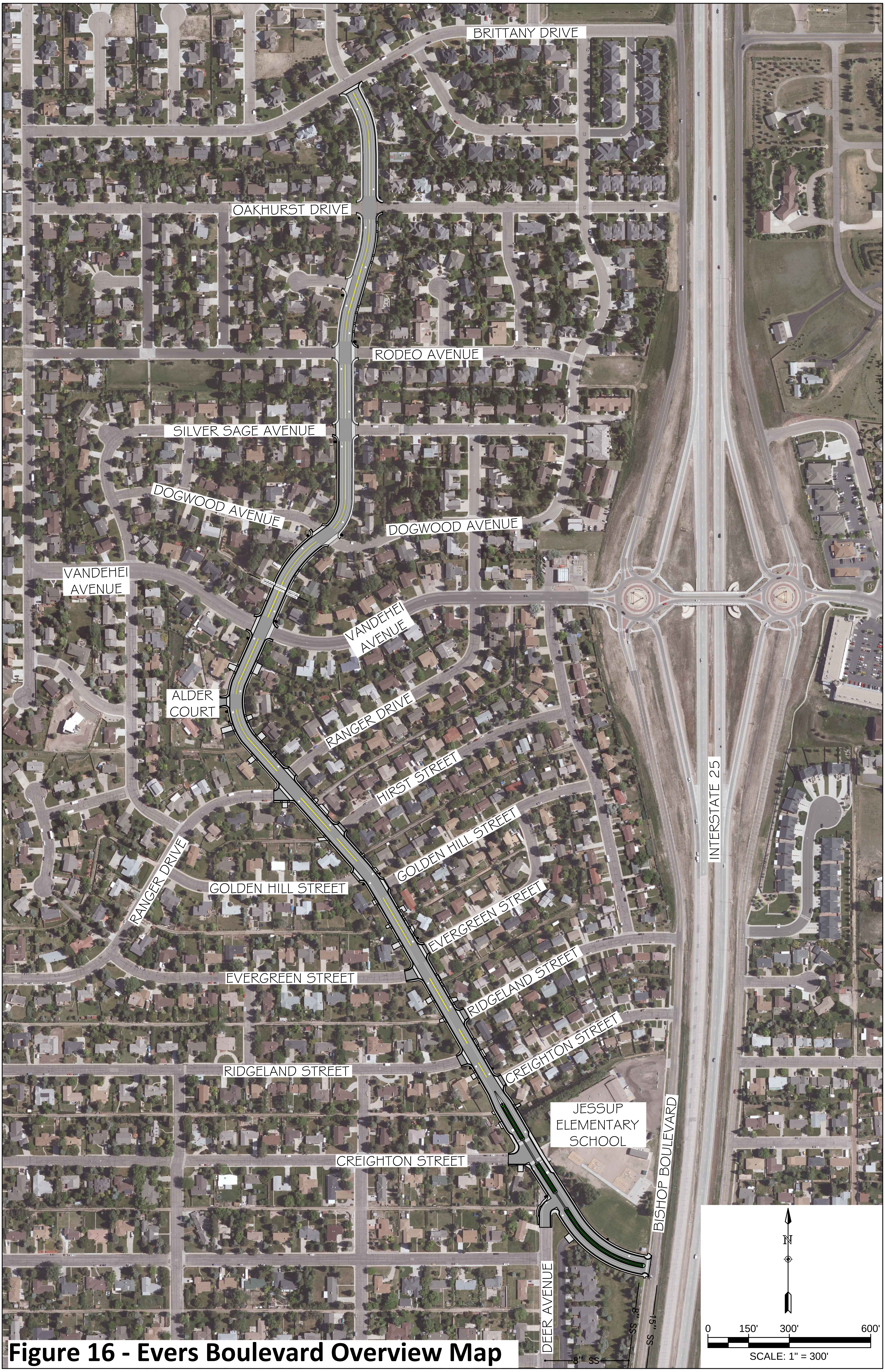
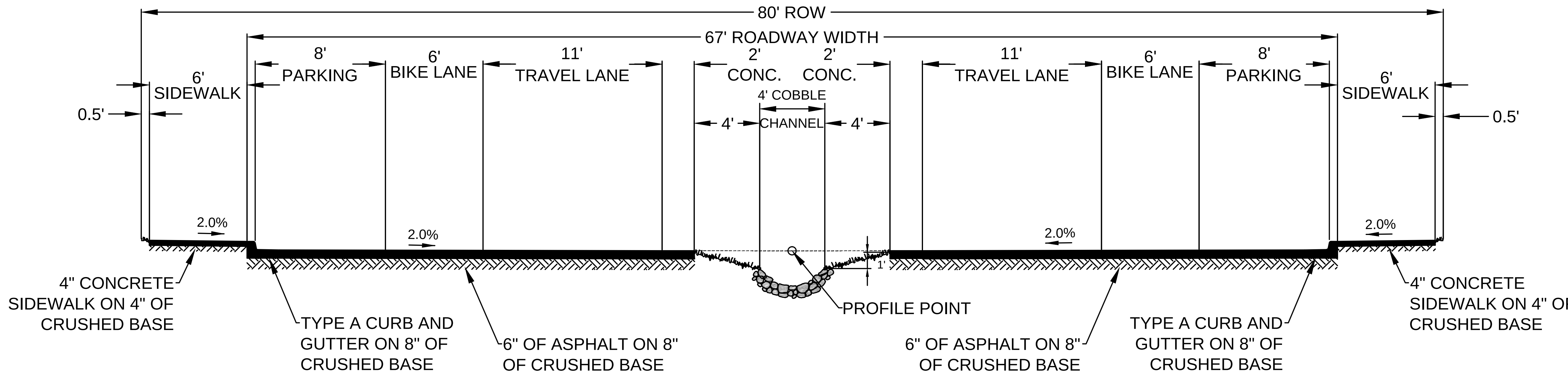
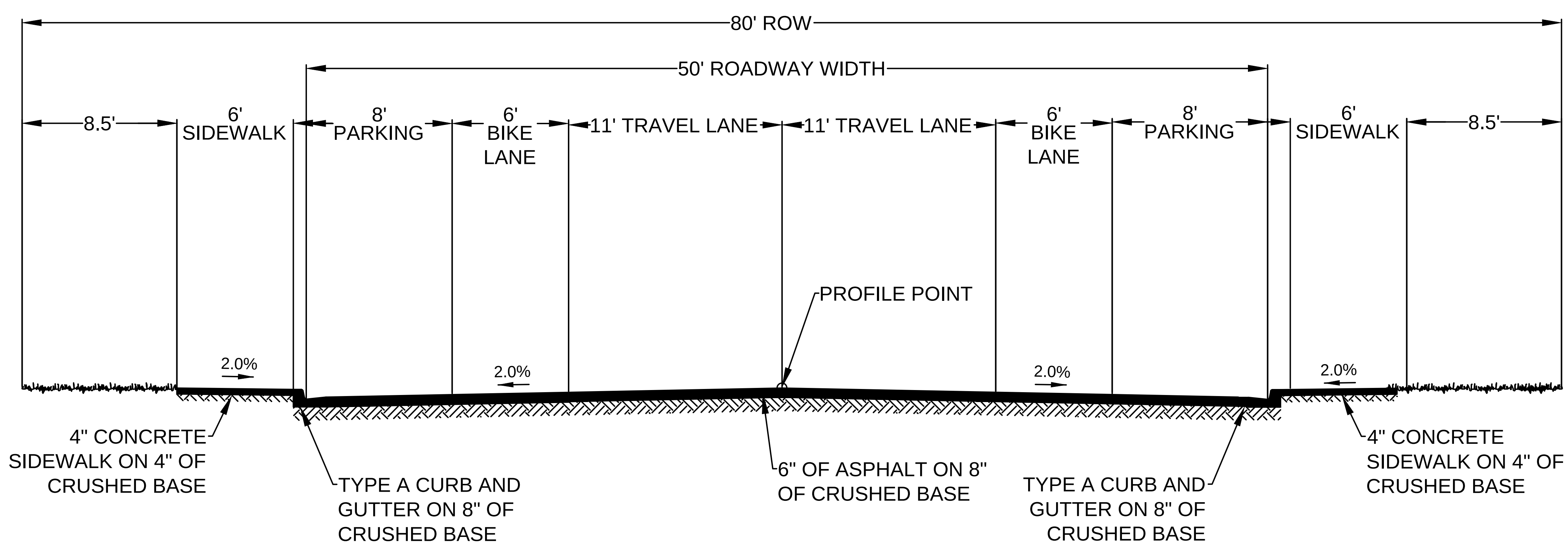


Figure 16 - Evers Boulevard Overview Map



TYPICAL SECTION - EVERS BOULEVARD
FROM BISHOP BOULEVARD TO CREIGHTON STREET



TYPICAL SECTION - EVERS BOULEVARD
FROM CREIGHTON STREET TO VANDEHEI AVENUE

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EVERS BOULEVARD
TYPICAL SECTIONS

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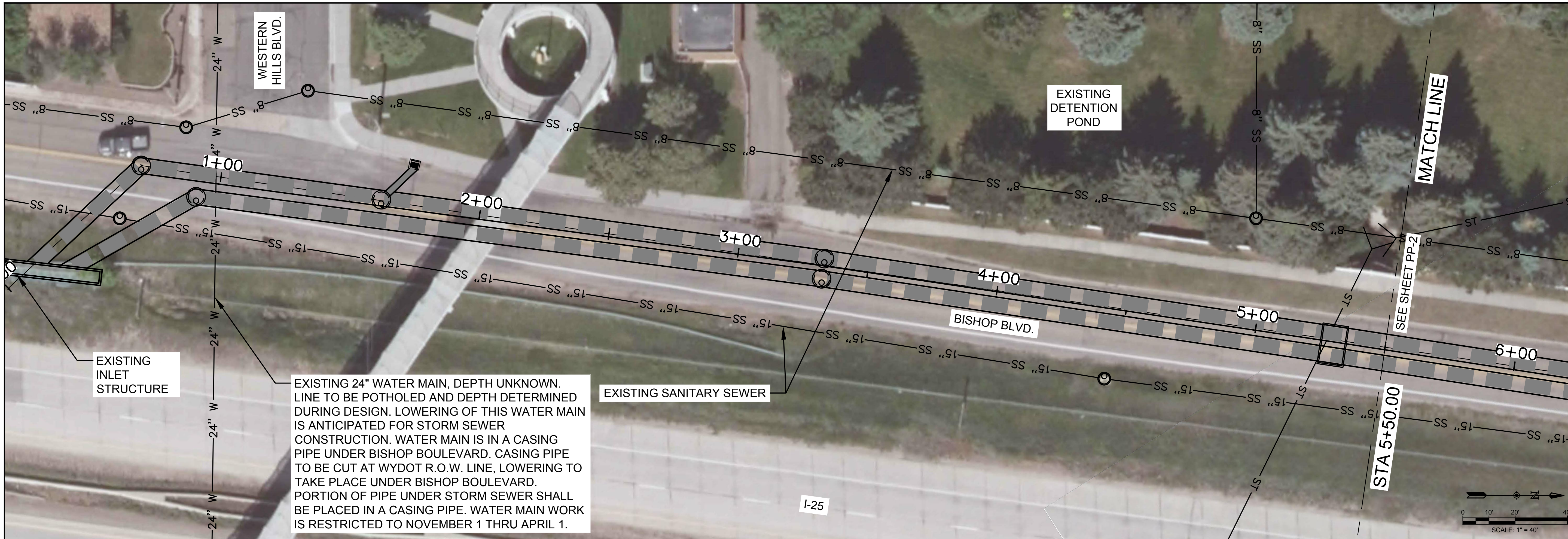

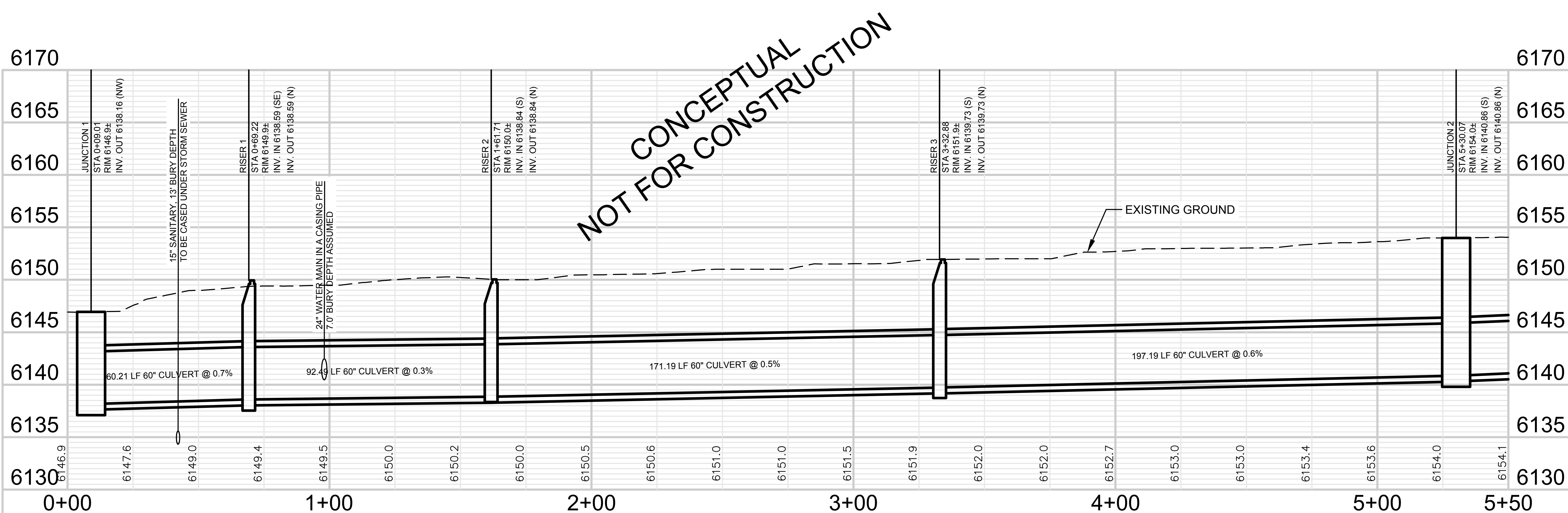

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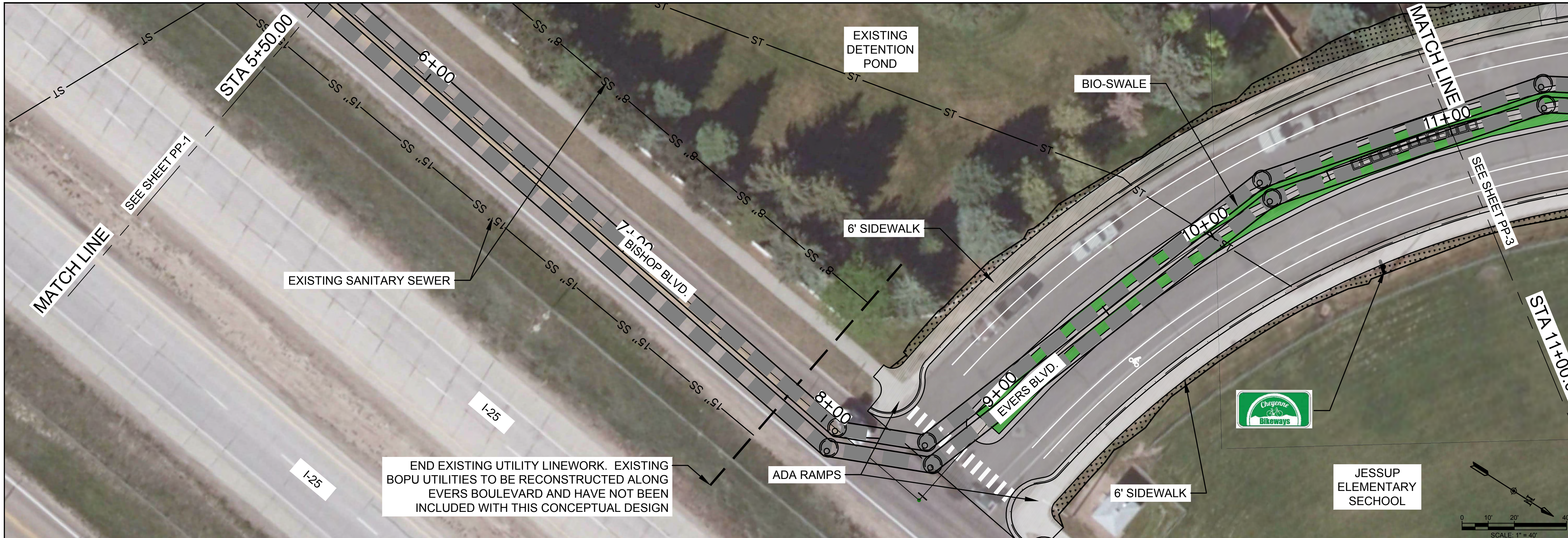

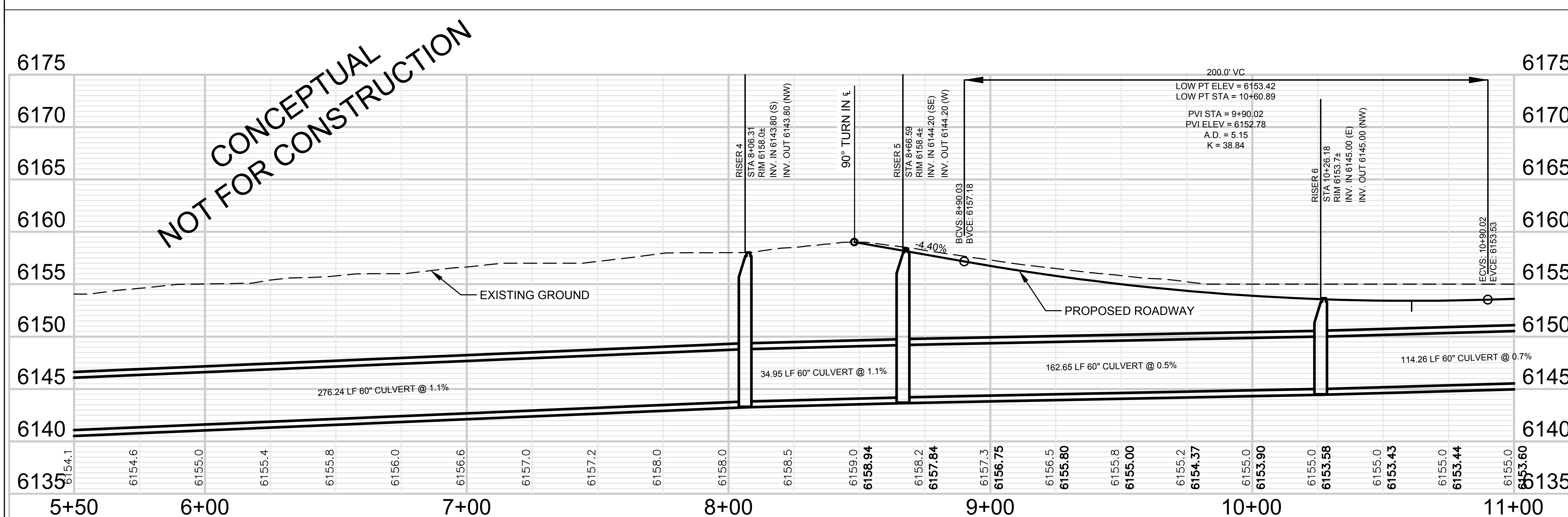

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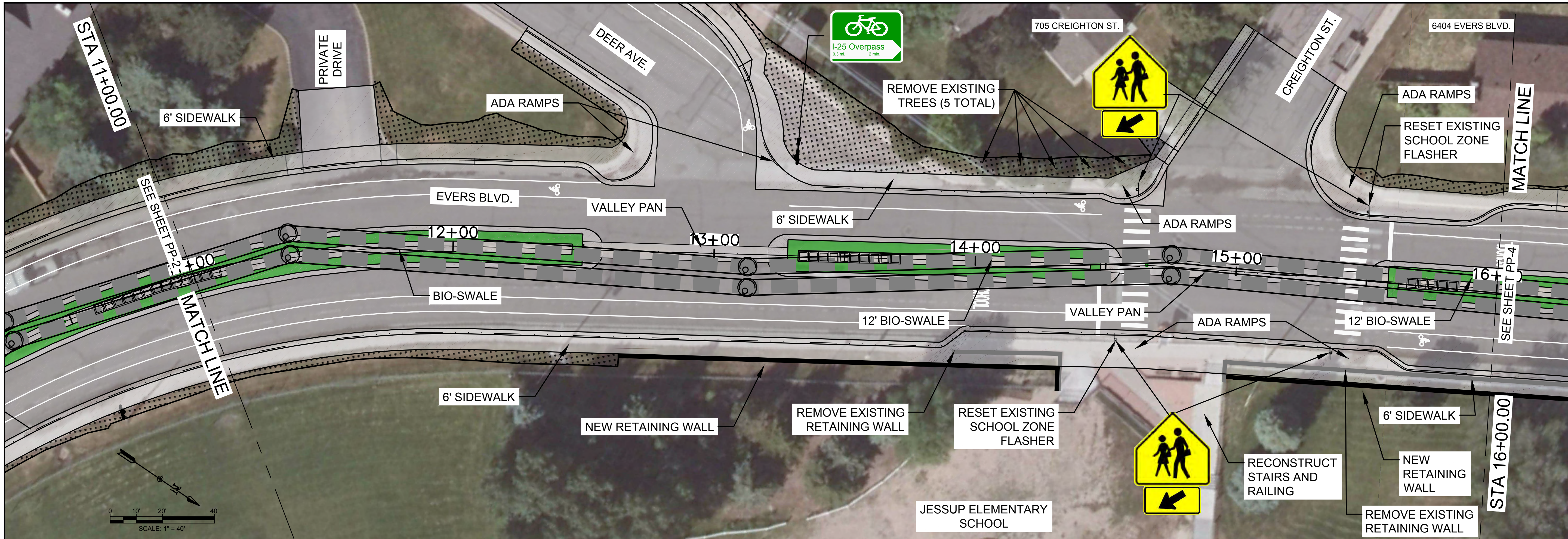

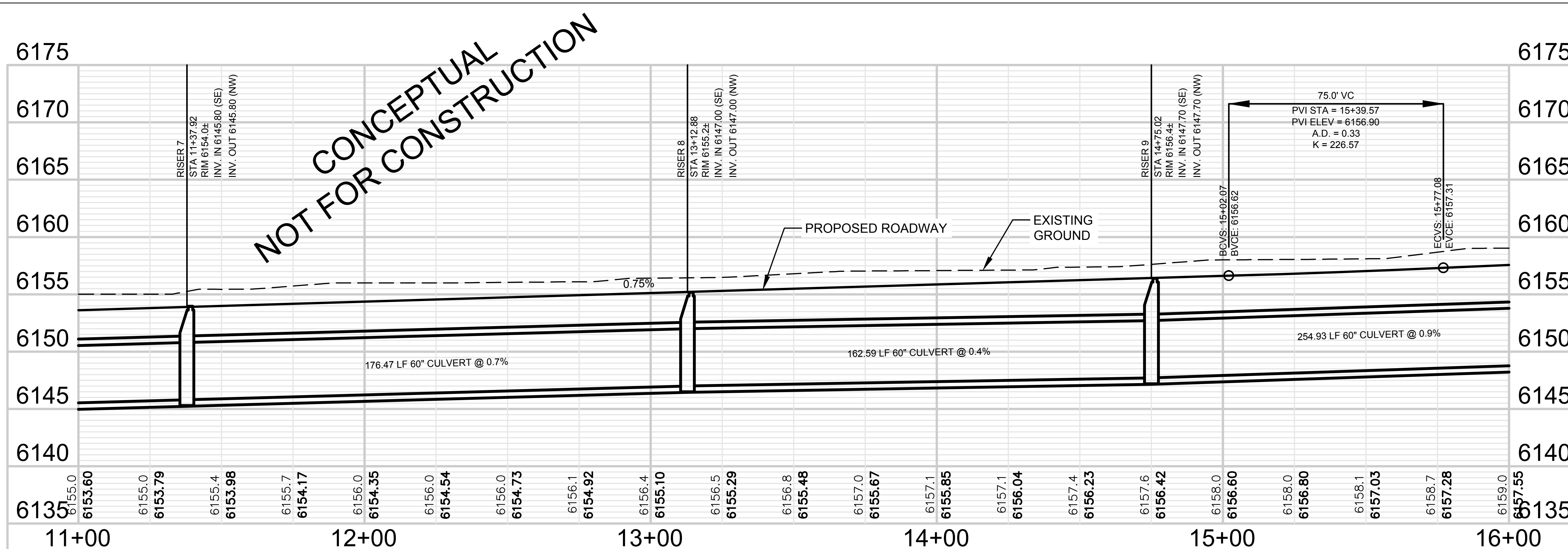

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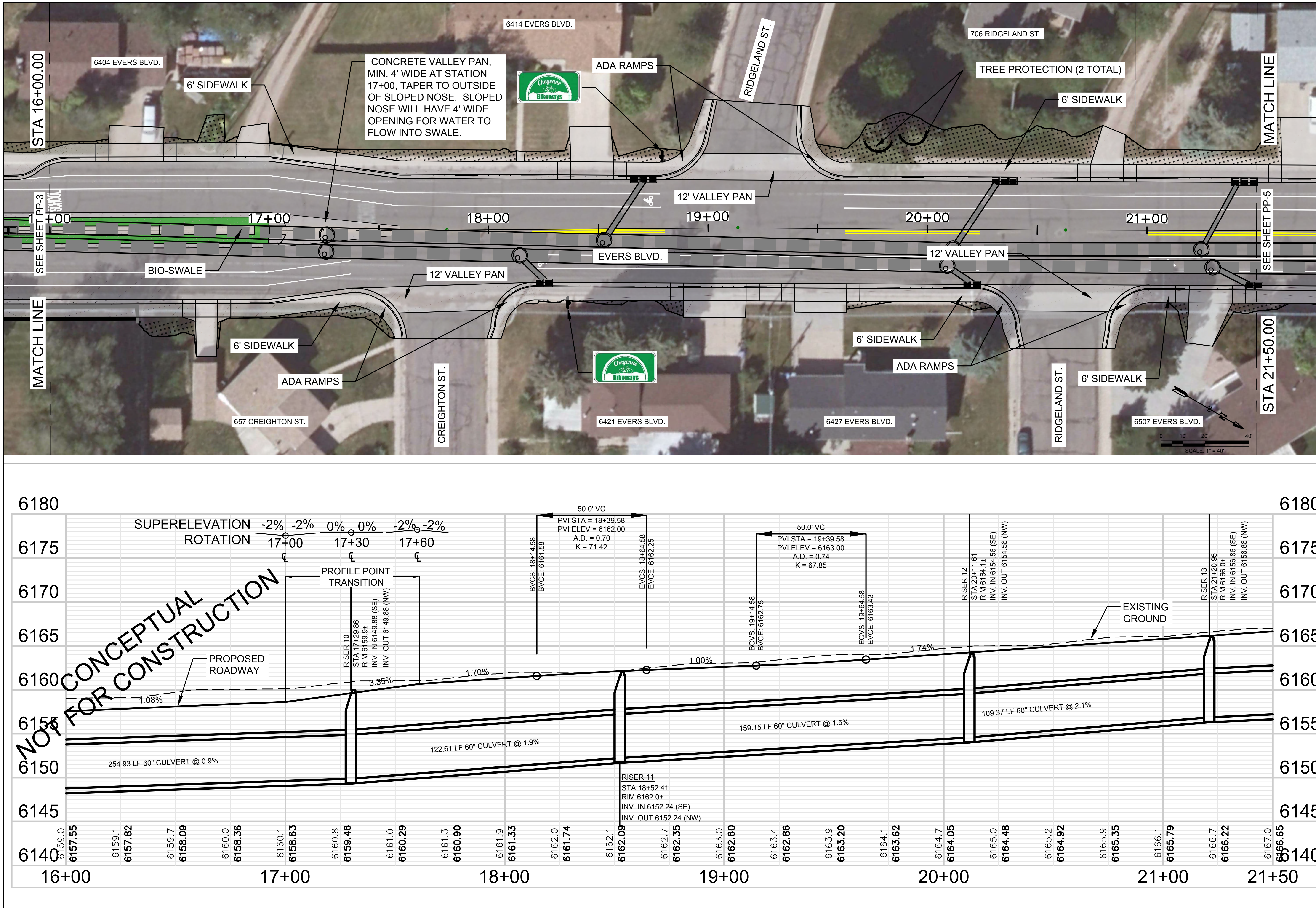

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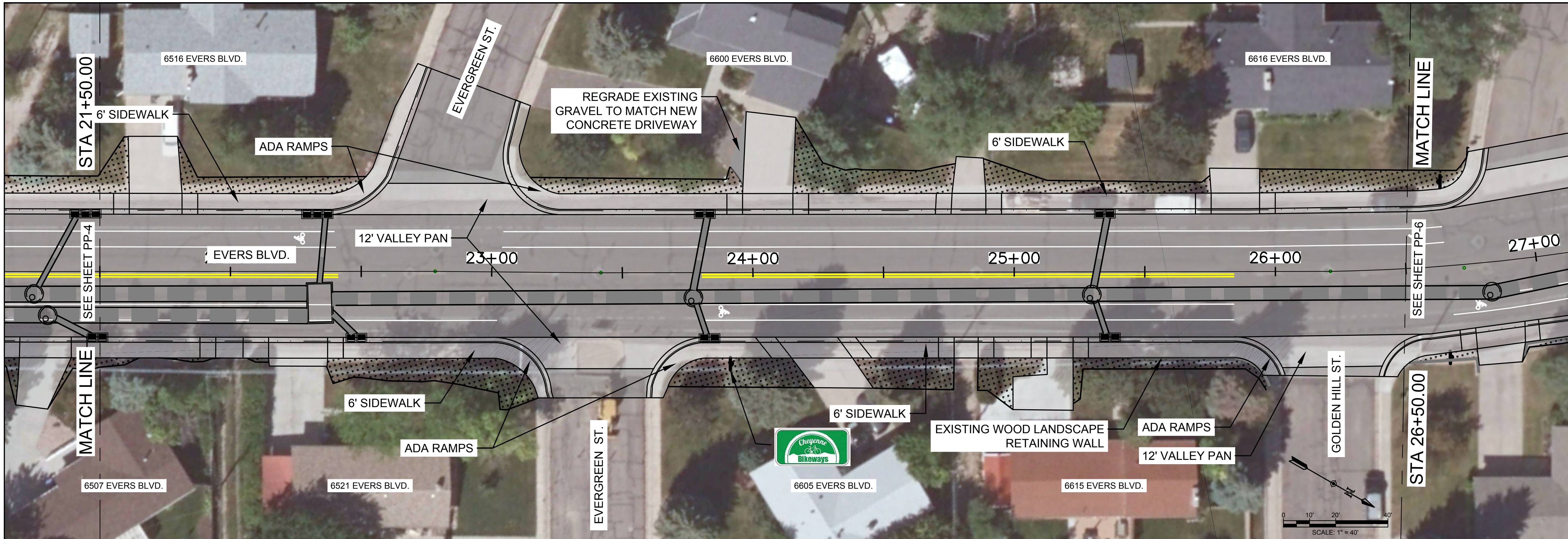

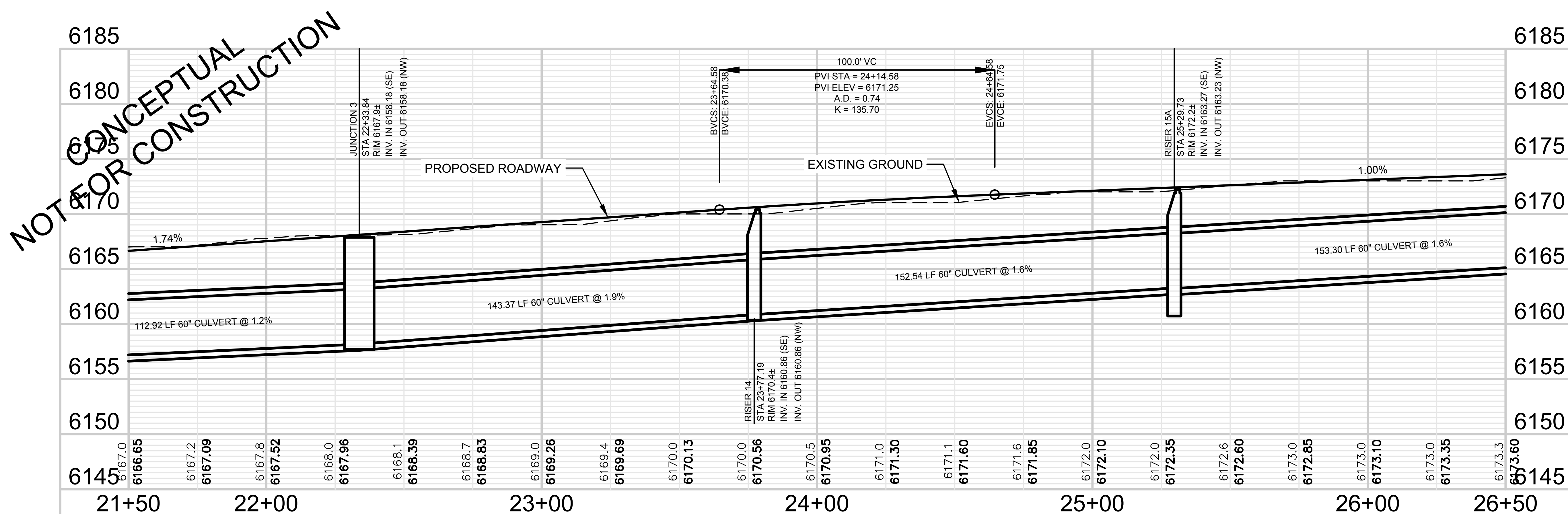

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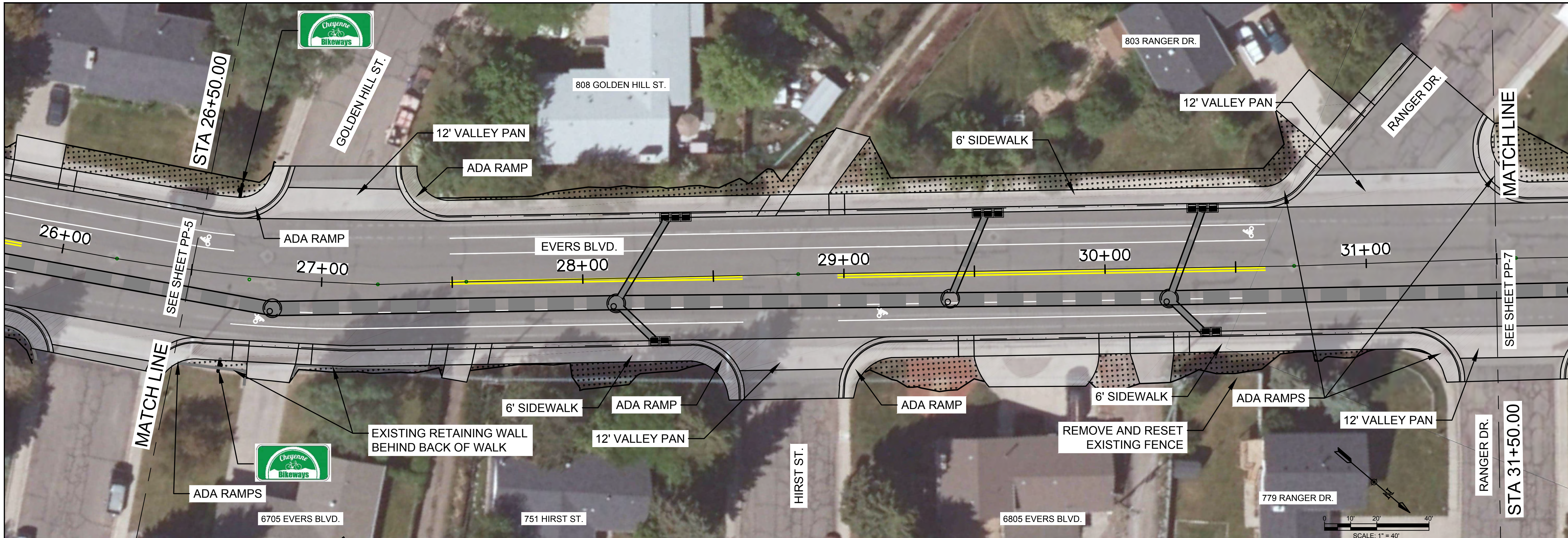

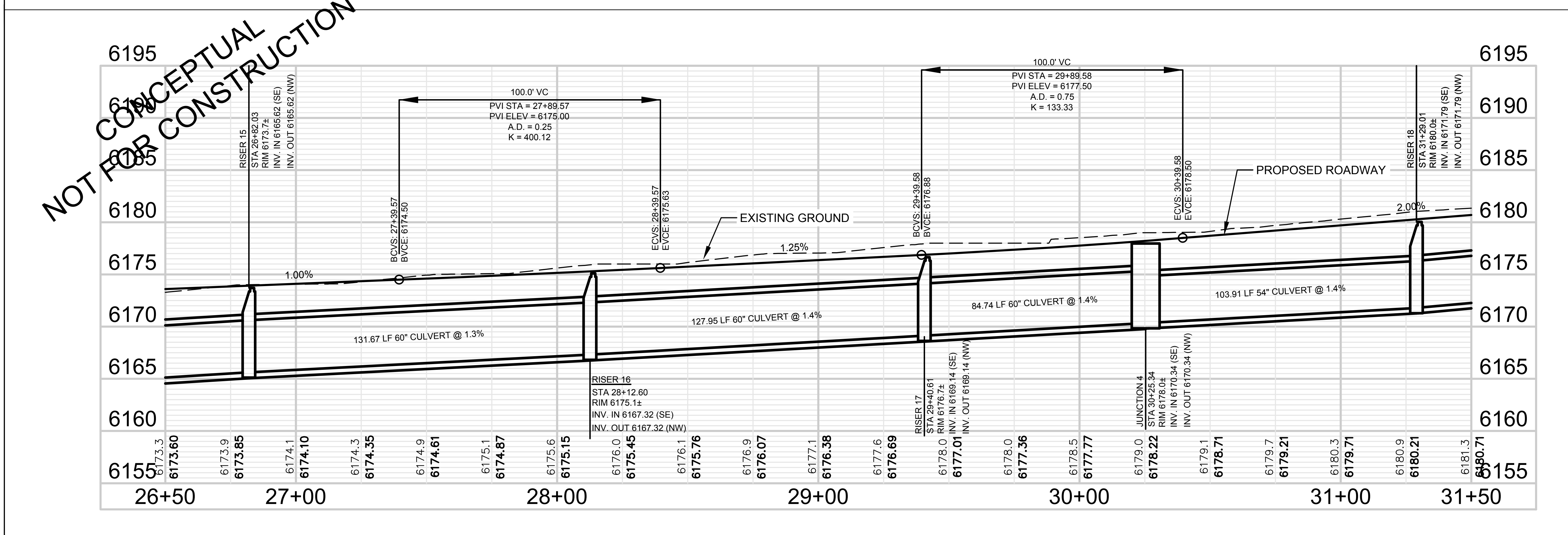

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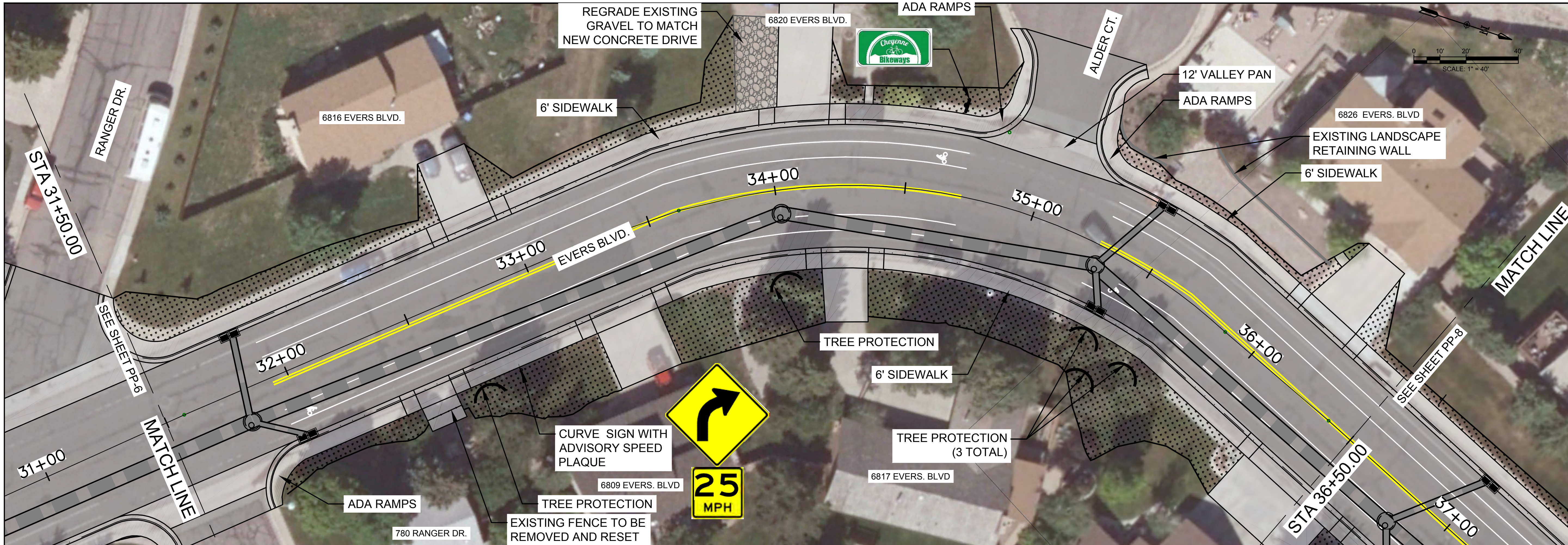

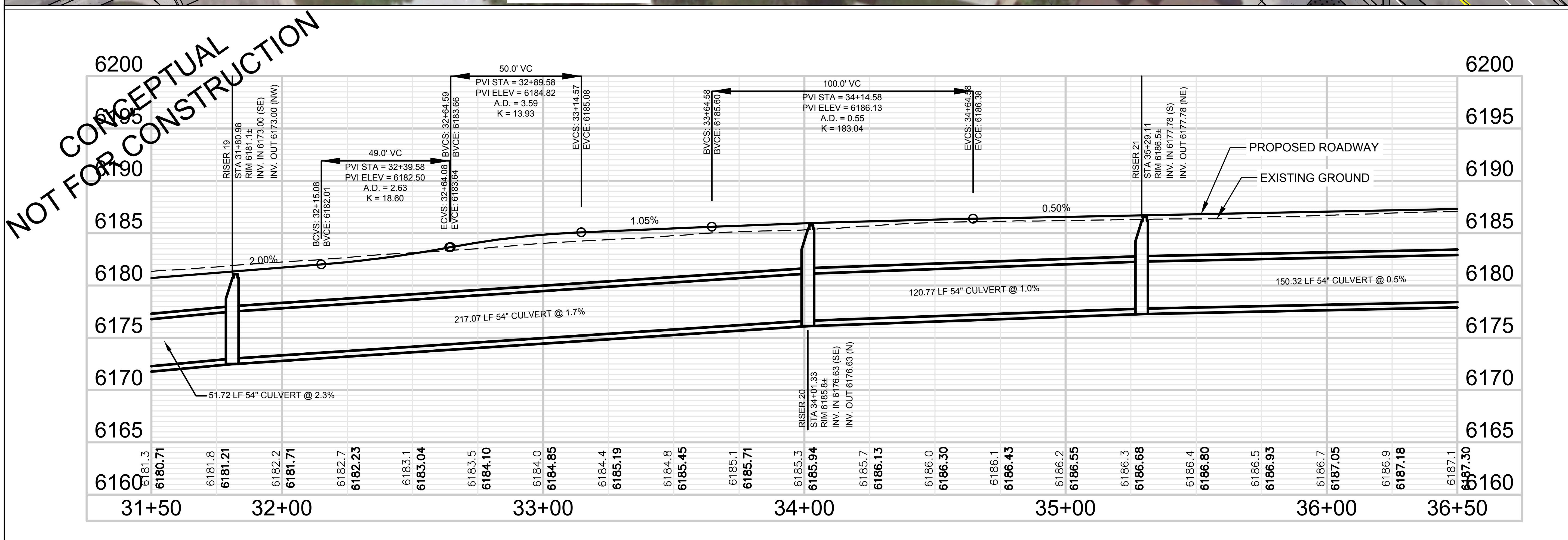

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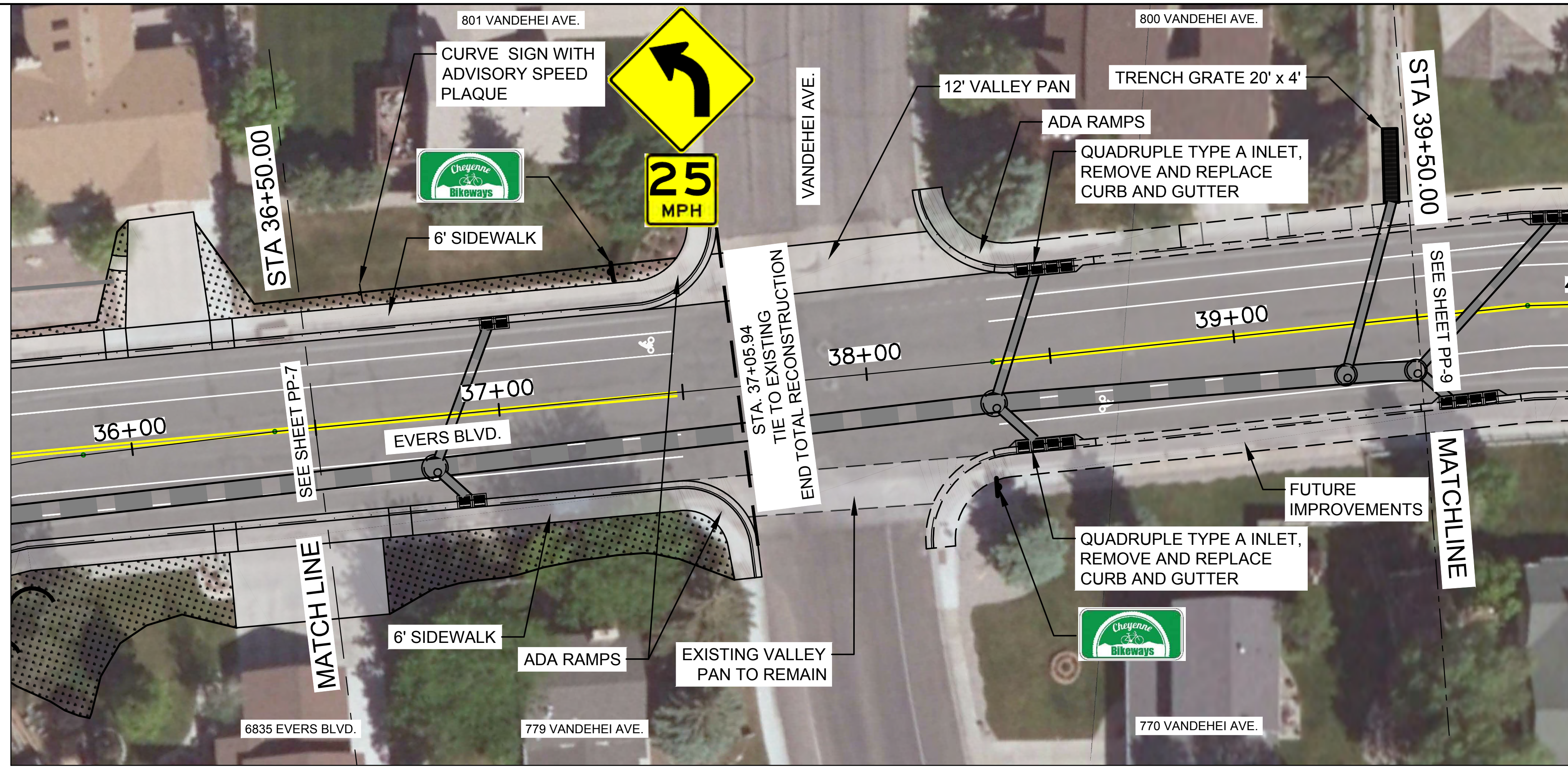

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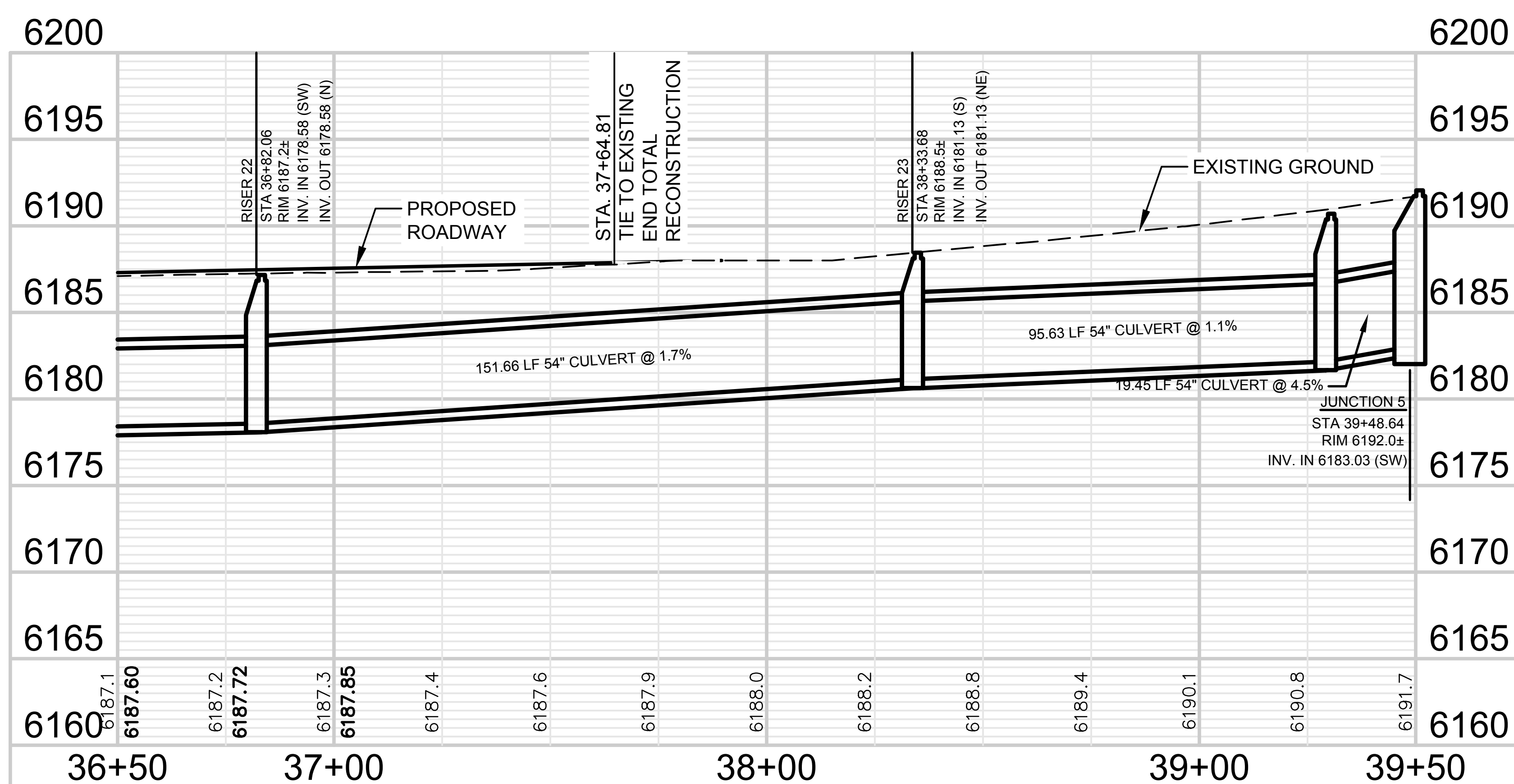

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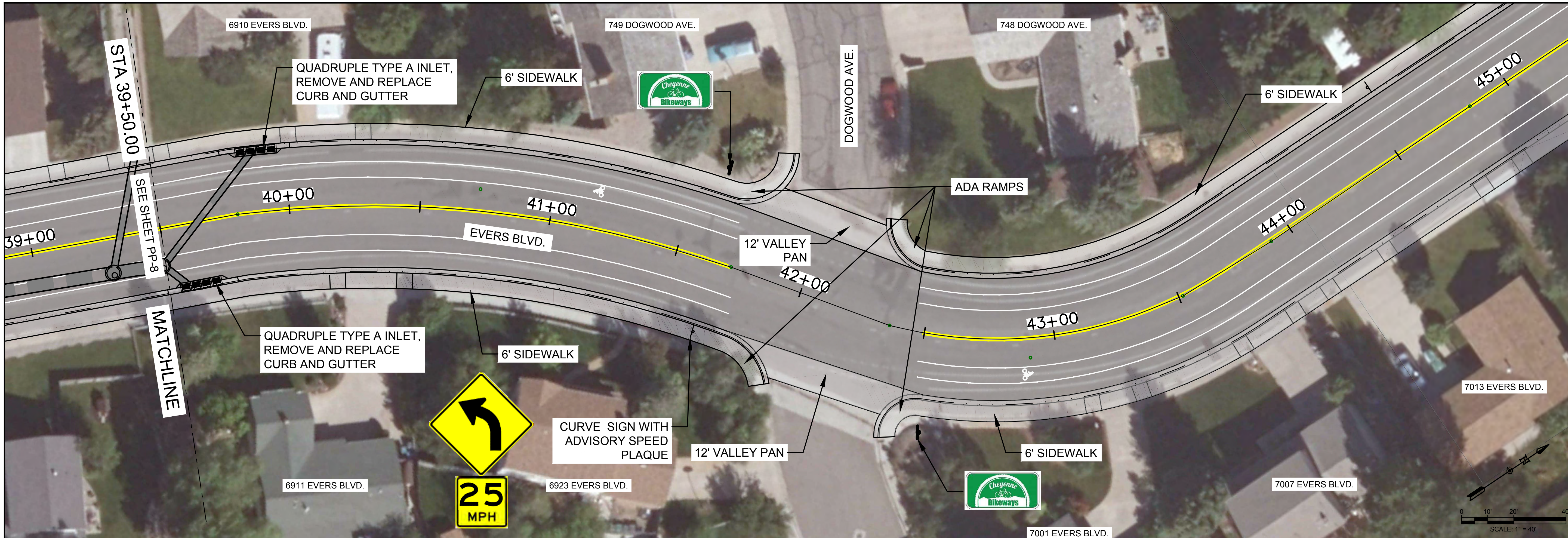

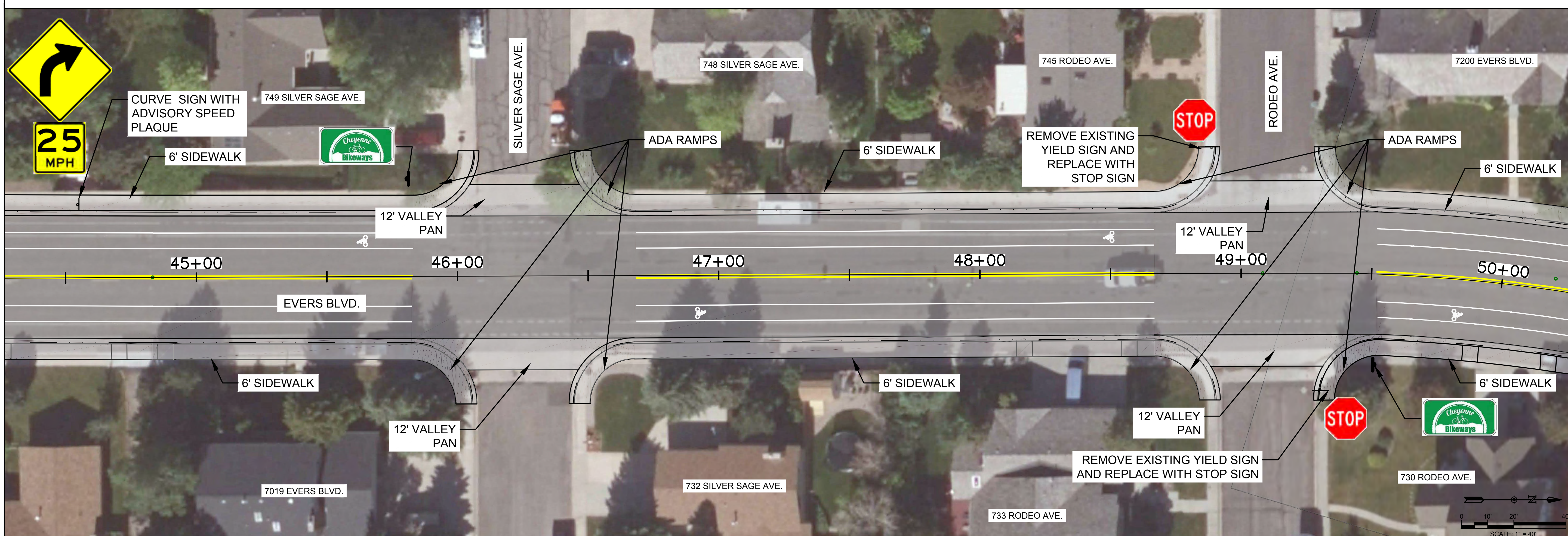

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PLAN AND PROFILES

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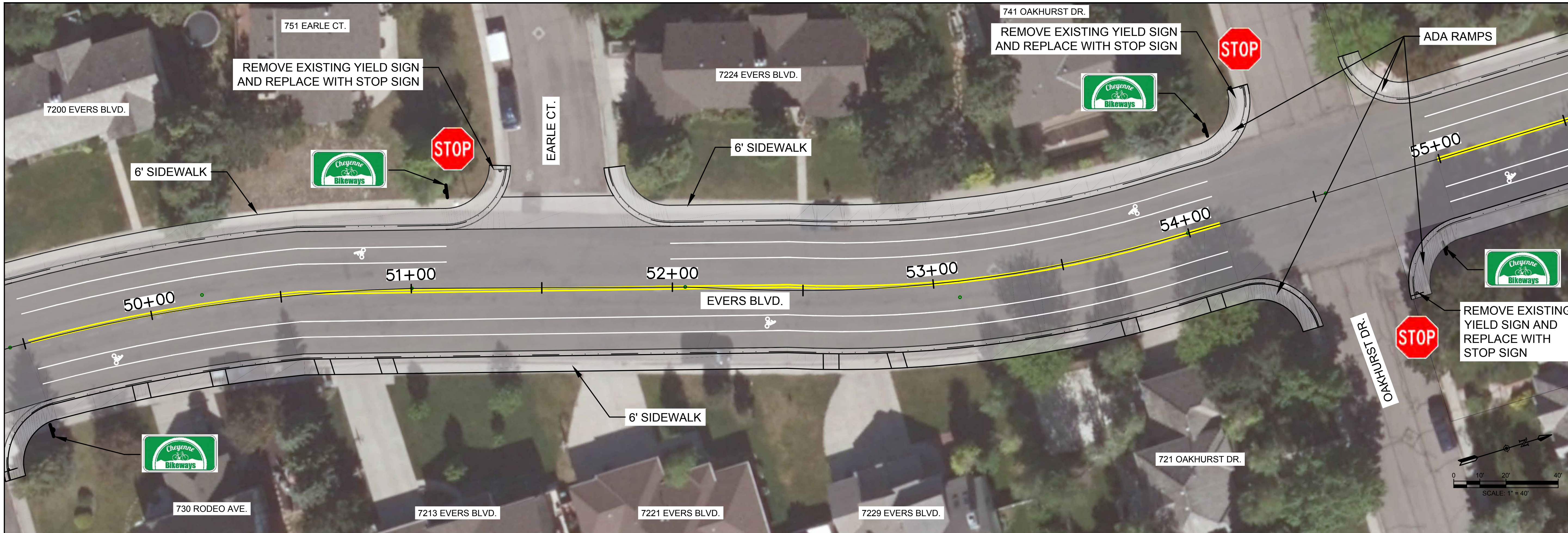

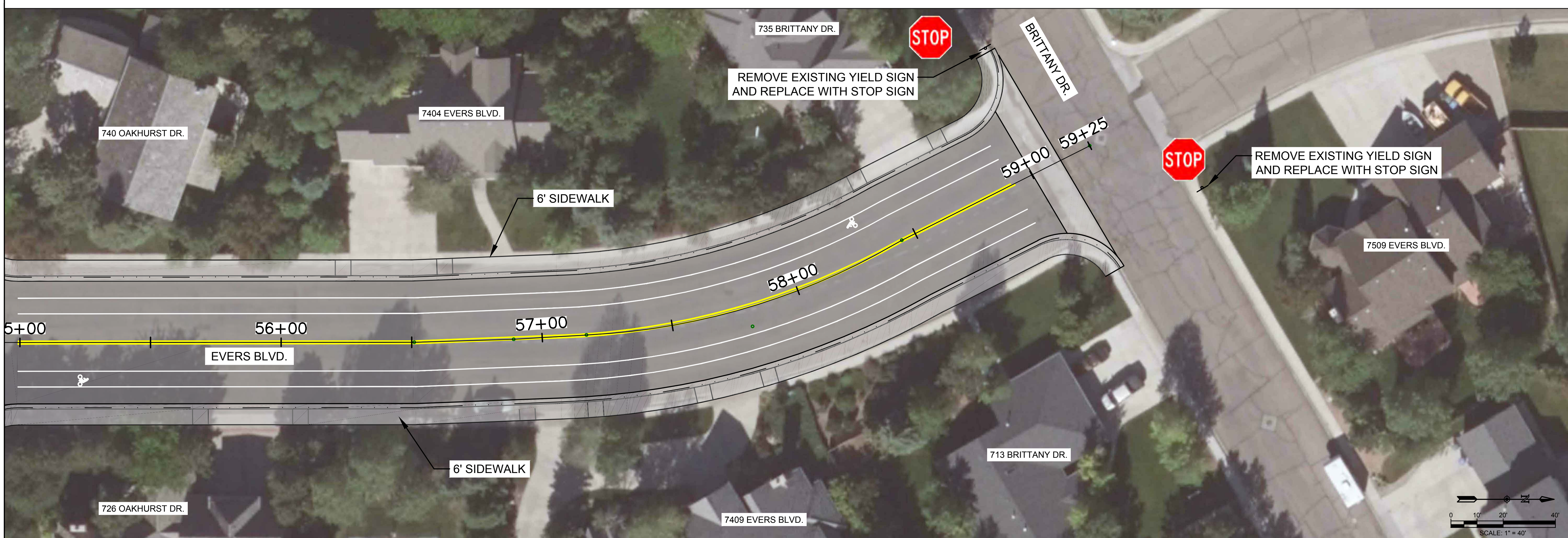

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Date:

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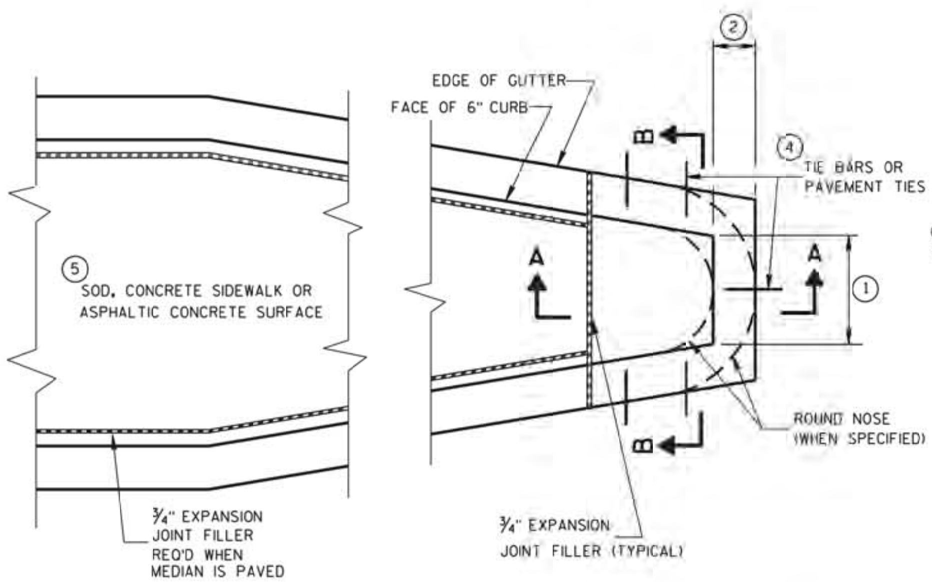
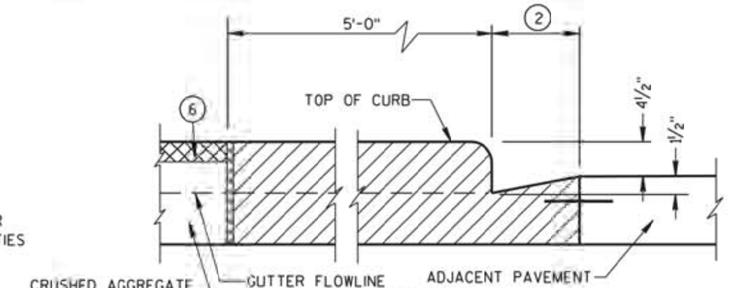
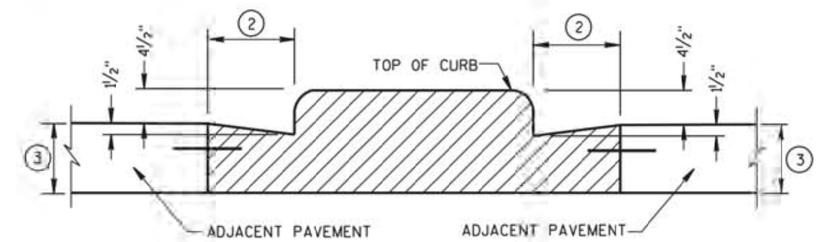
32-1835.00

DRAWING NO.
PP-10





SECTION A-A



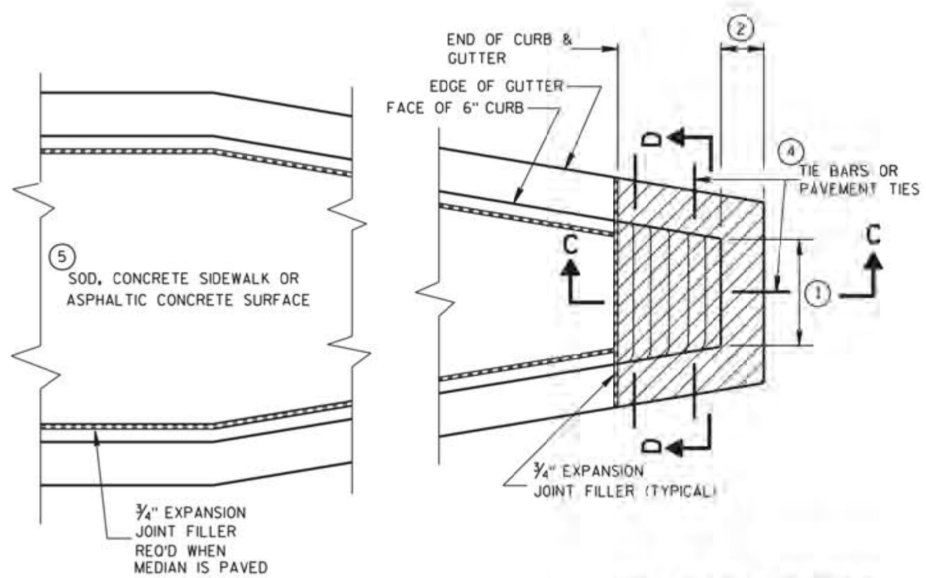
SECTION B-B

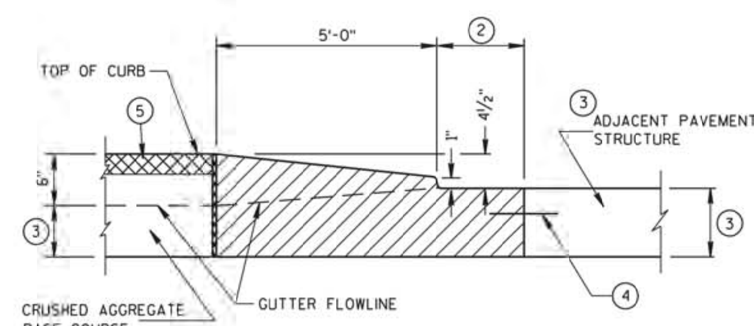
CONCRETE MEDIAN BLUNT NOSE DETAIL

GENERAL NOTES

DETAILS OF CONSTRUCTION, MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.

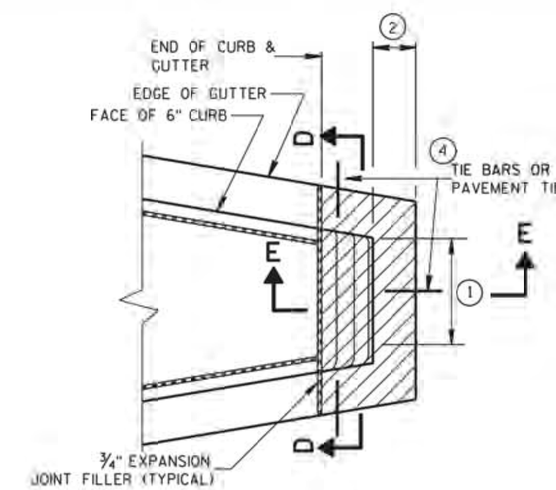
1. SEE PLAN FOR MEDIAN NOSE WIDTH AND RADIUS (FOR ROUND NOSE ALTERNATE).
2. WIDTH OF GUTTER TO MATCH EXISTING ADJACENT GUTTER OR AS SPECIFIED ELSEWHERE IN THE PLAN.
3. DEPTH EQUAL TO ADJACENT PAVEMENT. ADJACENT PAVEMENT STRUCTURE DETAILS ARE SHOWN ON THE PLAN. TYPICAL OPTIONS ARE:
   (1) NEW OR EXISTING CONCRETE PAVEMENT.
   (2) ASPHALTIC CONCRETE PAVEMENT OVER NEW OR EXISTING CONCRETE BASE COURSE.
   (3) ASPHALTIC CONCRETE PAVEMENT OVER CRUSHED AGGREGATE BASE COURSE.

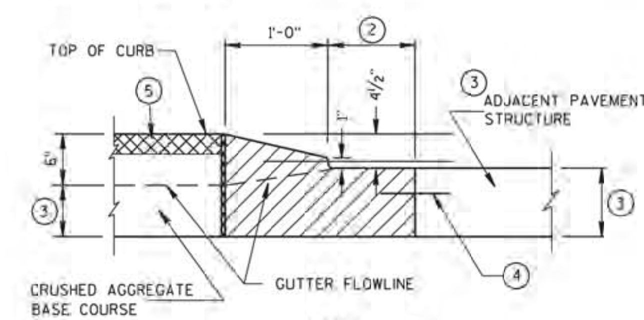




SECTION C-C

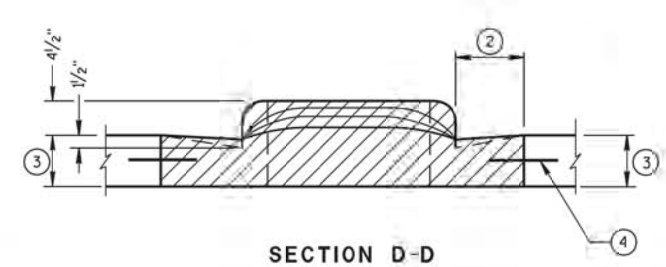
CONCRETE MEDIAN SLOPED NOSE TYPE 1





SECTION E-E

CONCRETE MEDIAN SLOPED NOSE TYPE 2



SECTION D-D

CONCRETE MEDIAN NOSE

Engineers/Scientists/Surveyors
214 W. Lincolnway, Suite 22
Cheyenne, WY 82001
Phone (307) 634-9888
Fax (307) 634-2353

AYRES ASSOCIATES

EVERS BOULEVARD
DETAIL - CONCRETE NOSE

EVERS BOULEVARD
ROAD REHABILITATION
35% DESIGN PLAN

Date

Revisions

Project Mgr.
Designed By:
Drawn By:
Date:

PROJECT NO.
32-1835.00
DRAWING NO.
DTL2

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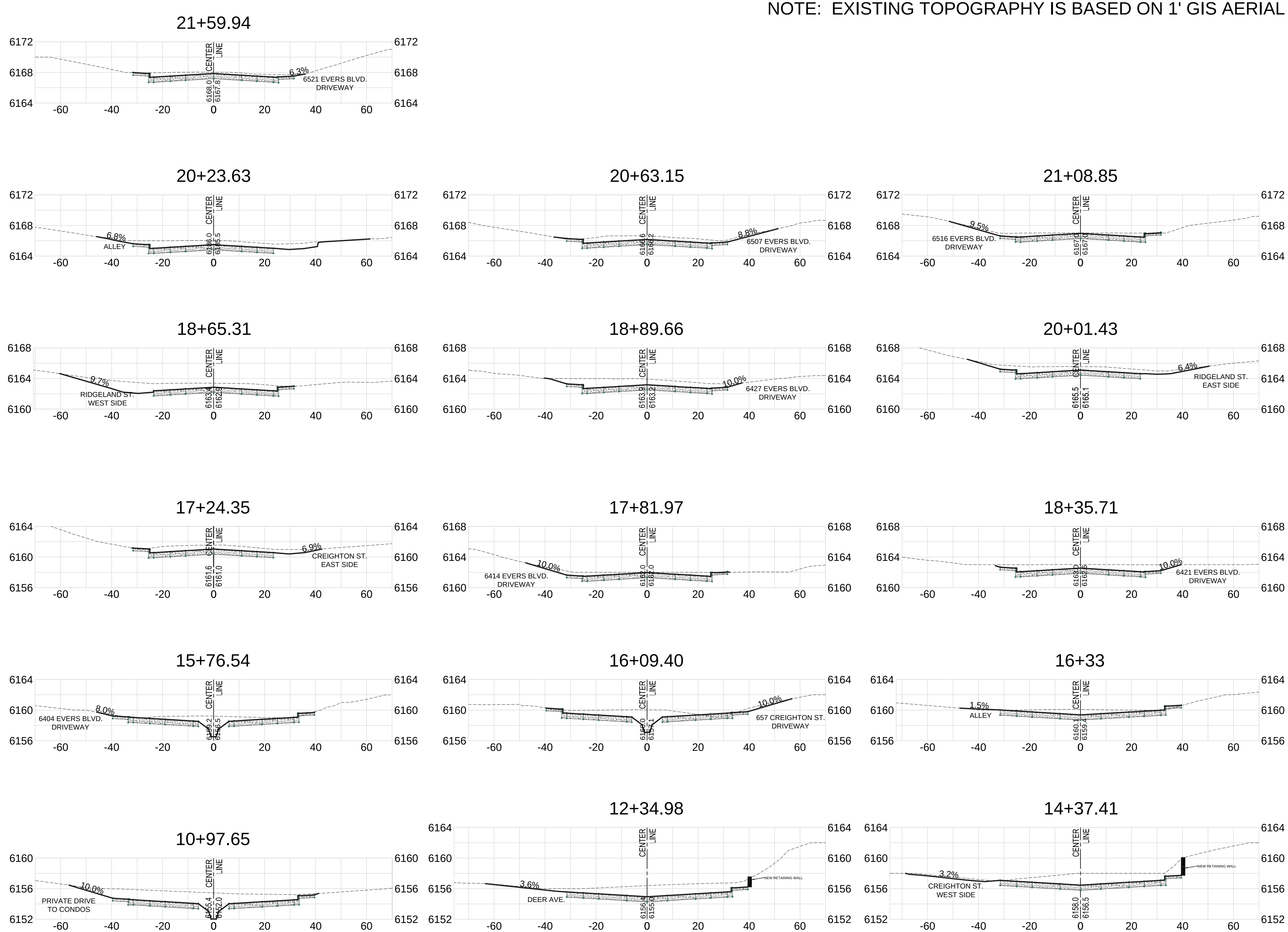

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EVERS BOULEVARD
CROSS SECTIONS

EVERS BOULEVARD
ROAD REHABILITATION
35% DESIGN PLAN

Date	Revisions

Project Mgr.:
Designed By:
Drawn By:
Approved By:
Date:

PROJECT NO. 32-1835.00

DRAWING NO. XS-1

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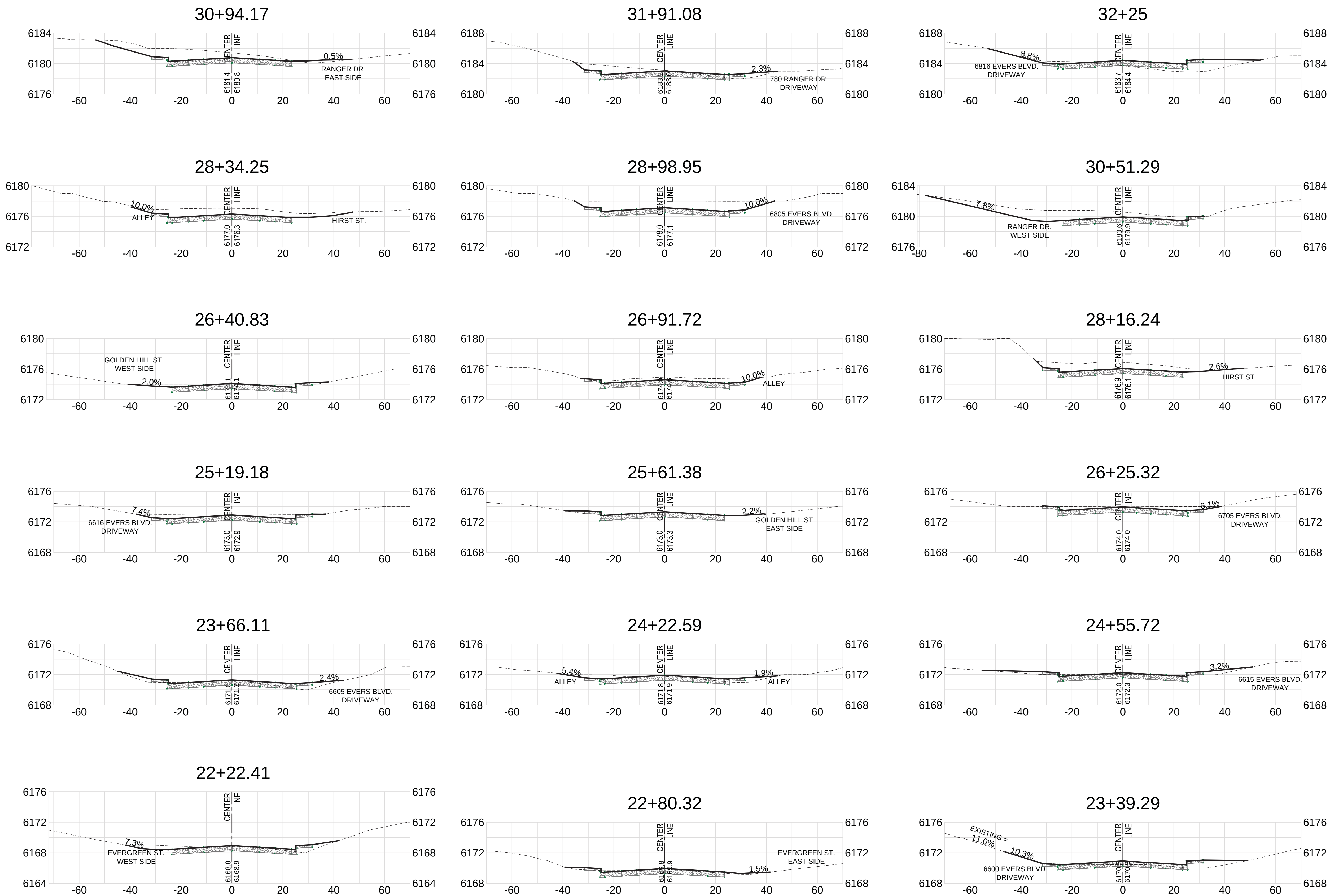

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EVERS BOULEVARD
CROSS SECTIONS

EVERS BOULEVARD
ROAD REHABILITATION
35% DESIGN PLAN

Date	Revisions

Project Mgr.:
Designed By:
Drawn By:
Approved By:
Date:

PROJECT NO. 32-1835.00
DRAWING NO. XS-2
SHEET OF

NOTE: EXISTING TOPOGRAPHY IS BASED ON 1' GIS AERIAL CONTOURS

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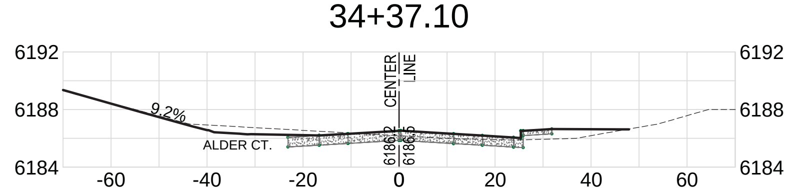

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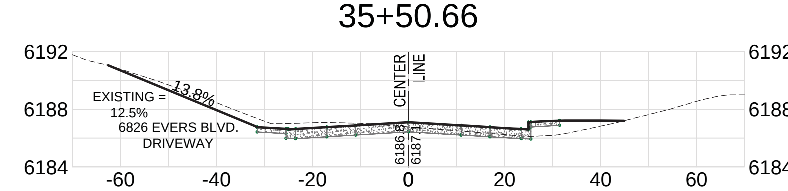

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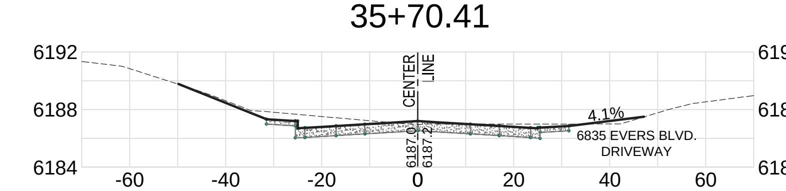

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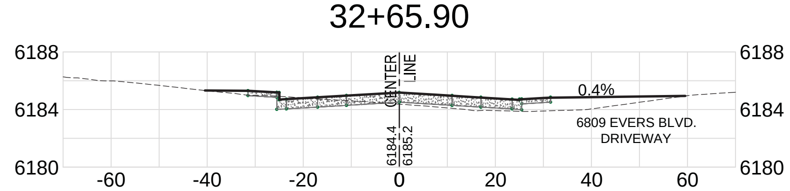

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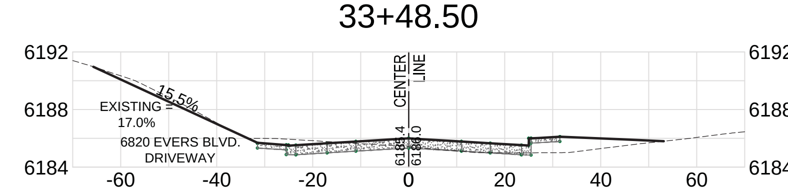

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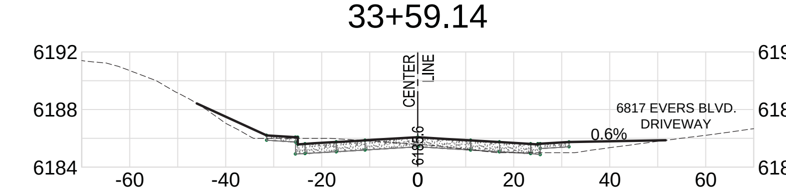

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EVERS BOULEVARD
CROSS SECTIONS

EVERS BOULEVARD
ROAD REHABILITATION
35% DESIGN PLAN

Date
Revisions

Project Mgr.
Designed By:
Drawn By:
Approved By:
Date:

PROJECT NO. 32-1835.00
DRAWING NO. XS-3
SHEET OF

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

CORRIDOR WALK COMMENTS

Meeting Location: Evers Boulevard | Project No.: 32-1835.00

Date/Time: 9:00 AM, September 13, 2014 | Re: Corridor Walk Comments

Notes By:

Attendees: Darci Hendon, Samantha Campbell, Gene MacDonald, Tom Mason, Nancy Olson, James Sims, Anna Lane

A corridor walk was completed on Evers Boulevard, September 13, 2014 from 9 AM – 12:30 PM. A summary of the comments received is below:

1. **What specific concerns do you have about storm water as it impacts Evers Blvd. and/or your property?**
   - No problems on top of hill. (2)
   - Flooding.
   - Floods every time it rains, floods over vehicle hoods.
   - Evers becomes a river when it rains. If parked on Evers it seems the vehicles could float away at times. Need better drainage.
   - The water on Evers can get 3' deep during storms.
   - Trash piles up and the drains on south end of Evers get plugged, water then floods.
   - Runoff from north going down to inlets, inlets get plugged and residents have to clean them, City does not maintain.
   - Raw water drain at bottom of Evers and broken and inadequate curb and gutter need repaired.
   - Huge amounts of water flooding the street starting at the intersection of Evers and Vandehei, south to Bishop. Need more sewer drains between Vandehei and Jessup.
   - Drainage, the drains are infrequent uphill and often clogged with debris.
   - Concrete erosion.
   - Damage has been done to the gutters, curbs, sidewalks and roadway. The volume of water that the gutters have to handle below the upper drainage input points during heavy rains and sometimes spring snowmelt is concerning.
   - Curb and gutter has eroded all along Evers Blvd. from Vandehei Ave. to Bishop Blvd. and many sections of sidewalk have been undermined as a result of the significant amounts of storm water. All curbs, gutters, and sidewalks need to be replaced on that stretch of Evers. Blvd.
   - When there is a lot of rain garbage cans, etc. wash down towards Jessup. The street cannot handle a large volume of water.
   - Gutter pan dumps into property at south end of 6910 Evers Blvd. Pan is cracked and heaved and water comes up through block retaining wall which is close to the basement. Lots of damage on gutters and curbs.

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- At 6809 Evers too much of the surface flow is channeled to the east curb as it runs south. Channel more to the west for better balance, raise the curb height or lower the street level to facilitate more volume in the street.
- At Jessup there is too much water accumulation and drainage is too slow.
- Lack of proper drainage causes water to overflow up onto sidewalk in front of 6615 Evers, heavy snowmelt does the same. Better drainage to keep water flowing would likely alleviate this issue.
- Pooling of water on Evers side of 735 Brittany Dr. (east side of property) does not drain correctly. Joint between asphalt and gutter doesn't drain.
- Concern about the volume of water that crosses Vandehei Ave. and floods sidewalks and yards just south of Vandehei Ave. on both sides, then the water the west side of Evers Blvd. crosses Evers Blvd. making for difficulty. However, the worst flooding occurs near Jessup Elementary. The sidewalks and crosswalk frequently flood making it nearly impossible for students to get home on Evers Blvd. Then the same water causes flooding just before Bishop Blvd. We had a car totaled because it was driven into floodwater on Evers Blvd. that was not visible when turning from Bishop Blvd. There should be some way to prevent water from crossing Evers. Blvd.
- Gutters are useless, during a light rain the flow comes on the sidewalks at 6516 Evers and is destroying them. Dirt and sediment has the sprinklers along the back of the sidewalk buried.
- Water on Oakhurst.
- Puddles up to grass at corner of Ranger and over sidewalk.
- Snow and water buildup on the west side of the road just south of Brittany.
- No drainage.
- Drainage is inadequate, water builds up between Deer Ave. and Bishop Blvd. should go under Bishop then south to Dry Creek.
- Drainage by Jessup is not adequate.
- Underground drainage is needed, water comes up into yard at 779 Vandehei and owner has to pay flood insurance. Would rather have money spent to put in storm sewer than on flood insurance.
- Drain grate in pond east of Deer Ave. is too large, children could fall in.
- The drainage area behind the homes on Deer Ave. has a catch basin, the sewer pipe may not be big enough and the pipes under I-25 may not be large enough to handle the water. Why is water returned under I-25 here and not further south since it needs to get to Dry Creek? Must fix the water through I-25 first before Evers can be fixed.
- Channel through and get water off of Evers faster. As an intermediate fix, get water resolved.
- Trench grate needed across Vandehei.
- Check if the roadway is higher than the east curb line.
- Balance the flow, north/east side of the street carries most of the flow and gets up to about 1/3 of the driveways.
- ADA corners are low and water stays in them.
- ADA ramp at corner of Dogwood took out the curb and now water flows into yard on SE corner, there is debris that builds up in yard.
- End of driveway at 6705 Evers becomes a rapid pool. It is scary because little kids will play in the pool, water flows like rapids and large chunks of asphalt flow

down the street and then block the driveway. Water comes up to paver blocks and fills up the street.
- 6817 Evers pays flood insurance, there is a lot of water in gutters but have not seen it on the sidewalk (only been at home 1 year). Water is bad at the south end by Bishop.
- 6835 Evers has lots of water buildup, up to driveway.
- Pond at Rodeo only gets a little water in it then the water flows out, keep water there longer.
- Water comes down the hill on Dogwood and there is lots of water at the corner of Dogwood and Evers so current goes to outside and into yard at 6923 Evers.
- Water flows across property at 6223 Deer Ave., tears down fence and sidewalk.

2. Have you seen problems with ice buildup along Evers Boulevard? If so, where?

- None on top of hill. (2)
- No, if ice is removed in gutters.
- Ice builds up in ADA ramp low spots.
- Ice is a problem; City plows cover up drains with snow which then creates ice.
- City does not plow snow properly from Deer Ave. to Bishop.
- After plowing the middle of the street and pushing snow to the gutters when melting occurs water runs down sidewalks instead of gutter.
- Ice builds up at the corner of Evers and Bishop in front of Jessup. Dangerous for pedestrians and students at Jessup. (2)
- Ice buildup in low spots along the curb and gutter and on sidewalks.
- Ice builds up in gutter and over sidewalk down by Deer Ave. (3)
- Ice always builds up from Bishop to Vandehei. Even the feeder streets fet ice buildup especially on both sides of Creighton.
- Corner of Evers and Vandehei always has ice buildup.
- Ice builds up on Evers Blvd. just south of Alder Ct. when runoff crosses Evers Blvd. Ice is also a major concern in the north intersection of the two streets just west of Jessup Elementary. Ice also becomes a concern trying to cross Evers Blvd. on Vandehei Ave. when runoff is present. Significant ice also accumulates in the north side of the crosswalk at Jessup Elementary and along the sidewalks and along Jessup making a safety concern for the children coming and going from school.
- Driveways are slanted which causes a hazard when icy; driveways need to be made flat.
- Part of the drainage problem is that ice builds up over the drains.
- Ice builds up after snow or sleet and covers sidewalks; driveway at sidewalk will be icy.
- Ice across road and up onto the sidewalk.
- Ice builds up at every intersection when water builds up.
- Bike lane does not get plowed, only plowed up to the edge of the travel lane.
- Winter ice buildup in front of house on Oakhurst.
- Ice builds up at the drop off for Jessup on Evers.
- Ice buildup at the corner of Ranger and Evers.
- Ice buildup at the bottom of the cul-de-sac on Alder Ct.
- Ice buildup especially on the north side of Ridgeland.
- Ice buildup on Evers at Hirst and at Jessup on curve at storm drain.
- Ice buildup in the gutter on the SW corner of Evers and Silver Sage.

- Ice buildup on the west side of Evers near Brittany Dr.
- Ice buildup has never been a problem it resolves itself quickly at 6809 Evers.
- Have not seen problems at 6817 Evers.
- SE corner of Vandehei ices a lot, goes over sidewalk and fills the gutter.
- Water freezes, builds up, forms lake in yard on SE corner of Dogwood, flows push a drift there and makes the problem worse.
- Ice builds up on lower portion (6600 Block).

3. **Do you have any concerns with safety along Evers Boulevard as it applies to pedestrians, bicyclists, and/or vehicles?**
    - Vehicle speeds are too high due to the wide roadway.
    - Vehicle speeds are too high due to the long, straight, wide roadway. Had a dog hit in front of 7221 Evers due to the cars speeding by.
    - Traffic can be fast along the road but most people slow down by Jessup.
    - Speeding along the south portion, had a dog killed in front of 6414 Evers due to speeding cars.
    - Vehicles travel fast down Evers.
    - People drive way over the speed limit, especially since the middle of the street was recently overlaid. Speed bumps would put a stop to that. Lots of drivers use the street like a race track, dangerous for children playing or walking to school.
    - The corner of Vandehei and Evers has a lot of speeding vehicles and bicyclists not staying in bike lane.
    - NE corner of Dogwood people go fast, surprised there have not been accidents.
    - The bike lanes are nice for residents.
    - Minor concerns with the occasional vehicle speeding through the curves north of Vandehei because of the limited sight distance.
    - Speed around the corner near Alder Ct. is a big concern. Vehicles frequently cross into the bike lane at high speeds around that corner. I have personally witnessed several near misses with children riding their bikes in the bike lane and cars crossing into the bike lane.
    - Evers is wide enough to accommodate traffic, bike, parking, etc. Speed could be lowered slightly but safety is not an issue overall.
    - Traffic volumes and speeds seem okay.
    - Concerns at night for pedestrians and bicyclists.
    - Some concerns with safety, the roadway is inadequate and dangerous.
    - Bike lanes need to stay with new roadway.
    - Bike lanes are needed on Evers Blvd., they are a must.
    - Bike lanes are great.
    - The bike lanes on Evers are nice but the vehicles are too fast and can be dangerous to people using bike lanes.
    - Dog walkers and families often walk in bike lane in street due to the slanted sidewalks at driveways. (2)
    - Pedestrians must walk in street because of snow/ice in gutters and ice on the sidewalk dues to the blocked gutters.
    - Do not like the bike lane, dangerous when kids ride in the bike lane and veer into the travel lane.
    - Feels safe biking on Evers.

- Sidewalk is too narrow and in poor repair and does not meet ADA code along most of Evers Blvd. so most pedestrians walk in the bike or parking lane on Evers Blvd causing hazards for both the pedestrians, bicyclists, and vehicles.
- Bishop Blvd. is too narrow for pedestrians and bicyclists.
- Put a 4-way stop at Vandehei. (2)
- Need to have some sort of traffic control at Oakhurst so vehicles cannot turn onto Evers without first stopping.
- Rectangular rapid flash beacons at Jessup and Brittany would make it safer for children.
- More safe places for bikes and pedestrians to cross are necessary.
- A lot of children are around during school pickup and drop off.
- Worry about kids walking and riding bikes in the road. Don't see a lot of cyclists, just kids.
- The population of the neighborhood is getting older and there are less children, the 30 mph speed limit on Evers is fine.
- In the non-snow months the potholes along the street/side street junction could break a leg and the ice rink in the snow months is so risky to kids walking to school, many falls from agile kids.
- Pavement and gutter on east side of Evers before Vandehei needs repair.
- The ice buildup is dangerous when kids get out of the car or try to use the crosswalk.
- Terrified of kids at school getting swept away by the flooding.
- Some kid is going to die when intersection floods.
- Even a small amount of water causes impacts of all modes of travel.
- During heavy or light rain Jessup school becomes a pool. Water rushes down Evers up on sidewalks and lawn.
- If ice and water is too much, kids can't be on the sidewalk, it is scary to have them on the street.
- No, but a parkway feel would improve beauty and safety.

4. **Would you like to see Evers Boulevard at Bishop Boulevard be more of a gateway entrance into the Western Hills neighborhood? If so, what improvements would you like to see: more green area, sidewalk improvements, changes to the width of the roadway, roadway improvements such as a median, or other suggestions?**
   - No interest. (4)
   - No problem with it.
   - Not necessary, must fix road and drainage.
   - No, worried about maintenance and vandalism.
   - No, limited funds could be better used for other problems, primarily fixing the drainage.
   - No, not necessary.
   - Yes, but no median. (2)
   - Yes, all of the above, I like a "parkway" feel.
   - Yes, as long as it is aesthetically pleasing.
   - Yes, making Evers Blvd. at Bishop Blvd. a gateway into Western Hills would be desirable. A median in from Bishop Blvd. to the first cross street on Evers Blvd. would help to slow traffic and be safer for children at Jessup when they have to chase a ball onto Evers Blvd.
   - Would be nice.

- Consider placement of an island on Evers that would serve to landscape the entry and exit traffic at Bishop and also could accumulate, store, and drain some surface water from the roadway area.
- The present roadway width is good as it safely supports the vehicle lanes adjacent to the bicycle lanes.
- Trees and green space would be nice.
- The idea of the gateway entrance is nice but would it bring in more traffic by Jessup Elementary School? Is this a good idea?
- Good idea, landscaping and new sidewalks would be nice.
- Because of the drainage issues on the streets the sidewalks are often iced in the winter, would like ot see clear sidewalks.
- Would be a nice feature, but anything put there will have issues with water.
- Could be a benefit, but do not impact drainage just to make it look nice.
- Beautification is a good idea if it is affordable, safety comes first.
- An entrance would be very nice. Safety concerns on Bishop with no guardrail as it approaches roundabout, dangerous when icy.
- Making entrance to Western Hills from Bishop cosmetically enhanced would be nice but don't spend money on this and not address the real problem, drainage. First put proper drainage in allowing drainage for side streets water rushing down to Evers and provide proper snow removal.
- Be good for neighborhood and community but drainage is priority.
- Better drainage. Debris piles up and blocks the one drain, it creates a mini lake during heavy rain or snow melt. Piles of leftover debris is an eyesore often times the debris piles up on the sidewalk right in front of Jessup.
- Tunnel water under Bishop and off of Evers and adjoining property.
- A retention pond would be a dangerous nuisance.
- Sidewalk improvements.
- Wider sidewalks or at least the required width, there are lots of people with strollers and kids.
- Would like to see sidewalks on both sides of Evers widened by a foot.
- Sidewalk does not need to be wider.
- Wider sidewalk would be good.
- Tend to walk in street because sidewalks are narrow.
- Kids at play sign on the roadway.
- Hasn't ever been considered a gateway entrance.

5. Do you have any comments or concerns specifically as it applies to Jessup Elementary School and how the school fits into the corridor?

- No known issues. (7)
- Do not travel by Jessup. (2)
- Jessup is wonderful, kids seem to be acting safely.
- There is congestion during pickup and dropoff times. (3)
- Parents park on Evers, cars turning on Evers from Bishop may go fast and kids cross Evers by Bishop.
- Traffic control along Evers where parents drop off and pick up kids. Are u-turns legal in that spot?
- A more efficient way for parents to pickup and drop off kids because kids are running across the street.
- Having only 2 drains for Evers at Jessup makes in unsafe for the children.

- Too much water builds up near Jessup for the children, it is dangerous.
- The gutters bordering Jessup receive all the runoff from Evers. During heavy rains it can become deep enough and fast enough to be dangers for a small child.
- Would like to see the ice issue resolved.
- The bicycle lanes are used by a number of children on their way to/from school. Reducing the widths of Evers could put them into closer proximity to vehicle traffic.
- The condition of the roadway as it is now is a safety hazard for children.
- Please plan for adequate drainage to allow the parking lot at Jessup Elementary to be paved.
- It fits perfectly into the area now.

6. General Comments. Please provide us with any additional comments on issues you feel may affect the project or your property.

- Check the street lighting on Evers to see if it is adequate. (2)
- Additional lighting on Evers and Brittany similar to Hawthorne.
- There are potholes everywhere due to the water.
- Fill in the potholes and fix the asphalt on the whole roadway not just the center.
- The center of the road was repaved and is now higher which causes more water to flow to the curbs.
- Overlay in center of roadway made it too high.
- Asphalt overlay in center of road was a good idea; only doing two lanes was a good idea as it saves money.
- Asphalt is eroding along the curb line and no one maintains the asphalt, the patching that is done washes away the first time it rains.
- Patching fix along curb and gutter has chunks of asphalt that float along and break off.
- Standing water in all the potholes causes health hazard with mosquitoes.
- Drainage is not sufficient, the elevations need to be fixed.
- Fix long-term drainage, do not just make it short term fixes.
- Better drainage is needed.
- There were three flood events just this past summer.
- Evers is often called the “Evers River” by residents.
- On the southern end of the road, the north side of the street floods worse than the south side.
- Water comes from I-25 west onto Bishop and Evers which makes the flooding worse.
- Storm water comes off Dogwood and Silver Sage, down Evers and causes flooding.
- Storm sewer inlets at Vandehei roundabouts drain to pond at Timberline then that outfalls to Evers.
- Vandehei roundabout drainage is causing more water on Evers.
- A lot of low spots along the roadway collect water.
- Concern with water going in swales because not all houses have sump pumps.
- Something in the middle of the roadway for water would be good.

- Drainage down the middle of street but not sure how that would handle the rain/snow flow from side streets onto Evers, even alleys cause water rushing into the street.
- Some speeding issues.
- Place speed bumps to fix the speeding issues.
- Side streets can cause problems and should have some sort of control.
- Stop sign instead of yield sign at Brittany Dr./Evers intersection.
- Deer Ave. intersection comes in at a weird angle with Evers.
- There is noticeably more traffic in the neighborhood since the build out to the north.
- The corners at Ranger and Evers do not have handicap access, resident at 780 Ranger uses a walker. It would be great to have handicap access when out walking.
- Fix sidewalks as the current conditions have destroyed them.
- When backing out of driveway at 6705 Evers car bottoms out because road is higher and sidewalk has sunk.
- Snow plows hit and break the curbs at Evers and Deer.
- Snow plows pile up snow in front of driveways. If plow goes westbound down the hill at Vandehei and picks up snow at SE corner it helps drainage along Evers and Vandehei for the whole winter.
- Landscaping on Vandehei roundabout. The Vandehei roundabout should look like the Pershing roundabout. Vandehei is nothing but weeds and acts as the "gateway" to Cheyenne form the north. It needs to be improved and cared for.
- Bike lane is in bad condition.
- Riding bikes on Vandehei is a concern because of steep slope and peoples speed.
- No calming islands, makes it dangerous. (2)
- Road should not be narrowed it is okay now. (2)
- On-street parking is used and should remain. (2)
- Sidewalk does not need to be wider.
- Underground power would be a good idea, makes for a better perception of the neighborhood.
- No medians on Evers. (2)
- No roundabouts on Evers.
- A curb/median may be needed to separate bike lane from traffic.
- Good concept.
- Pleased to know project will be done and happy to have people coming to homes and get opinions of residents.
- Whatever the plan remember the snow plows will open road down the middle of the street and be done. What happens when melting occurs will still be an issue. Ice on sidewalks is a danger and residents cannot remove the ice. Plows cannot be relied on as they are opening roads everywhere and can't/won't give special attention to Evers.

<u>ENGAGE CHEYENNE – EVERS BOULEVARD</u>

The Cheyenne Metropolitan Planning Organization is pleased to announce the launch of Engage Cheyenne, an online community engagement website that allows participants the opportunity to share ideas, give feedback on initiatives, and collaborate with the planning and design team on the Evers Boulevard project.

To provide feedback and comments on a variety of topics please visit **www.plancheyenne.org/engage.** Click on Evers Boulevard Road Reconstruction under PROJECTS on the homepage.

Anyone may view the topics. To leave comments and participate in the discussion a user account must be established. Click on one of the Sign up buttons to get started. Enter the required information and click the Create Account button - you are ready to start leaving feedback.

The planning and design team will use this website to post discussions as well as to present design ideas. Your comments on these design ideas will assist us in developing a plan for Evers Boulevard that represents what the users of this corridor most want to see in their neighborhood. This is a great way to make Ever Boulevard Reconstruction YOUR project complete with YOUR ideas!

Questionnaire for Property Owners and Concerned Citizens

Evers Boulevard Road Reconstruction Plan
Bishop Boulevard – Brittany Drive
Cheyenne Metropolitan Planning Organization

Name: ____

Address: ____

____

Phone Number: ____________________* -OR- **E-mail**:______________________

* Phone numbers will not be given out but will be used to contact you about specific questions if follow-up is requested by you. Or if further discussion would be helpful as we work through the planning and design phase.

Do you own or lease property along the project? Own ____ Lease ____ N/A____

We are sorry we missed you during the September 13, 2014 corridor walk. Please use the following questionnaire to submit your comments and concerns to the projects' planners and designers. Your comments are important to us and will be taken into consideration during the planning or design process.

Please return the completed questionnaire by October 1, 2014. The questionnaire may be submitted by mail to:

Ayres Associates
ATTN: Darci Hendon
214 W. Lincolnway, Suite 22
Cheyenne, WY 82001

or by email to HendonD@AyresAssociates.com. If you have any questions, please contact Darci Hendon or Samantha Campbell, Ayres Associates, at (307) 634-9888.

1. What specific concerns do you have about storm water as it impacts Evers Blvd. and/or your property?

____
____
____
____

2. Have you seen problems with ice buildup along Evers Boulevard? If so, where?

____
____
____

3. Do you have concerns with safety along Evers Boulevard as it applies to pedestrians, bicyclists, and/or vehicles?

____
____
____

4. Would you like to see Evers Boulevard at Bishop Boulevard be more of a gateway entrance into the Western Hills Neighborhood? If so, what improvements would you like to see: more green area, sidewalk improvements, changes to the width of the roadway, roadway improvements such as a median, or other suggestions?

5. Do you have comments or concerns specifically as it applies to Jessup Elementary School and how the school fits into the corridor?

6. General Comments. Please provide us with any additional comments on issues you feel may affect the project or your property.

PUBLIC MEETING COMMENTS

AYRES ASSOCIATES

Meeting Location: Jessup Elementary School

Project No.: 32-1835.00

Date/Time: 4:30-6:00 PM, April 28, 2015

Re: Public Meeting Comments

Notes By:

Attendees: Tom Mason, Nancy Olson, James Sims, Sreyoshi Chakraborty, Darci Hendon, Samantha Campbell, Gene MacDonald

A public meeting was held in the Jessup Elementary School gym, April 28, 2015 from 4:30 PM – 6:00 PM. An introduction was given by Tom Mason followed by a Power Point presentation by Darci Hendon and Gene MacDonald. During the presentation voting was done using the MPO's software incorporated into the Power Point.

108 people signed in at the meeting.

A summary of the written comments received is below:

1. **Placing a bio-swale in the middle of Evers Boulevard in conjunction with the storm sewer pipes under the roadway, will provide more relief from flooding. Are you in favor of the roadway design with the bio-swale median to reduce flooding? Why or why not?**
   - Yes, there is too much water on Evers. It must be controlled. It will also help with the speed.
   - Yes, I have reviewed the options over the last year and believe the swales are the best, most effective option.
   - Yes, it is done very well and is much nicer than storm drains to look at, safer for cars and pedestrians.
   - Yes, without taking the "Evers River" underground add street work can only provide stopgap relief.
   - Are bio-swales used in climates like ours? I wonder where the water goes when we get the ice/melt cycle going. Other than that I am in favor of anything fixing lakes surrounding Jessup.
   - Please save as many trees as possible as they are important.
   - No, this improvement would be a loss of a lot of current landscaping and I would hate to see established landscaping gone.
   - No, lose 7-feet along Evers, 6-foot sidewalks are not necessary
   - No, I am not in favor of a swale. It reduces top surface area. Prove to us how the swale is required over a properly drained street.
   - No, I am not in favor of the bio-swale. We'll end up with a two-foot deep ditch in the center of the road with an average 3:1 slope. When it gets snowy or icy or when drivers aren't careful cars will skid off the road into the ditch. Snow and ice will collect in the swale and have difficulty draining and melting. Wind will blow tumbleweeds and trash into these ditches. The city may or may not clean them

214 W. Lincolnway ● Suite 22 ● Cheyenne, WY 82001 ● 307.634.9888 ● Fax: 307.634.2353 ● www.AyresAssociates.com

out. Cobbles in the swale that get loose may collect on the street and pose hazards to drivers. I'm in favor of 5-foot diameter storm drains on both the east and west sides of Evers. Grates along the curbs on the edge of the road would drain water into the storm drains. If there is a capacity concern, start working now with WYDOT to enlarge the storm drains where Dry Creek crosses I-25.
- Not anymore. Too wide, too ambitious. Dig a trench for drainage in the middle of the road. Cover and mark it for the safety of vehicles, pedestrians and animals. Raise sides of road so water run into it. My suggestion is absurdly simplistic but that's my point. We don't care about aesthetics, we just want functionality safety and practicality, simplify.
- Should seriously evaluate an alternative that does not widen existing footprint. Significant cost and public dissension could be avoided. Has a comprehensive hydraulic study been conducted? How effective will the 2-60" pipes be in addressing drainage problem?
- I have no preference. The concept does not affect our property bordering Evers. We will leave comments to those directly affected.

2. Including a bio-swale median will require the sidewalk to be placed closer to the right-of-way line. Are you in favor of moving the sidewalk to accommodate the bio-swale?
- Yes (3)
- Yes, and I'm ok with that. I would trade my yard and grass for the ability to landscape what's left, have less ice buildup and feel safer when heavy rain comes.
- 6-foot sidewalks are overkill to an established roadway.
- I would prefer this did not need to happen and you fix the problem without taking yards.
- A buffer is not needed (more than the existing bike lane and parking lane) with the swale.
- No
- No, this reduces property for home owners. It does not prove the swale will solve the issues.
- No, we should keep the foot print of the area disturbed by Evers Blvd. constant or even narrow it. The people who live along Evers don't want their landscaping ripped out. The 60% in favor to 40% opposed computer poll was done prior to the audience becoming aware that the bio-swale would require disturbance of an additional 7-foot wide swath on both the west and east sides of Evers. Someone at the back of the hall told me the later show of hands was more like 50-50, not 60-40. If you didn't' have a bio-swale you wouldn't have this problem.
- Absolutely not, we have large, mature trees 30-50 years old planted to block the west sun. We are very concerned our trees would be killed. Also paid $14,000 for xeriscaping front yard, that would also be ruined. We are absolutely certain that nothing would be done to restore our yard. We're retired and on a fixed income so that is a startling realization. A 6 foot sidewalk is ridiculous anyway, don't need it. Bike lane is fine as is also.

3. Between Vandehei Avenue and Brittany Drive the sidewalk can be located to allow for a buffer between pedestrians and vehicles. Which option do you prefer?
- 8-foot Landscape Buffer between Sidewalk and Curb – 1
- 2-foot Stamped Concrete between Sidewalk and Curb – 5

- Place Sidewalk at Back of Curb (No Buffer) – 8
- Prefer that the sidewalks are adjusted so we do not gain or lose property.
- I am not in favor of narrowing the road from Vandehei Ave. to Brittany. I feel pushing people together on a road that isn't straight will cause more accidents. I think the sidewalks and bike and driving lanes are safe now.
- Make sidewalks wider just get the water underground.

4. Are there other improvements that you would like to see, which have not been presented?

- 4-way stop at Brittany and Evers
- Do not need a median or a swale.
- Please include a bike path.
- Create a right-angle entry from Ranger Drive to the west side of Evers it's at 120 degrees now.
- I'm in favor of the safety improvements proposed for Jessup School and Deer Avenue.
- Reconstructed sidewalks don't need to be 7 feet wide, 5 feet is adequate, make sure there are curb cuts for people in wheelchairs.
- I'm in favor of widening the bike lanes from 5 to 6 feet as you have proposed.

5. General Comments. Please provide any additional comments on issues you believe affect the project.

- Recommend leaving the current width of Evers at the bend at Dogwood.
- 6-foot sidewalks are not needed from Vandehei to Bishop. I would suggest 4-foot sidewalks are plenty wide for this area of the road.
- I think you all have done a great job addressing all of our concerns. Thank you!
- For a very rough comparable look at Table Mesa west of Broadway in Boulder.
- How do you get to the I-25 pedestrian overpass? The current bike lane continues along Deer Ave. Will this leg be eliminated?
- I enjoy biking, but think the bike path lane could be decreased in size and recommend it's looked at. Thank you for your efforts.
- How much flow comes from the Air Force base? If considerable is there a possibility of a sediment basin on the base?
- Thank you for taking votes.
- Put the sewer manholes in the parking lanes and not in the driving lanes.
- Downstream drainage is an issue, I understand that. My son attends Jessup, I jog along Evers often.
- The swale would greatly impact trailers.
- We have lived at 813 Evergreen, three houses up from Evers, 22 years. The city has kept doing Band-Aid repairs on Evers every few years, adding another layer of asphalt. Now the asphalt is higher than the curbs or the sidewalks and the sidewalks are ice rinks in winter and crumbling in the summer. So I'm all for a long term solution. Put in storm drains. Put the telephone lines underground and get rid of the poles along Evers. Tear out all the old asphalt and put new asphalt in (not concrete, which tends to crack and crumble in this climate). The general meeting was a good idea. I particularly liked the lighted signs on the frontage road which notified residents of the meeting.
- The sidewalk buffer options on the upper section of Evers does affect our property. The first two options will have a direct effect on our driveway. It is

currently fairly steep and moving the sidewalk back is not acceptable. I question the logic as to the need for a buffer.

6. **Are you a landowner and/or resident whose property line is along or adjacent to Evers Boulevard?**
   - Yes – 10
   - No – 7

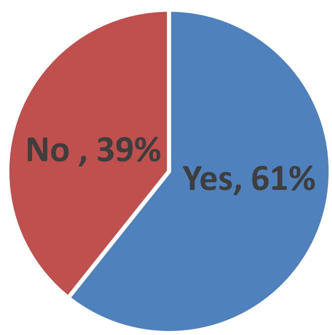
Multiple questions were asked by audience members during the presentation. Some of those questions were written down, but not all. These questions include:

1. Q: Who will maintain the bio-swale? A: City Public Works
2. Q: What design storm was used? A: 100 year storm event. (Gene then went on to describe what a 100 year storm event means in terms of a 1% chance of that size event happening in any given year.)
3. Q: Will the bio-swale reduce flooding in a 100 year event? A: Yes, it will allow for more conveyance of storm water.
4. Q: What is proposed north of Vandehei? A: A 36” pipe and inlets are proposed to Dogwood St.. Nothing is planned north of that.
5. Q: What if we don’t have a swale? A: The other option is to use only curb inlets with laterals and trunk lines. The concern is that because the grade of Vandehei is steep that the storm water will flow too quickly the closer it gets to Bishop and become a life safety problem, because not all of the storm water will be able to be captured in inlets.
6. Q: Where will the snow go? A: Snow will likely go into the swale. Plows will likely be told not to plow snow toward the swale.
7. Q: Is there a danger to cars with the swale? A: Yes, it is possible that a car will go into the swale. The swale is being designed with 4:1 side slopes for 4’ wide and 1’ deep then a 4’ wide cobble bottom at 1’ deep. A 4:1 slope is recoverable, meaning that if a vehicle drives onto a 4:1 slope, that vehicle can get out. The cobble lined bottom portion will not be recoverable. The design will look into possibly putting rumble strips into the 2’ wide concrete portion between the swale and the travel way. Also, tubular markers can be used to delineate the swale locations. Safety to vehicles is being considered.
8. Q: Will the road slope toward the swale? A: Yes, it is a reverse crown roadway, with a slope from the curb toward the swale at 2%.
9. Q: How will water get out of the swale? A: There will be inlets in each swale connected to the storm sewer trunk lines.
10. Q: Has the design taken into account the planned reconstruction of Jessup Elementary School? A: Yes, Ayres is working with the school district and Dennis Auker. [Note: Dennis Auker was present at the meeting. There are no conceptual plans for the Jessup Reconstruction at this time.]
11. Q: Why put in a swale and not traditional curb inlets? A: The concern is that the inlets will not have enough capacity to hold water. Storm water will continue down the hill toward Bishop Blvd., moving very quickly and becoming a life safety hazard. There is not enough conveyance in a traditional gutter for the amount of storm sewer runoff on Evers Blvd.
12. Q: Where does the water go that comes out of the holding ponds north of Vandehei? A: Water coming out of the pond between Rodeo Ave and Silver Sage Ave flows down an easement onto Silver Sage Ave and then surface flows in the gutter until it gets to Evers Blvd.

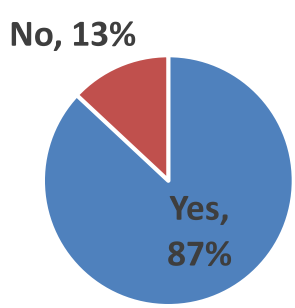
13. Q: Why aren't you looking at that water/pond at Silver Sage? A: In this project we are not tasked with evaluating that pond. We will collect that water when it gets to Evers Blvd.
14. Q: How much wider will Evers be? A: The swale in the middle of Evers will require 79' of the existing 80' wide right of way. Currently there is about 6.5' between the back of sidewalk and the right of way line in places where the existing sidewalk is 3.5' wide.
15. Q: My property has a drop off, if you widen the roadway what will happen to the drop off and my trees? A: Retaining walls can be added if needed. Trees that are inside the right of way, where the roadway will be widened, will be removed to create the space necessary for the roadway elements.
16. Q: Won't adding more pavement mean more impervious area. A: Yes, it will. The goal of this project is to get the storm water off the street for a frequent event and reduce the floodplain, if possible.

RESULTS FROM PUBLIC MEETING VOTING DURING PRESENTATION

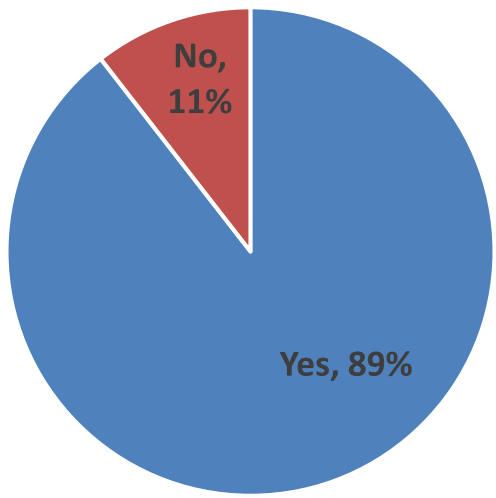
Are you in favor of having a bio-swale in the middle of Evers Boulevard to capture more storm water?



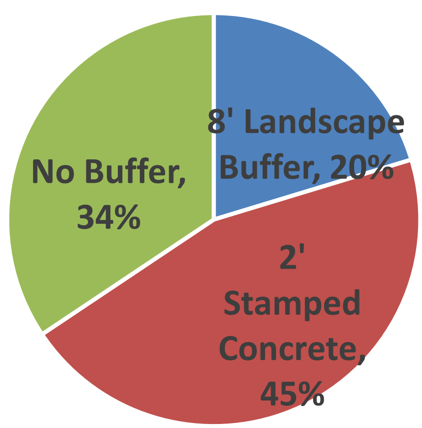
Do you agree with the need for the safety improvements planned at Jessup Elementary School including dual crosswalks, wider sidewalks to shorten crossing distance, and no parking between the crosswalks?



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? [This question applies specifically to the area between Vandehei and Brittany, asking about the width of the buffer between the back of curb and the sidewalk.]



EVERS BLVD. RECONSTRUCTION PLAN BISHOP BLVD. TO BRITTANY DR.

COMMENTS

1. **Placing a bio-swale in the middle of Evers Boulevard in conjunction with the storm sewer pipes under the roadway, will provide more relief from flooding. Are you in favor of the roadway design with the bio-swale median to reduce flooding? Why or why not?**

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2. **Including a bio-swale median will require the sidewalk to be placed closer to the right-of-way line. Are you in favor of moving the sidewalk to accommodate the bio-swale?**

____

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3. Between Vandehei Avenue and Brittany Drive the sidewalk can be located to allow for a buffer between pedestrians and vehicles. Which option do you prefer?

______ 8-foot Landscape Buffer between Sidewalk and Curb

______ 2-foot Stamped Concrete Buffer between Sidewalk and Curb

______ Place Sidewalk at Back of Curb No Buffer

4. Are there other improvements that you would like to see, which have not been presented?

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5. General Comments. Please provide any additional comments on issues you believe affect the project.

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6. Are you a landowner and/or resident whose property line is along or adjacent to Evers Boulevard?

_____ YES _____ NO

Name: ____

Address: ____

Email: ____
(Please provide an email address if you would like to be added to a distribution list which will ONLY be used for Evers Boulevard Project notifications.)

You may turn in this comment sheet at today's meeting, email comments to HendonD@ayresassociates.com, or mail comments to Darci Hendon at 214 W. Lincolnway, Suite 22, Cheyenne, WY 82001, or call 307-634-9888 ext. 3593.

Thank you for taking the time to attend this meeting and provide feedback!

Sign in Sheet

Open House
Evers Boulevard Corridor Project
Cheyenne Metropolitan Organization and the City of Cheyenne

April 28, 2015

Name	Address	Email (if available)
Nadine Raffelson	6919 Hawthorne Drive	nraffe@msn.com
Charles Raffelson	"	craffelson@bresnan.net
JAMES RUEKER	779 Vandehei	DrummeR56ID @ Yahoo
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Randy & Suzy Murphy	817 Golden Hill	szmurph@outlook.com
JEFF Bledsoe	6826 Valley View	
Roy Copeland	823 Golden Hill St	ROY@[illegible].com
Phil & Anna Lane	751 Hirst St.	ajlane@bresnan.net
John Hickey	6301 DeeR	
DON ANDERSON	7209 KINGSWOOD DR	
JOEL S. SHEPITKA	6421 EVENS BLVD	
MELANIE BEAMAN	6421 EVENS BLVD	
James Drudge	929 Pike St.	James.K.Drudge@Gmail.com
DENNIS AUKER	2810 HOUSE AVE	
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Sign in Sheet

Open House
Evers Boulevard Corridor Project
Cheyenne Metropolitan Organization and the City of Cheyenne

April 28, 2015

Name	Address	Email (if available)
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Joe Widde	6809 - Evers Blvd	Geoffdan@AOL.com
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Bernie + Val Lewkowski	7116 Hawthorne Dr.	b.lewkowski@bresnan.net
Dr Mark Rinne	Cheyenne City Council	
Rick Kaysen	Mayor	
Tom DeHoff	WYDOT	tom.dehoff@wyo.gov

Sign in Sheet

Open House
Evers Boulevard Corridor Project
Cheyenne Metropolitan Organization and the City of Cheyenne

April 28, 2015

Name	Address	Email (if available)
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CHARLES DeFOND	743 VANDEHEI Ave	cdefond@BRESNAN.NET
Lynn Webers	824 Silver Sage Ave	lhweberg@aol.com
Nathan Beauheim	2101 O'Neil	
Carol & Earl Kabeiseman	6223 Deer	
Mike Weiland	5118 Scrubbrush Ave	mweiland@bresnan.net
Joan Stout	6923 Evers Blvd	jstout6923@aol.com
Andy Edwards	837 Creighton St.	
Shane Crofts	756 Silver Sage Ave.	shane.c.crofts.mil@mail.mil
JOHN HALL	803 RIDGELAND ST.	jdhall@sehinc.com

Sign in Sheet

Open House
Evers Boulevard Corridor Project
Cheyenne Metropolitan Organization and the City of Cheyenne

April 28, 2015

Name	Address	Email (if available)
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Dick Nelson	719 Ridgeland	DNelson729@aol.com
lisa Gardner	764 Rodeo Ave.	james.gardner@bresnan.net
Chris Rodgers	748 Dogwood Ave	
JEFF VAN DORN	827 CREIGHTON AVE.	J.VANDORN@BRESNAN.NET
Bill Benskin	7001 Evers Blvd	williambenskin@Q.com

Sign in Sheet

Open House
Evers Boulevard Corridor Project
Cheyenne Metropolitan Organization and the City of Cheyenne

April 28, 2015

Name	Address	Email (if available)
Rita Richmond	764 Silver Sage Ave	rraer@wyoming.net
Jacque Busacker	800 Silver Sage Ave	jacqbusac@aol.com
Margie Sewell	925 Evergreen St	mrgtswll@gmail.com
BOB + MARY KISER	730 RODEO AVE.	bobrkc1@HOTMAIL.COM
Randall Butt	6849 Valley View Place	randster88@hotmail.com
ROBERT D. CLARY	825 GOLDEN Hill	bob@rdcpepc.Com
MATT ASHBY	2101 O'NEIL	MASHBY@CHEYCITY.ORG
Kevin Bohnenblust	761 Dogwood	kdbwyo@bresnan.net

Sign in Sheet

Open House
Evers Boulevard Corridor Project
Cheyenne Metropolitan Organization and the City of Cheyenne

April 28, 2015

Name	Address	Email (if available)
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Marilyn Bingham	6507 Evers Blvd.	
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Tim Richmond	764 Silver Sage	
Frank McKinley	6910 Evers Blvd	
Corey + Brianna Wheeler	803 Ranger Dr.	BRI.M.WHEELER@gmail.com
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Ciara Knepper	7246 Golden Hill St.	cpknepper@gmail.com
Cheryl & Don Farris	808 Golden Hill	
Catherine A Perry	6058 Valley View PL	
Dennis Murray	6600 Evers Blvd.	—
Korey Keys	6705 Evers Blvd	—
Bill Morse	608 Silver Sage Ave	billmorse7@gmail.com
WILLIAM ZEGLEY	637 EVERGREEN ST	WILLIAM.ZEGLEY@YAHOO.COM

Sign in Sheet

Open House
Evers Boulevard Corridor Project
Cheyenne Metropolitan Organization and the City of Cheyenne

April 28, 2015

Name	Address	Email (if available)
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N. Bruce Haston	6115 Deer Ave	
Brett Mares	732 Silver Sage Ave	BJMFL@Hotmail.com
Pat Hand	6101 Deer Ave	
Joe & Mary Jo Rotter	6516 Evers Blvd	mjrwy2556@bresnan.net
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Mary Hartman	7404 Evers	
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Dave and Adrianne Johansen	741 Oakhurst Dr.	djohansen96@gmail.com
Wally Rice	925 Ever Green St.	wallywRice@Gmail.com

Power Point used at Public Meeting

Evers Boulevard Corridor Plan

Public Meeting
Tuesday April 28, 2015

Why?

- Evers Boulevard is slated to be reconstructed using money from the 5th Penny Sales Tax
  - Reconstruction is planned from Bishop Boulevard to Vandehei Avenue only
  - The Study area with this project extends north to Brittany Drive
- The final design will take into consideration the wishes of the local neighborhood

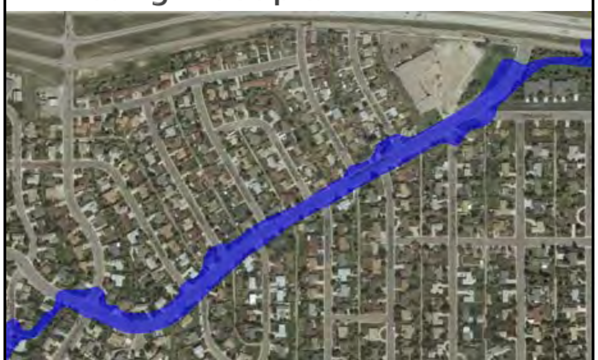
What is the Goal?

- Utilizing the available 80 Foot Right-of-Way such that it has the greatest benefit for users

What have we heard?

- Flooding and lack of storm water drainage is the number one concern
- Other concerns:
  - Icing in the gutters and damage to gutters and asphalt due to standing water and ice
  - Safety of Vehicles, Pedestrian, and Bicyclists
    - Vehicle Speeds are <u>too high</u>
    - Sidewalk is <u>too narrow</u>
    - Ice on the sidewalks causes pedestrians to walk in the roadway

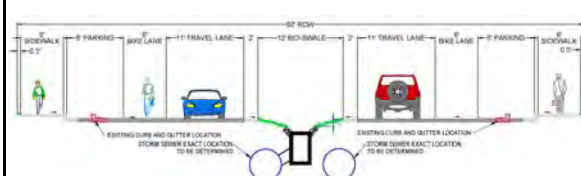
Existing Floodplain



Drainage Investigation

- Constraint – Existing storm sewer pipes under I-25 drain Evers Boulevard
- Larger storm events produce more runoff than can be accommodated with storm sewer pipes given that we have to tie to the existing storm sewer under I-25
- In order to capture more storm water we are proposing a **bio-swale** down the middle of Evers Boulevard

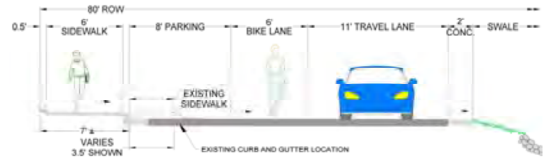
Bio-Swale in the Middle



Considerations:

- Bio-swale location will allow turning onto side streets but not at every driveway
- Some driveways will become right-in, right-out only
- Legal U-Turns are allowable around the bio-swale medians

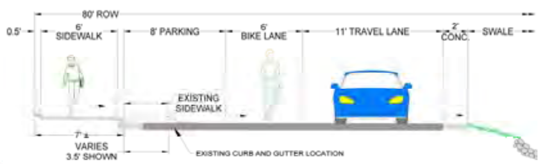
Proposed Roadway Section:
Bishop Blvd. to Vandehei Ave.



- Wider Sidewalks – More Pedestrian Friendly
- Wider Bike Lane – Safer for Bicyclists
- Narrower Travel Lane – Statistically Reduces Vehicle Speeds
- Roadway footprint takes up almost all of the Public Right-of-Way

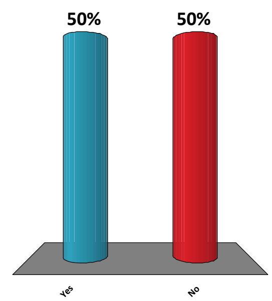
Audience Participation

- Question #1
  - Are you in favor of having a bio-swale in the middle of Evers Boulevard to capture more storm water?
  - A = Yes, B = No



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

A. Yes
B. No



Proposed Safety Improvements near Jessup Elementary School

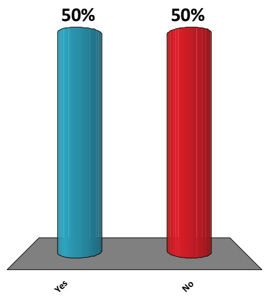
- Pedestrian crossing distance reduced from 60 feet to 50 feet.
- No parking between crosswalks allows drivers to see children better – no rushing out to the street in between parked vehicles

Audience Participation

- Question #2
  - 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?
  - A = Yes
  - B = No

Do you agree with the need for the safety improvements planned near Jessup Elementary School?

A. Yes
B. No



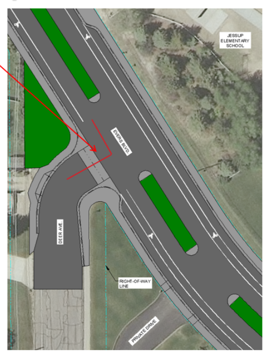
Existing Deer Avenue Alignment

When intersections are skewed (angle of roads is greater or shorter than 90 degrees) drivers have to physically turn their bodies to have a clear view of oncoming vehicles. This can be challenging to some and is deemed to be less safe for both motorists and pedestrians.

Audience Participation

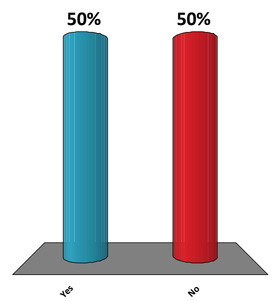
- This is what the intersection would look like if it was modified to 90 degrees.
- Pedestrian crossing distance is reduced from 112 feet to 45 feet.
- Alignment provides better visibility for drivers

- Question #3
  - Do you agree with the improvements to realign Deer Avenue to meet Evers Boulevard at a 90-degree angle?
  - A = Yes
  - B = No

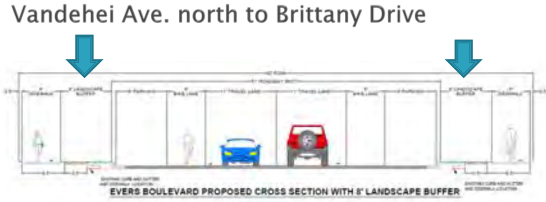


Do you agree with the improvements to realign Deer Avenue to meet Evers Boulevard at a 90-degree angle?

A. Yes
B. No

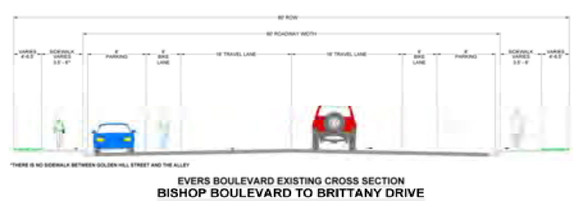


Roadway Section:
Vandehei Ave. north to Brittany Drive

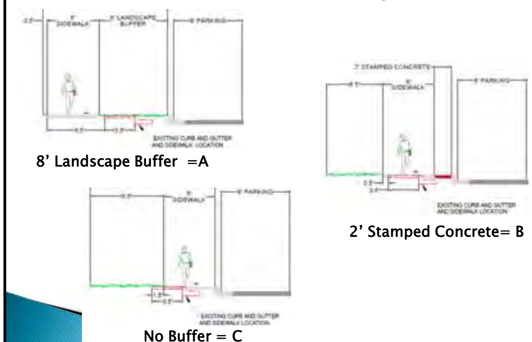


- Sidewalks are safer and more inviting for users if there is a buffer separating the traffic from the pedestrians on the sidewalk.

Existing Roadway Section:



Roadway Section:
Vandehei Ave. North to Brittany Drive

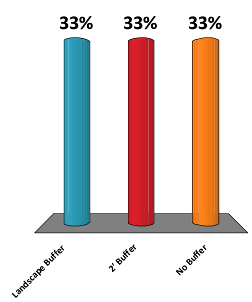


Audience Participation

- Question #4
  - Which roadway section option do you prefer?
  - **8' Landscape Buffer =A**
  - **2' Stamped Concrete = B**
  - **No Buffer = C**

Which roadway section option do you prefer?

A. Landscape Buffer
B. 2' Buffer
C. No Buffer



Where do we go from here?

- Comments will be reviewed and the conceptual plan will be evaluated against the comments
- A final report will be prepared for the MPO including conceptual plan and profiles for the corridor – Bishop Boulevard to Brittany Drive
- Final Conceptual Plan will be presented to the governing body for adoption

Where do we go from here?

- The MPO will hand the project over to the City of Cheyenne who will hire an engineering firm to complete the construction plans for Evers Boulevard from Bishop Boulevard to Vandehei Avenue once enough funds have been collected from the 5th Penny Tax

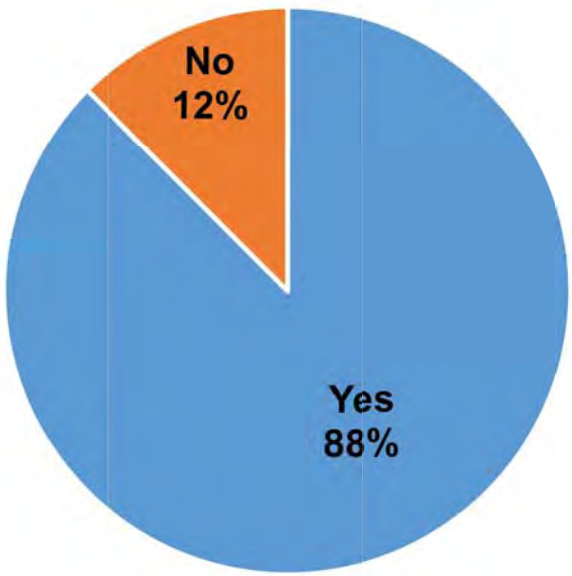
How do you stay involved?

- Provide an email address on the comment form
- Look for updates, including the final report on the MPO web page:

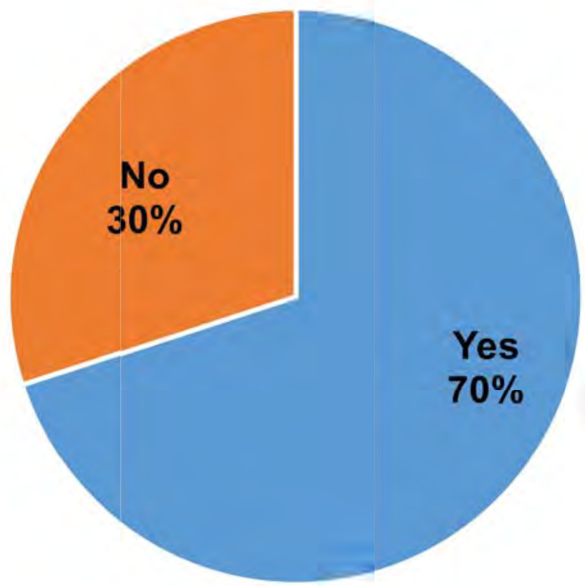
www.plancheyenne.org

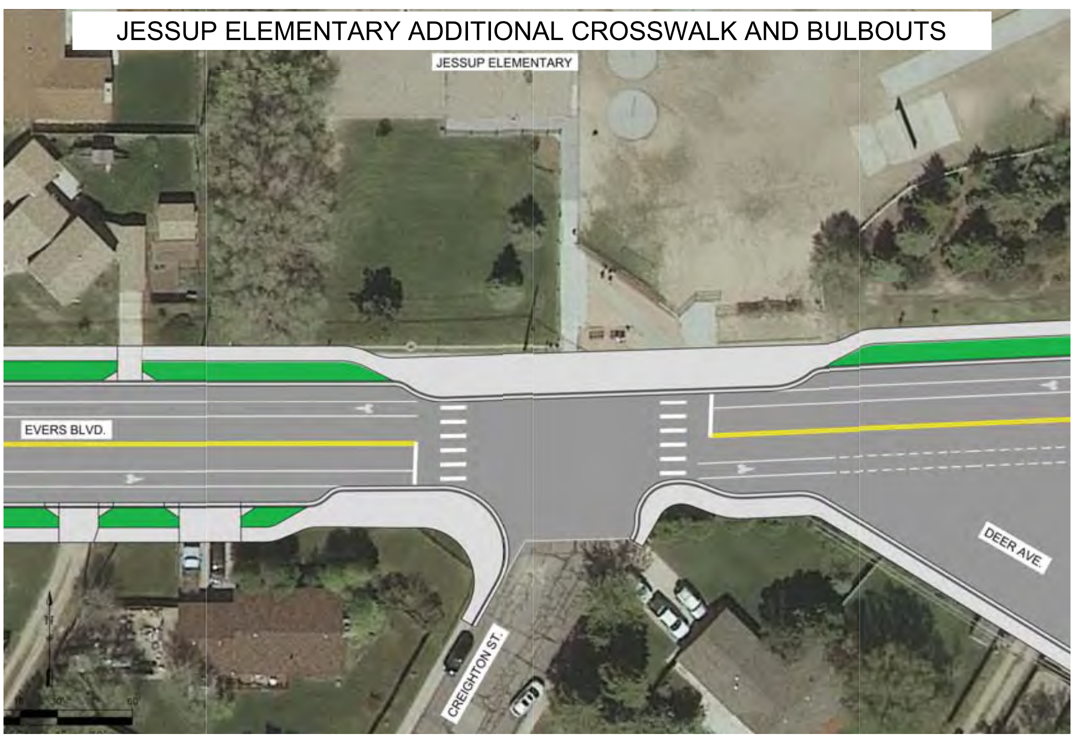
WHAT WE HAVE HEARD SO FAR...

Would you like to see an additional crosswalk and bulbouts constructed at Jessup Elementary?



Would you like to see bulbouts at additional intersections on Evers Boulevard?

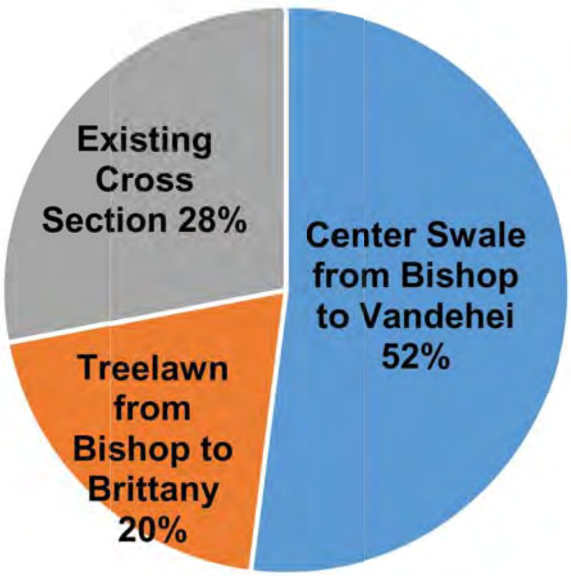




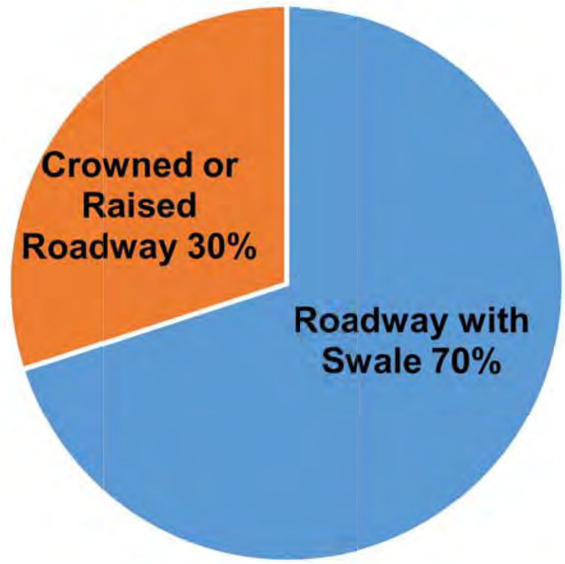
AYRES ASSOCIATES

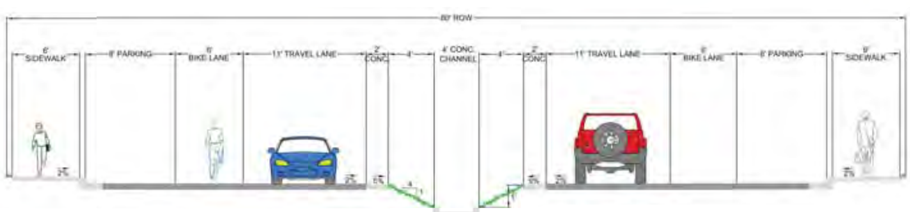
WHAT WE HAVE HEARD SO FAR...

What do you want Evers Boulevard to look like?

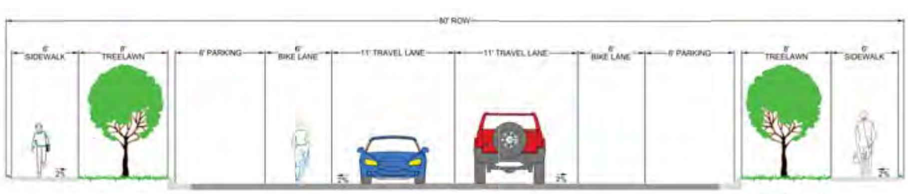


Which roadway option do you like the most for Evers Boulevard?

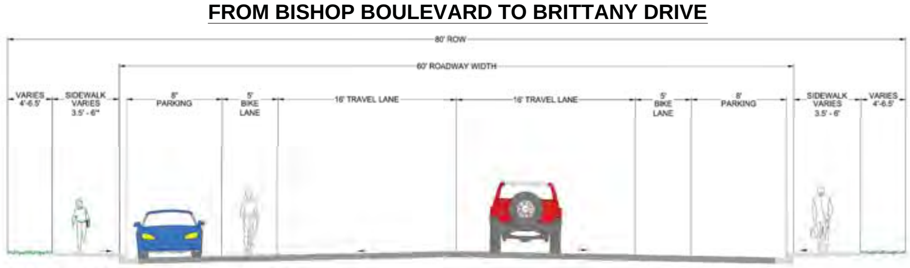




EVERS BOULEVARD PROPOSED CROSS SECTION WITH SWALE
FROM BISHOP BOULEVARD TO VANDEHEI AVENUE



EVERS BOULEVARD PROPOSED CROSS SECTION WITH TREELAWNS
FROM BISHOP BOULEVARD TO BRITTANY DRIVE



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

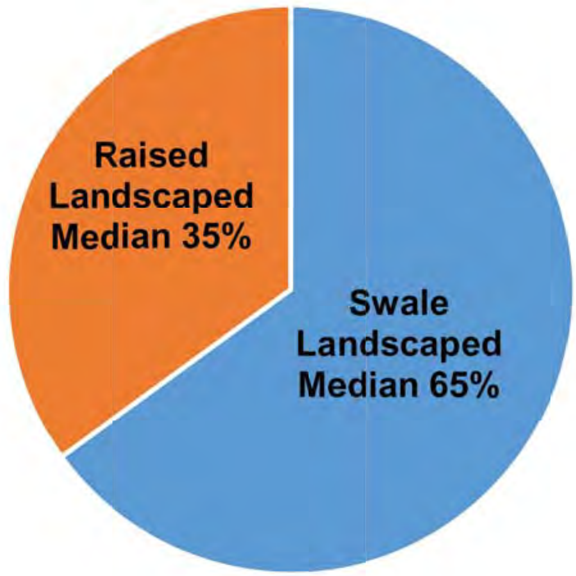
EVERS BOULEVARD EXISTING CROSS SECTION
BISHOP BOULEVARD TO BRITTANY DRIVE

AYRES ASSOCIATES

MPO

WHAT WE HAVE HEARD SO FAR...

Which median type do you prefer along Evers Boulevard?

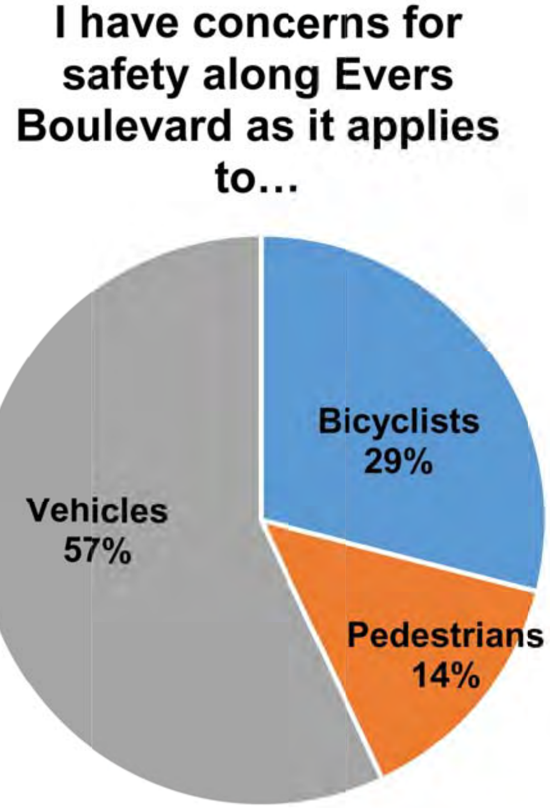



RAISED LANDSCAPED MEDIAN


SWALE LANDSCAPED MEDIAN

AYRES ASSOCIATES

WHAT WE HAVE HEARD SO FAR...



HOW WE ARE ADDRESSING SAFETY CONCERNS:

VEHICLES

- *REDUCING TRAVEL LANE WIDTH WHICH STATISTICALLY REDUCES VEHICLES SPEEDS*

BICYCLISTS

- *INCREASING BIKE LANE WIDTH FROM 5' TO 6'*

PEDESTRIANS

- *INCREASING WIDTH OF SIDEWALKS*
- *ADDING BULBOUTS AND CROSSWALKS AT JESSUP ELEMENTARY SCHOOL*
- *ADDING SIDEWALK BUFFERS WHERE RIGHT-OF-WAY PERMITS*

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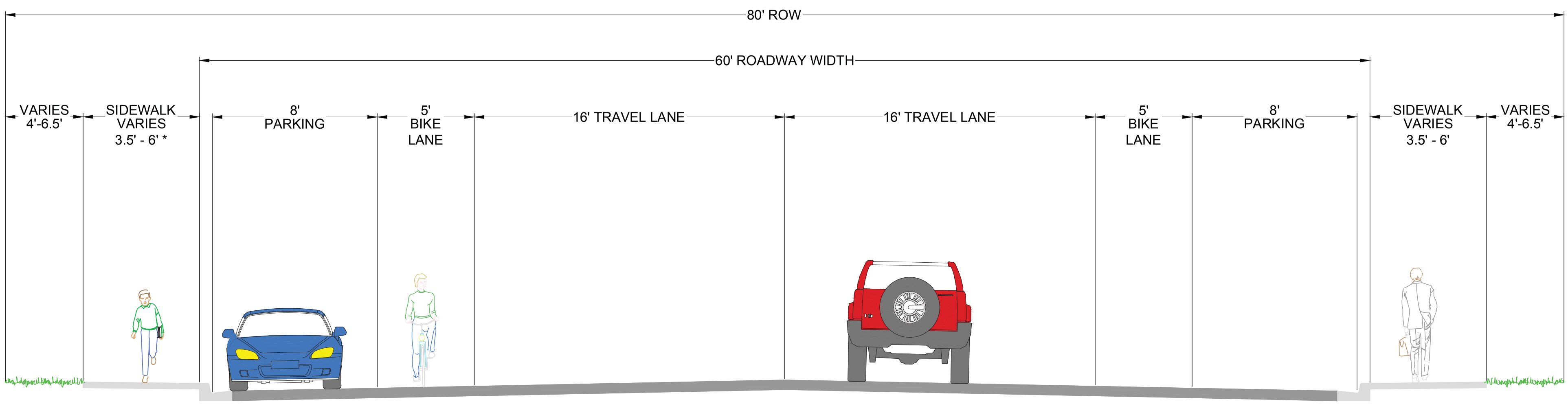
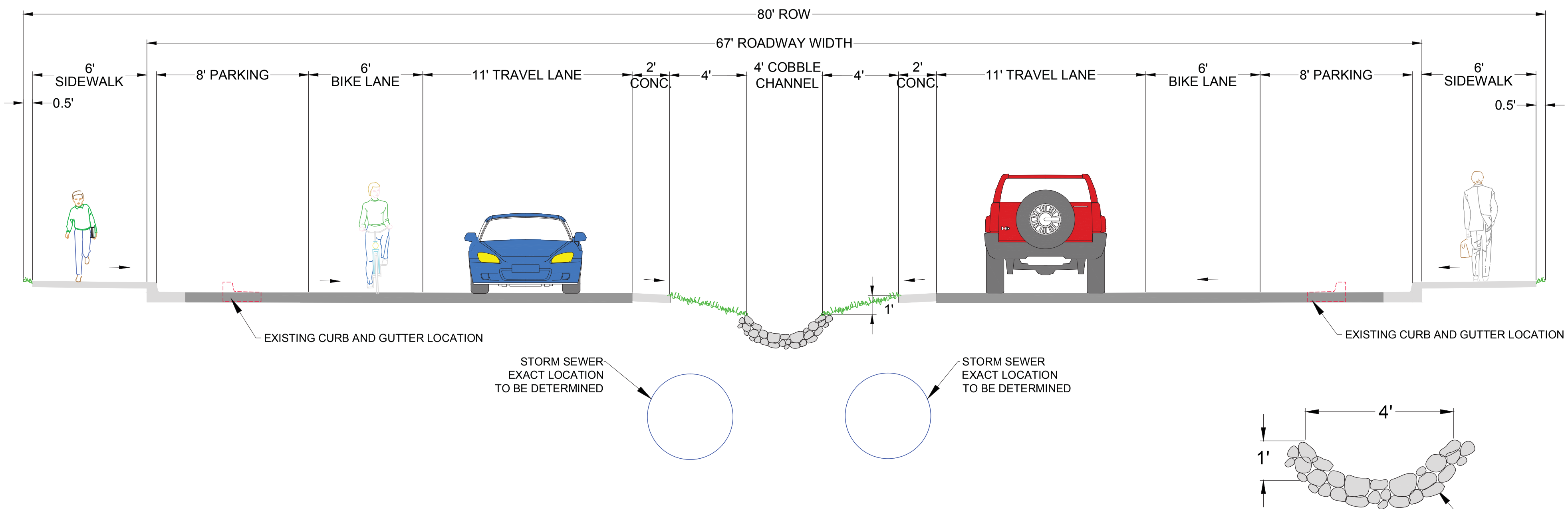
EXISTING 100-YEAR FLOODPLAIN



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

EVERS BOULEVARD EXISTING CROSS SECTION

BISHOP BOULEVARD TO BRITTANY DRIVE



BIO-SWALE DETAIL

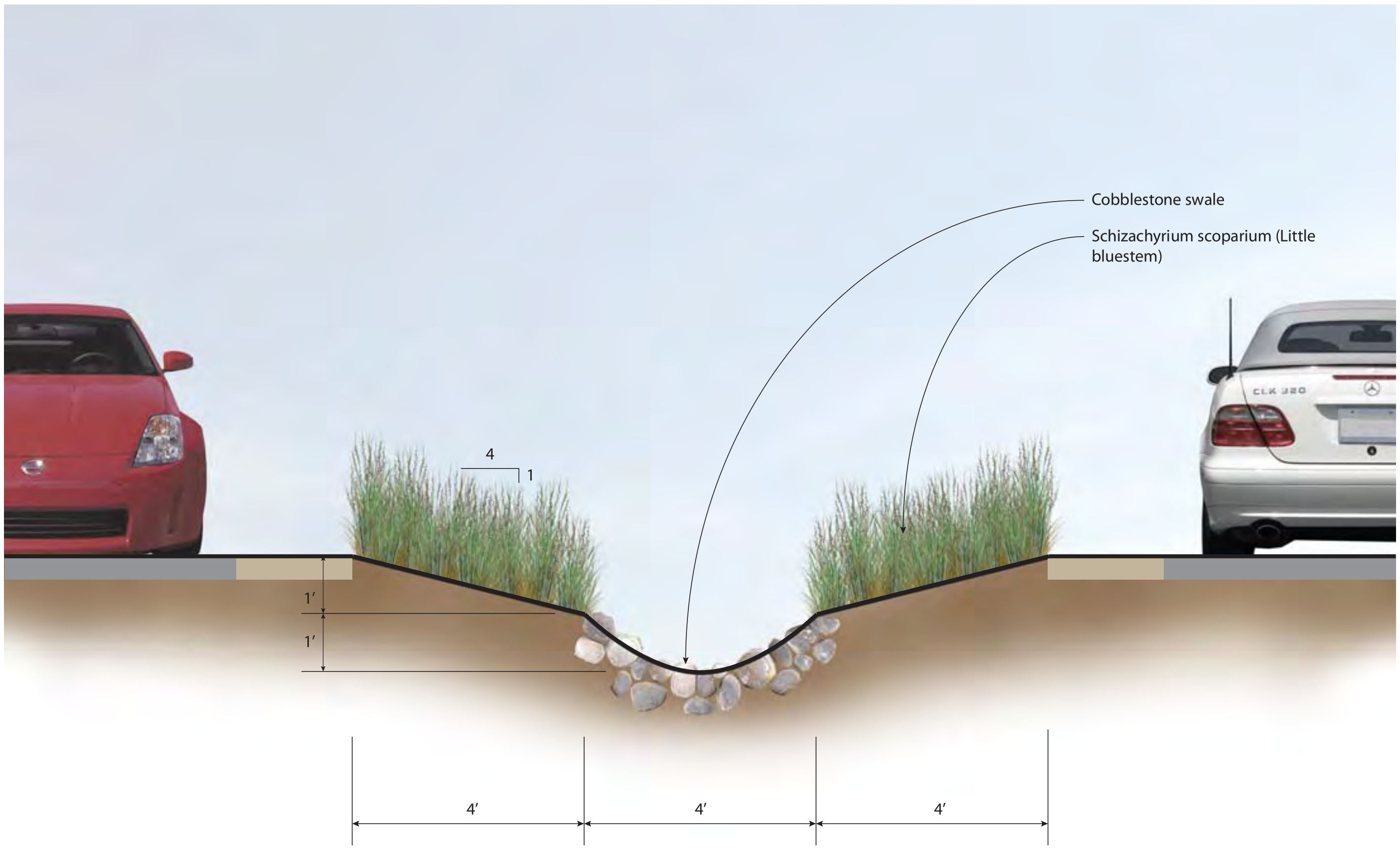
BIO-SWALES ARE LANDSCAPE ELEMENTS THAT HELP TO CLEAN STORMWATER WHILE ALSO PROVIDING ADDITIONAL STORMWATER STORAGE.

EVERS BOULEVARD PROPOSED CROSS SECTION WITH BIO-SWALE

FROM BISHOP BOULEVARD TO VANDEHEI AVENUE

AYRES ASSOCIATES

Evers Boulevard with Bio-Swale



Schizachyrium scoparium

2-4′ high x 1.5-2′ wide
Tolerant of drought & poor soils
Effective for erosion control
Tolerant of short-duration flooding

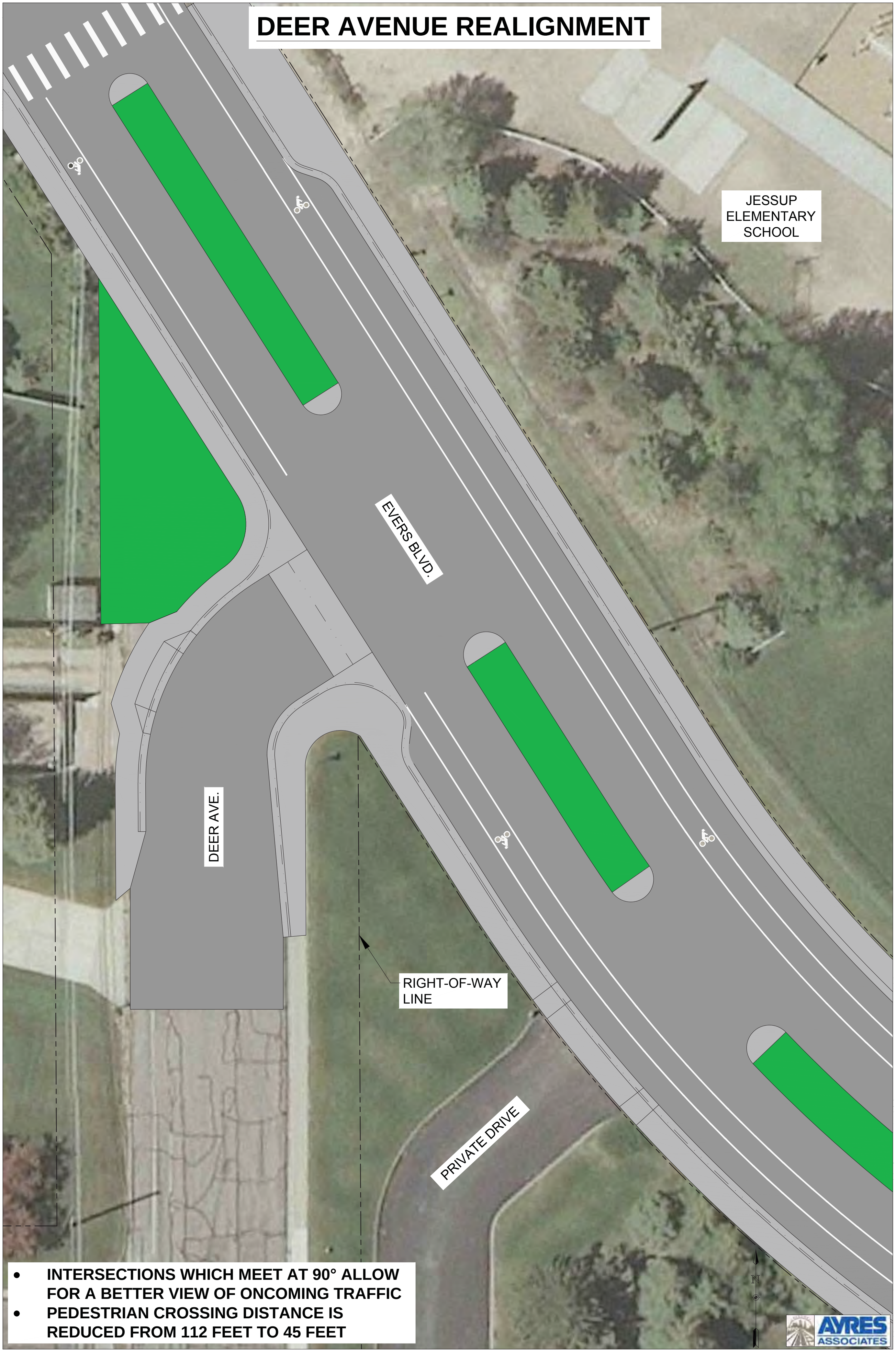
EVERS BOULEVARD WITH BIO-SWALE

BISHOP BOULEVARD TO VANDEHEI AVENUE

AYRES ASSOCIATES

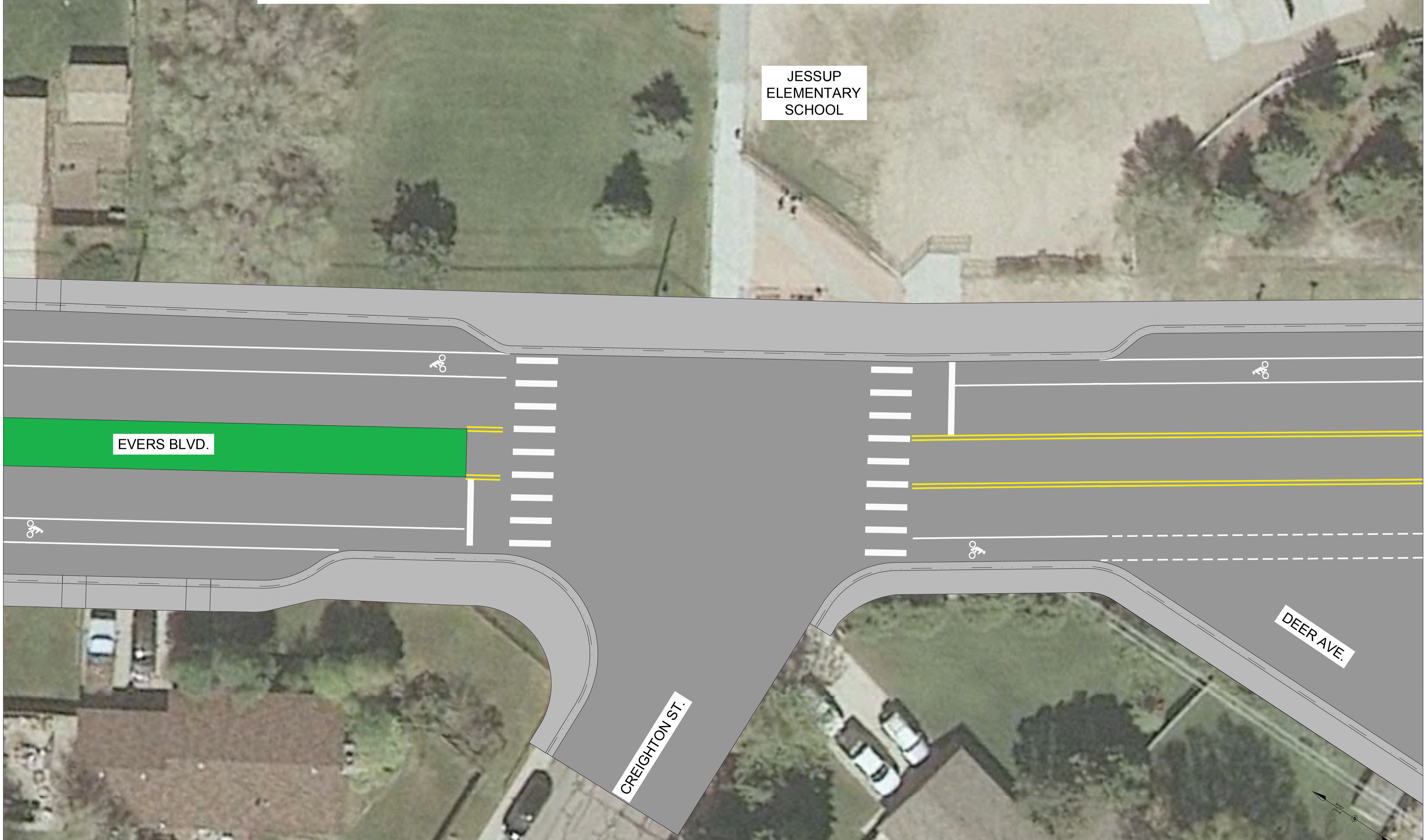
EVERS BOULEVARD BIO-SWALE LOCATIONS

DEER AVENUE REALIGNMENT



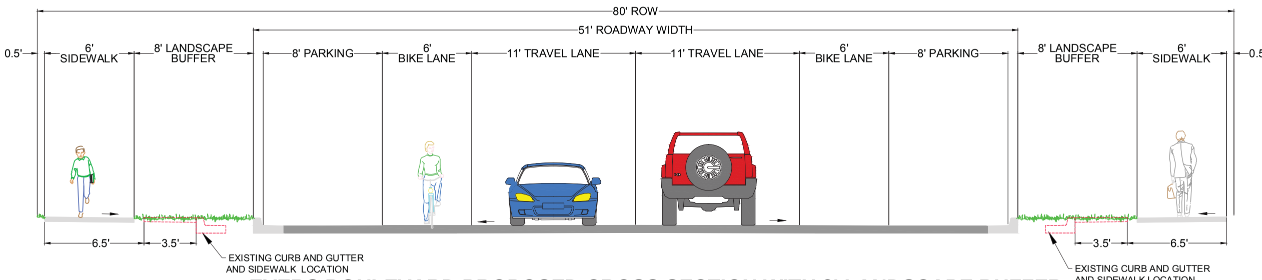
- **INTERSECTIONS WHICH MEET AT 90° ALLOW FOR A BETTER VIEW OF ONCOMING TRAFFIC**
- **PEDESTRIAN CROSSING DISTANCE IS REDUCED FROM 112 FEET TO 45 FEET**

JESSUP ELEMENTARY ADDITIONAL CROSSWALKS AND BULBOUTS



- PEDESTRIAN CROSSING DISTANCE IS REDUCED FROM 60 FEET TO 50 FEET
- NO PARKING BETWEEN CROSSWALKS ALLOWS FOR GREATER PEDESTRIAN VISIBILITY

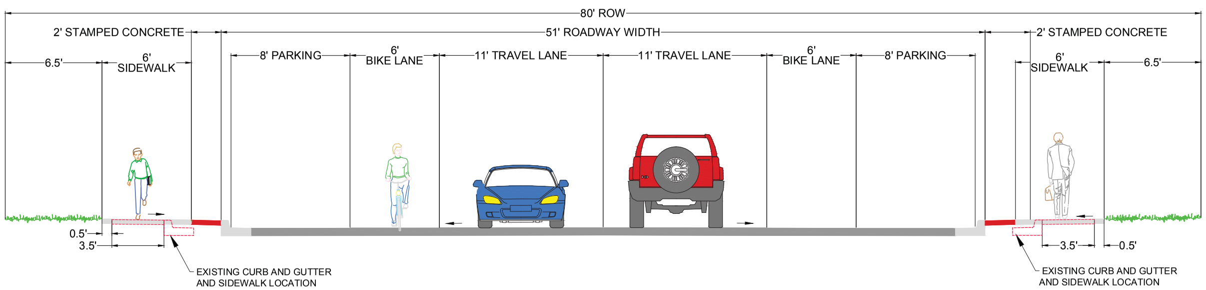
FROM VANDEHEI AVENUE TO BRITTANY DRIVE



EVERS BOULEVARD PROPOSED CROSS SECTION WITH 8' LANDSCAPE BUFFER

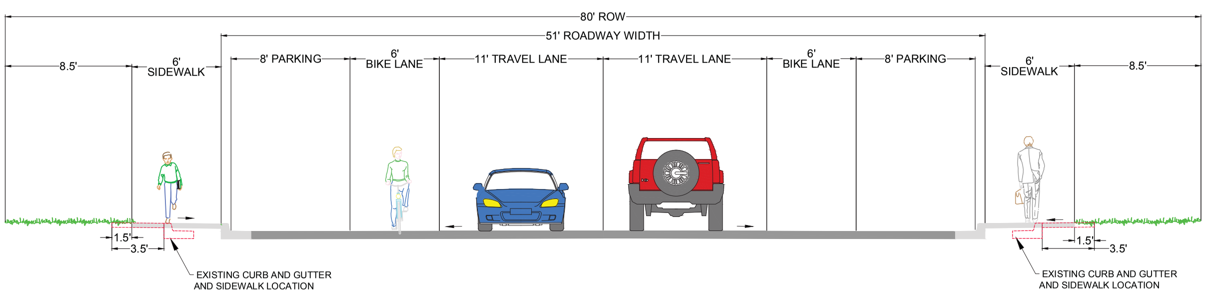
DO YOU PREFER THE 8' LANDSCAPE BUFFER?

WHAT DO YOU PREFER THE BUFFER TO LOOK LIKE?		
STAMPED CONCRETE?	LANDSCAPING ROCK?	SOD?



EVERS BOULEVARD PROPOSED CROSS SECTION WITH 2' STAMPED CONCRETE BUFFER

DO YOU PREFER THE 2' STAMPED CONCRETE BUFFER?



EVERS BOULEVARD PROPOSED CROSS SECTION WITHOUT BUFFER

DO YOU PREFER THE ROADWAY WITHOUT A BUFFER?

WHY ARE WE PROPOSING A BUFFER BETWEEN THE SIDEWALK AND THE CURB?

PLACING A SEPARATION BETWEEN VEHICLES AND PEDESTRIANS CREATES A SAFER AND MORE PLEASANT ENVIRONMENT FOR SIDEWALK USERS.

AYRES ASSOCIATES

ROADWAY COLLISION DIAGRAM

CRASH DATA SUMMARY

SYMBOLS	TYPES OF COLLISIONS	CRASHES PER YEAR	CRASH PATTERN
MOVING VEHICLE	REAR END	2009 3	• 5 CRASHES DURING SNOW OR ICE CONDITIONS
PARKED VEHICLE	HEAD ON	2010 2	• 4 CRASHES DURING DARK CONDITIONS
FIXED OBJECT	RIGHT ANGLE	2011 3	• 2 CRASHES RESULTING IN INJURIES
	ANGLE (FRONT TO SIDE)	2012 2	
	SIDE SWIPE	TOTAL 10	

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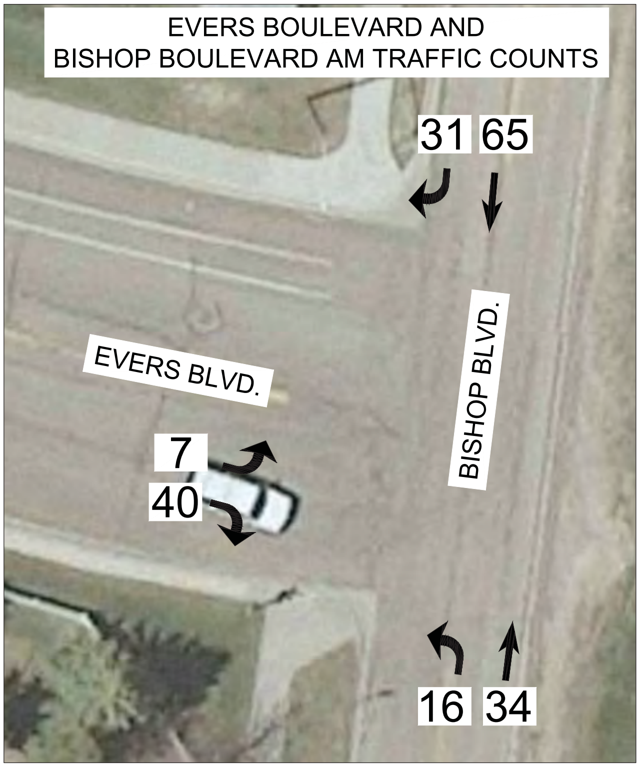
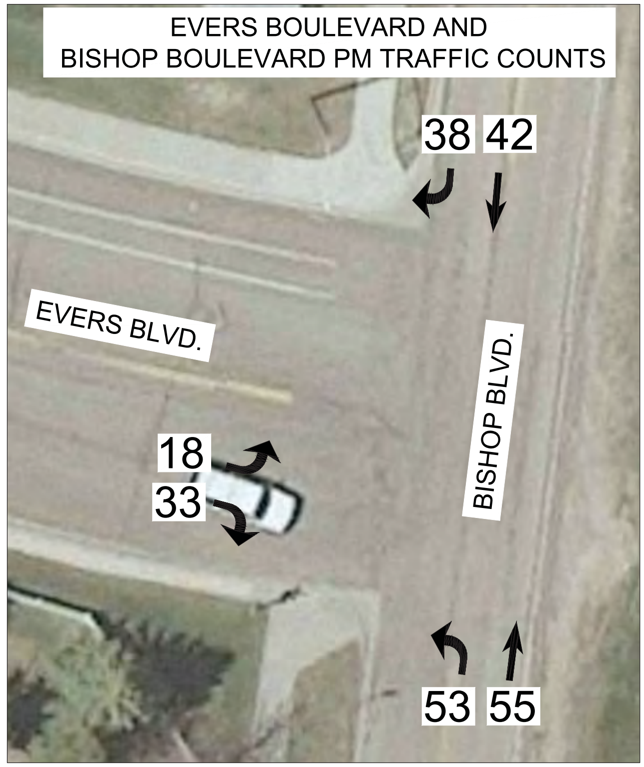
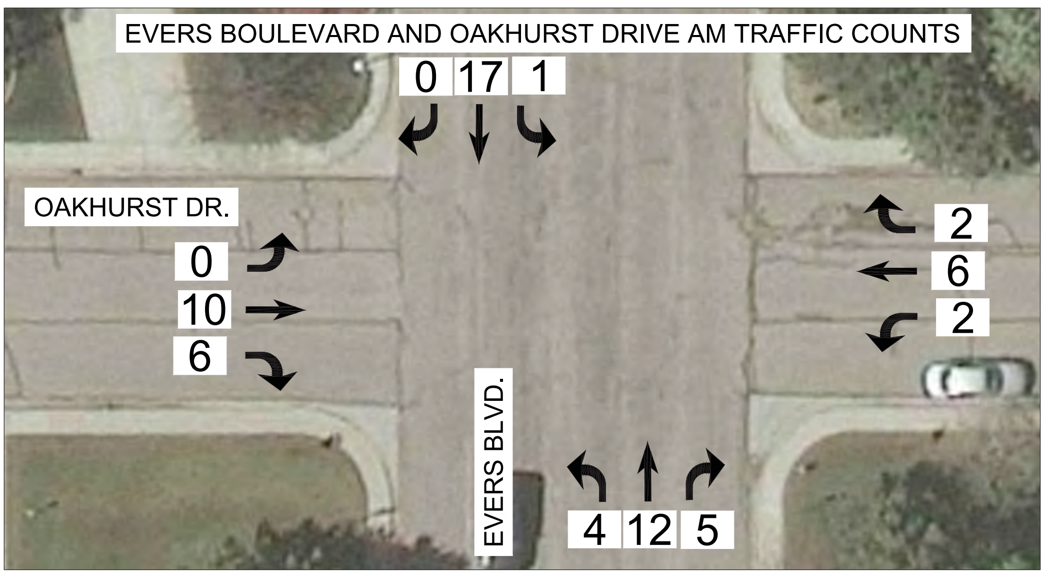
EXISTING INTERSECTION TRAFFIC COUNTS



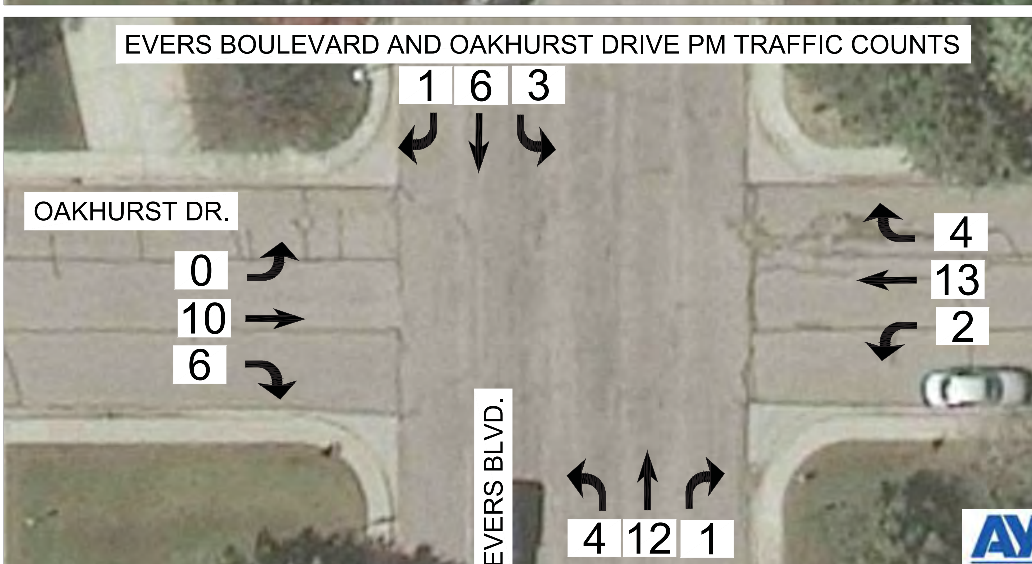
EVERS BOULEVARD AND BISHOP BOULEVARD AM TRAFFIC COUNTS



EVERS BOULEVARD AND BISHOP BOULEVARD PM TRAFFIC COUNTS



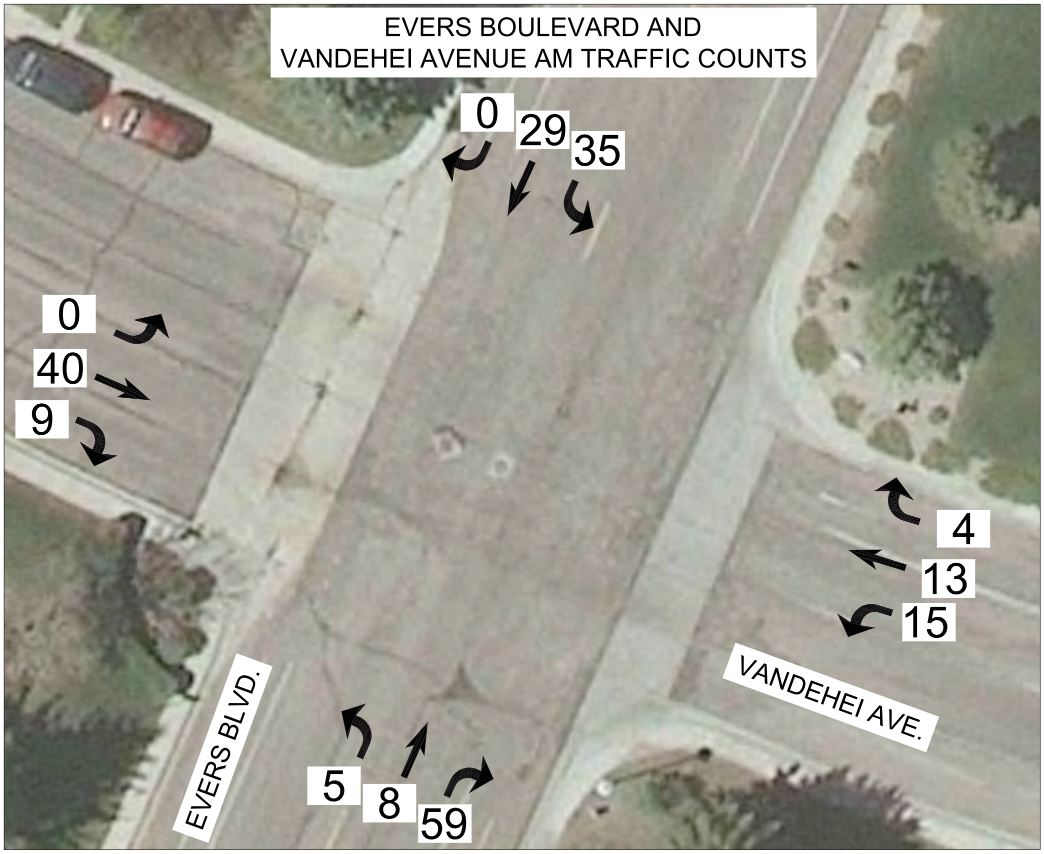
EVERS BOULEVARD AND OAKHURST DRIVE AM TRAFFIC COUNTS

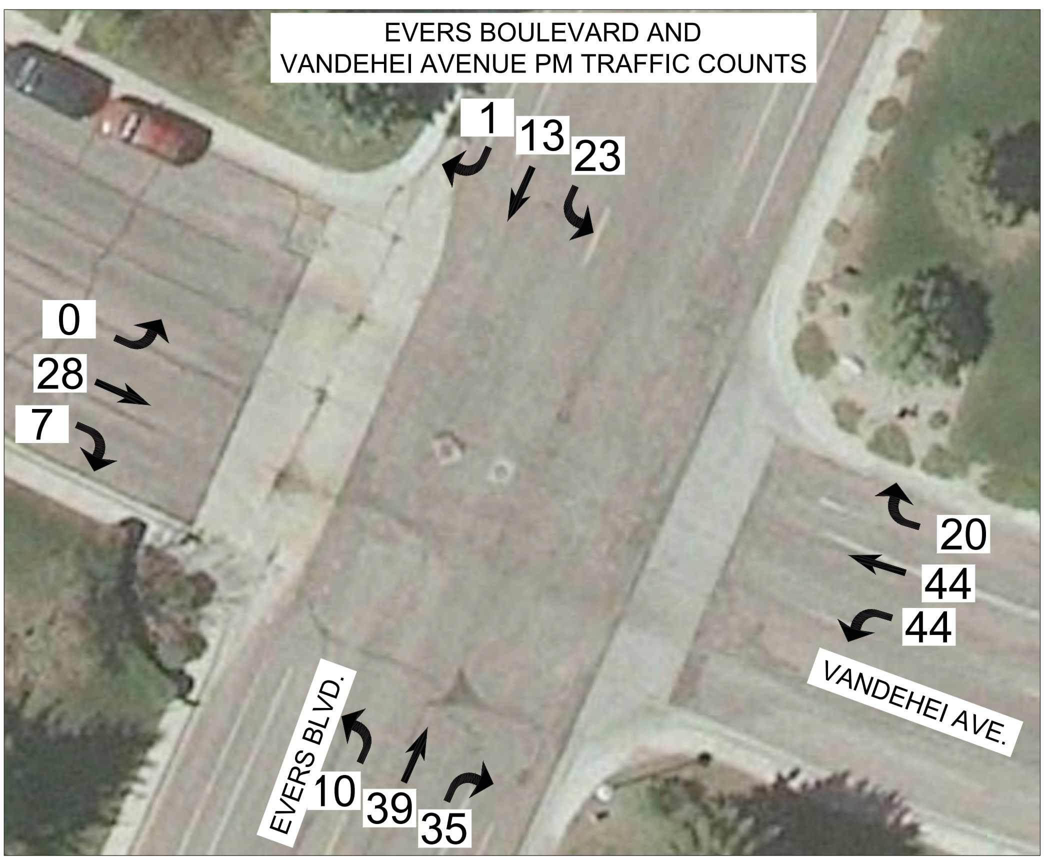


EVERS BOULEVARD AND OAKHURST DRIVE PM TRAFFIC COUNTS

AYRES ASSOCIATES

EXISTING INTERSECTION TRAFFIC COUNTS





Evers Boulevard Corridor Plan

The Cheyenne Metropolitan Planning Organization and Ayres Associates are developing a plan for this roadway that addresses drainage and transportation concerns for all users including students, cyclists, pedestrians and vehicles. We would appreciate your feedback on these topics so that the corridor plan can be shaped to reflect the needs and desires of the users. This is the second public input opportunity for the Evers Boulevard Corridor Plan.

Please use the City's MindMixer platform, a virtual townhall to provide feedback on these topics and join in the discussion with other citizens@ Engage Cheyenne by MindMixer If you would prefer to be mailed a paper copy of these items and provide written comments please make your request to Darci Hendon: Hendond@AyresAssociates.com, or call 307.634.9888 ext. 3593.

TOPIC #1

DRAINAGE – Based on the feedback we have received, reducing the impacts caused by storm water is the highest priority for residents along Evers Boulevard. There is too much storm water flowing down the street and inadequate infrastructure capacity to handle the flow. The proposed drainage design would incorporate an underground storm sewer system with inlets from approximately Dogwood Avenue to Bishop Boulevard. This drainage system is limited in size due to the existing culverts which are already in place under Interstate-25.

An analysis of storm water flow has been done. If the design were to include a traditional storm sewer system with inlets along the gutters the results would be:

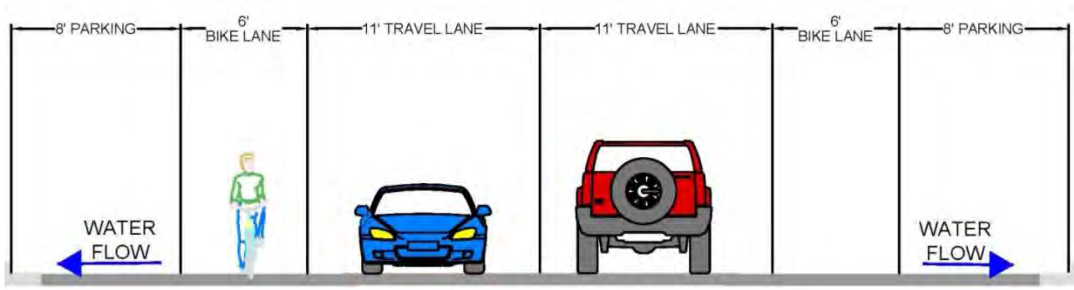
- A 10-year frequency event would be completely contained within a traditional storm sewer system. This means; all of the runoff from a 10-year event would be collected in the storm sewer system and not cause ponding on the roadway, in the gutters, or in the valley pans.
- A 25-year frequency event would be contained in the storm sewer system until Hirst Street. South of Hirst Street the storm sewer system would be full and unable to collect more water. Storm water would flow within the roadway, contained between the curbs until Creighton Street. South of Creighton Street, to Bishop Boulevard, storm water would get 9-inches deep. This means that the water would be 3-inches higher than the curb.
- A 50-year frequency event will cause storm water to get 9-inches deep between Vandehei Avenue and Hirst Street, 10-inches deep between Hirst Street and Creighton Street, and 11-inches from Creighton Street to Bishop Boulevard. Standard curb is 6-inches tall, thus at the intersection of Evers Avenue and Bishop Boulevard the storm water would be 5-inches higher than the curb.

The analysis shows that a traditional storm sewer system, with inlets along the gutter, will continue to cause ponding to the depths listed above, in a larger storm event. For this reason we are considering another option in addition to storm sewer pipes under the curbs and that option is constructing a storm sewer swale in the middle of Evers Boulevard. An analysis on the swale option has not been completed, but the swale will reduce ponding because the swale itself will hold additional storm water. A complete analysis will be done if the feedback we receive indicates that this is an option we should continue to explore.

Discussion:

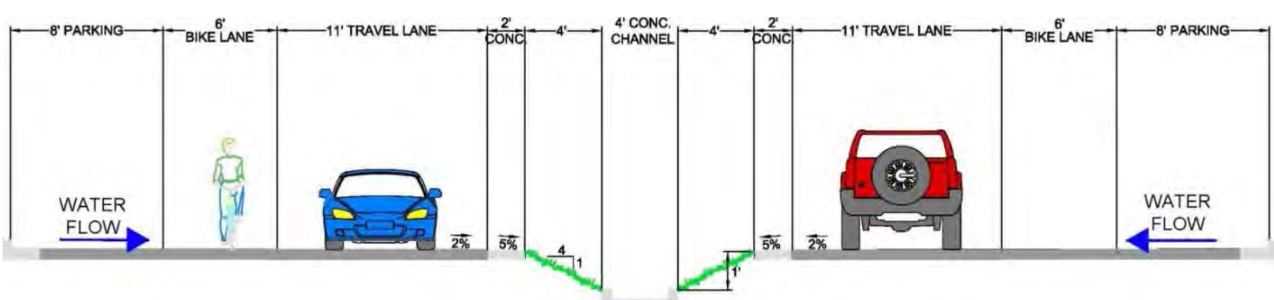
- There are two options proposed to direct stormwater into the new storm sewer system - a crowned or raised roadway with a traditional storm sewer system, and a roadway with a swale.

  - Crowned Roadway – places the highest point of the roadway in the center and directs water to the curbs on either side. Inlets are placed in the gutter and allow for water to enter the storm sewer pipe which is under the roadway.



CROWNED ROADWAY

  - Roadway with a Swale – Water is directed to the center of the roadway by sloping down from the gutter to a swale constructed in the center of the roadway. The swale is constructed with a concrete channel at the bottom with inlets placed along the channel allowing stormwater to enter the storm sewer pipe which is under the roadway. A swale is only being considered as an option along **Evers Boulevard from Vandehei Avenue south to Bishop Boulevard.**



ROADWAY WITH SWALE

Questions:

- Which roadway option do you like the most and why?
- Tell us why you don't like the other option.

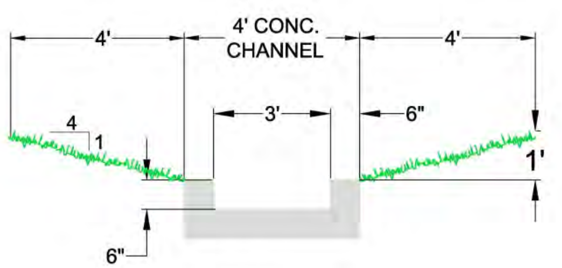
TOPIC #2

ROADWAY CROSS SECTIONS – The 60 feet wide pavement on Evers Boulevard is currently wider than the City standard for a "Collector" roadway. The City standard for a "Collector" roadway is a 51-foot pavement width with tree lawns between the curb and the sidewalk. There are several cross-section options to consider for Evers Boulevard:

Discussion:
Evers Boulevard has an existing right-of-way width of 80 feet. Currently 60 feet of the existing right-of-way are being utilized by the roadway from back of curb to back or curb.

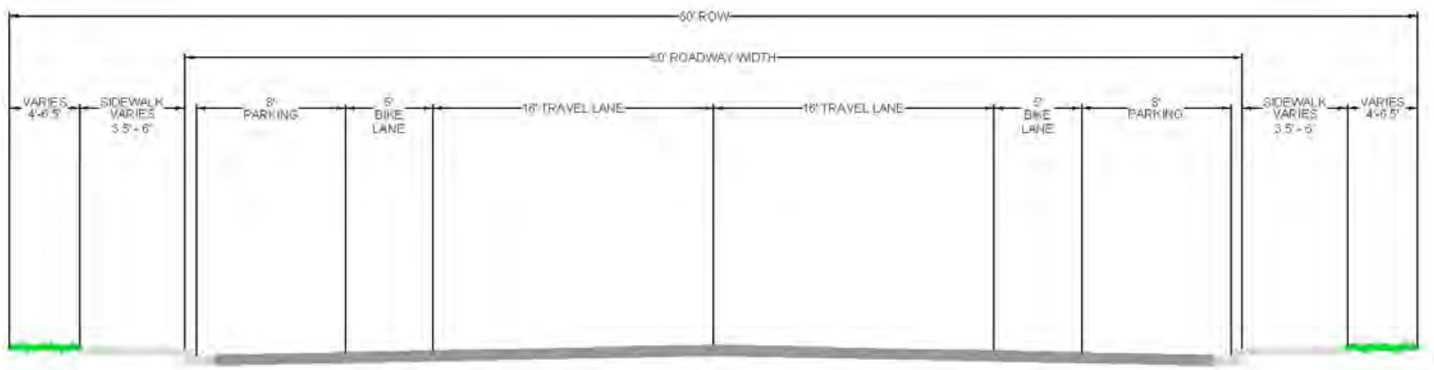
- Cross-Section with Tree lawns (Bishop Boulevard to Brittany Drive)
  - The wide travelway will be reduced to 51 feet while maintaining the existing bicycle and parking lanes on both sides of the street.
  - The outside edge of the sidewalks will be brought out to the edge of the existing 80 foot right-of-way. Currently, the roadway and adjacent sidewalks do not occupy the full right-of-way width; by expanding the sidewalks to the right-of-way line the sidewalks would be moved further away from the roadway but would still remain inside platted City right-of-way.
  - An 8 foot tree lawn could be added to both sides of the road. Per City Code, the adjacent property owner is responsible for maintenance of the tree lawn. In the past tree lawns have been landscaped using sod, seed, and/or decorative rock and optional trees. The possibility of flooding would be taken into consideration when deciding what type of landscaping is appropriate in the tree lawns.

- Cross-Section with Swale (Bishop Boulevard to Vandehei Avenue)
  - The travelway will be 67 feet while maintaining the existing bicycle and parking lanes on both sides of the street.
  - Swales will be placed periodically (not continuously) along the roadway in locations that do not interfere with turning onto cross streets.
  - Placement of a swale will restrict left turning into and out of some driveways onto Evers Boulevard.
  - The roadway will be sloped towards the center to direct water into the swale.
  - The center swale will have landscaped sides at a 4:1 slope (25%) with a 4 foot concrete channel bottom and inlets connected into storm sewer pipes.

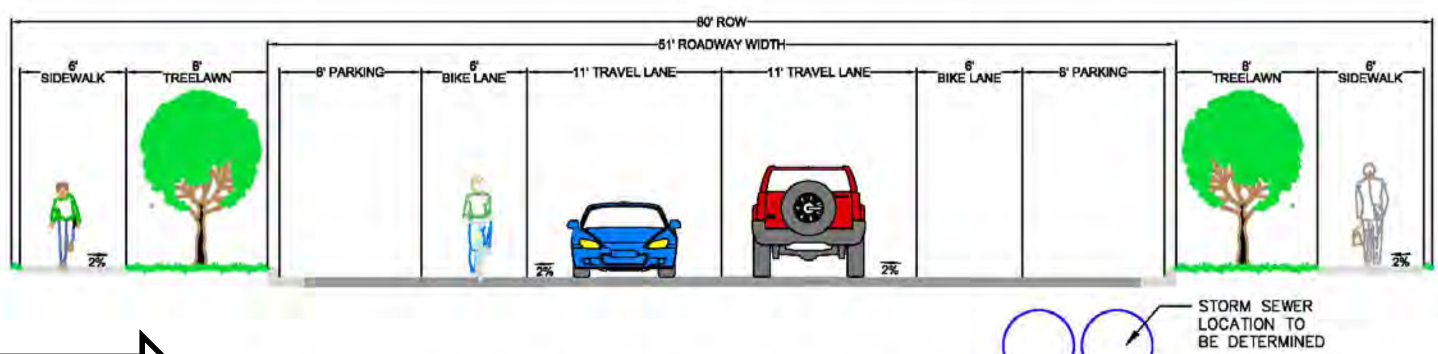


SWALE DETAIL

- The outside edge of the sidewalks will be brought out to the edge of the existing 80 foot right-of-way. Currently, the roadway and adjacent sidewalks do not occupy the full right-of-way width; by expanding the sidewalks to the right-of-way line the sidewalks would be moved further away from the roadway, but would still remain inside platted City right-of-way.
- The swale is being considered as an option from Vandehei Avenue south to Bishop Boulevard.

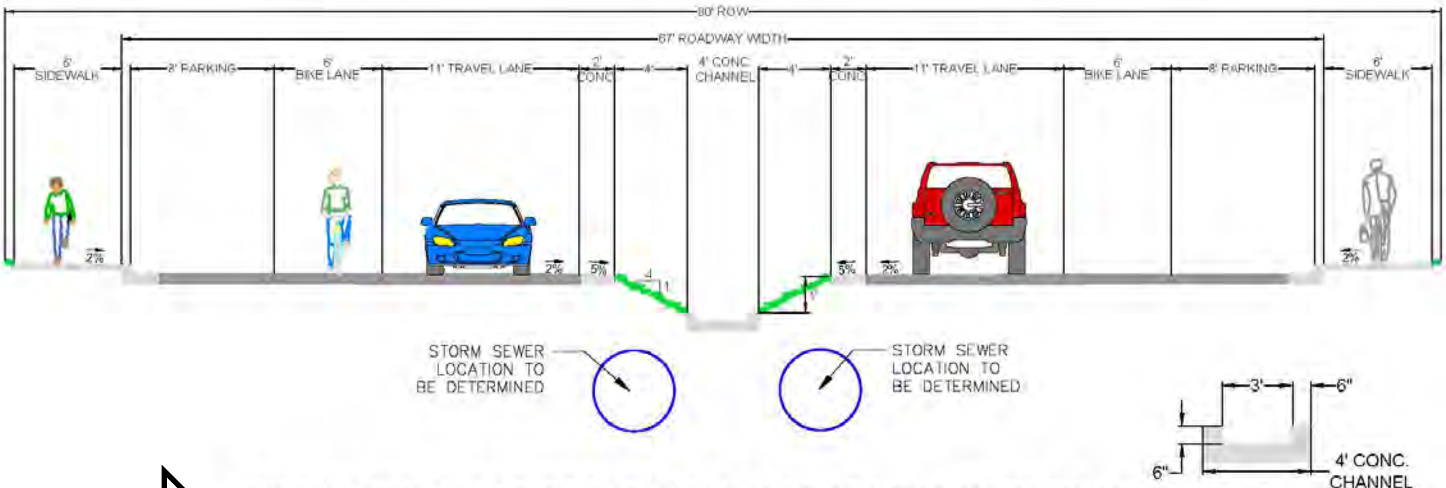


EVERS BOULEVARD EXISTING CROSS SECTION
BISHOP BOULEVARD TO BRITTANY DRIVE



Option1

EVERS BOULEVARD PROPOSED CROSS SECTION WITH TREELAWNS
FROM BISHOP BOULEVARD TO BRITTANY DRIVE



Option2

EVERS BOULEVARD PROPOSED CROSS SECTION WITH SWALE
FROM BISHOP BOULEVARD TO VANDEHEI AVENUE

CONCRETE CHANNEL DETAIL

Questions:

- Which option do you prefer and why?
- What elements of these proposed cross sections do you like the most and why?
- What elements do you like the least and why?

TOPIC #3

MEDIANS – The comments we received during the first public involvement process were mixed about the need for a median on this roadway. The image below shows a center median between Deer Avenue and Bishop Boulevard: 125-feet long. The median is shown 8-feet wide with 4-foot wide tree lawns between the curb and the sidewalk. If a swale option is not selected, at Vandehei Avenue a 70-foot long median could be added on Evers Boulevard on the south leg of the intersection. With either option a 40-foot long median could be added to the north leg of the intersection.

Raised medians have been installed in various locations in Cheyenne to help manage traffic through residential neighborhoods. A good example would be the median islands along Vandehei Avenue between Hynds Boulevard and Yellowstone Road. Medians can also be constructed as swales to enhance drainage and water quality where the elevation of the median is lower than the surrounding pavement. Medians can be landscaped with sod, seed, and/or decorative rock, and optional trees or alternatively they can be hardscaped with concrete.

CHEYENNE MPO

AYRES ASSOCIATES

Raised Landscaped Median

Swale Landscaped Median

Questions:

- Which median type would you prefer at Evers and Bishop Boulevard?
- Which median type would you prefer at Evers and Vandehei Avenue?
- Why?

CHEYENNE MPO

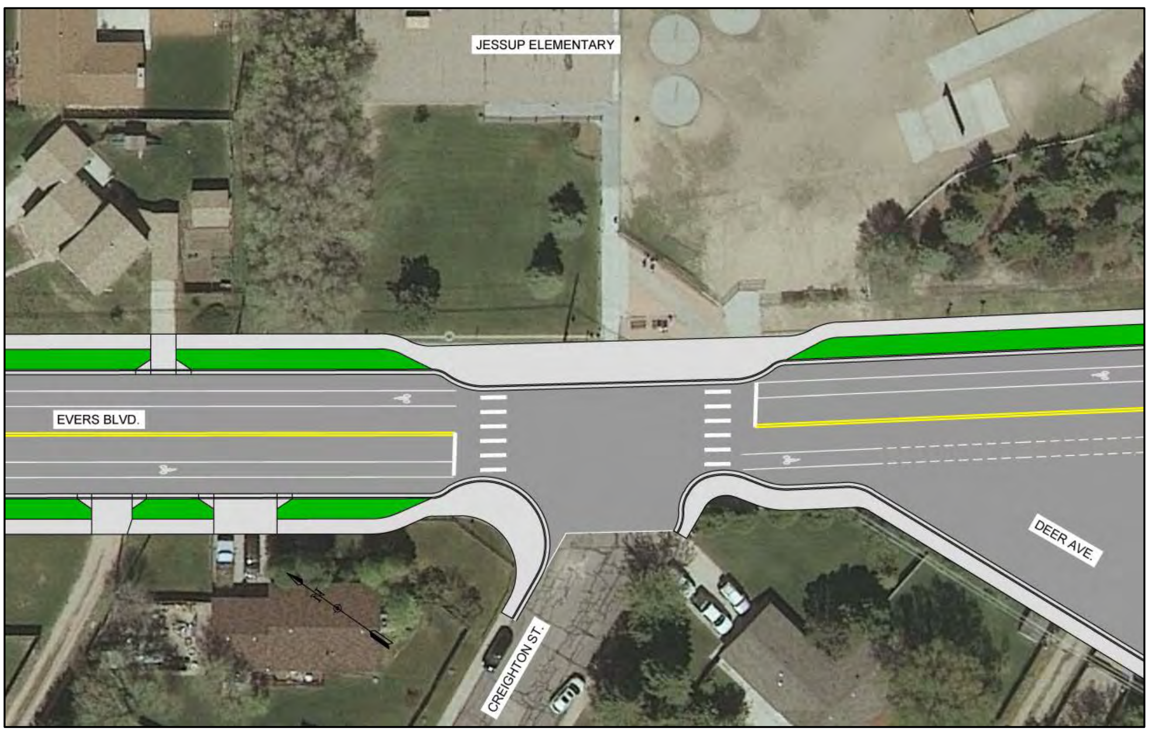
AYRES ASSOCIATES

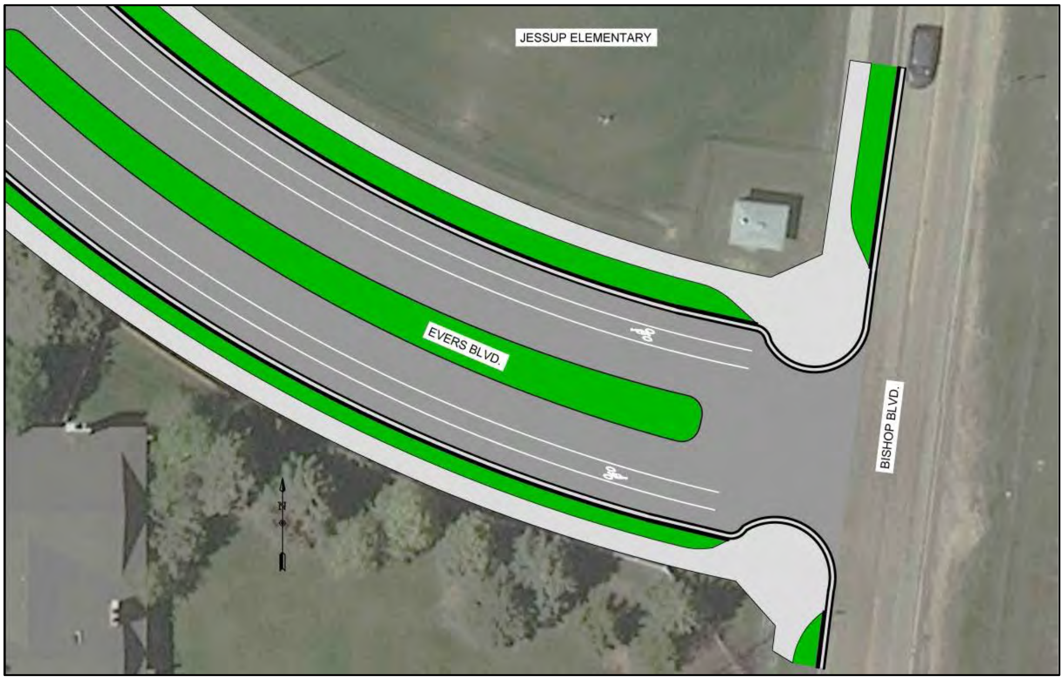
TOPIC #4

BULBOUTS AND SAFE CROSSING OPTIONS – During the first public involvement process we received many comments concerning the safety of pedestrians crossing the roadway, particularly for students at Jessup Elementary School.

Discussion:

- Bulbouts define the location and space for pedestrians to cross the road and reduce the crossing distance for pedestrians making it a safer crossing.
- Bulbouts reduce the width of the roadway which in turn statistically reduces vehicle speeds.
- The following image shows the option of bulb-outs at the street corners near Jessup Elementary School with an additional crosswalk on the south side of Creighton Street. Pedestrians are frequently crossing at this location rather than crossing Creighton Street and then proceeding to the one existing crosswalk. Moving the curb line closer to the roadway and eliminating parking between the crosswalks provides a defined location for pedestrians and increases pedestrian visibility because they are not entering the roadway in between parked vehicles.





Questions:

- Would you like to see improvements to the Jessup Elementary School Frontage off Evers Boulevard?
- If not, are there any other improvements you would like us to consider?
- Would you like bulbouts at intersections to be included in the conceptual plan for Evers Boulevard?

Topic Name: Gateways

Idea Title: I see no reason to have a gateway element included

Idea Detail: This is not the main entrance into Western Hills and I think gatway components there are a waste of money

Idea Author: Mike S

Number of Seconds 0

Number of Points 2

Number of Comments 0

Idea Title: GAteway

Idea Detail: I see no reason for a Gateway at this entrance off of Bishop. If gateway is even wanted, it should be at the Vandehei entrance.

Idea Author: Jeff W

Number of Seconds 0

Number of Comments 0

Topic Name: Ice Buildup

Idea Title: Ice

Idea Detail: All along the front of the school to the intersection immediately North of school (Creighton?)

Idea Author: Mike S

Number of Seconds 0

Number of Comments 0

Address: 6421 Evers Blvd 82009, United States

Idea Title: Evers and Vandehei

Idea Detail: At Evers and Vandehei the slope of the streen is not continuous and water, snow and ice buildup on the west side of Evers immediately north of the Vandehei intersection.

Idea Author: David M

Number of Seconds 0

Number of Comments 0

Idea Title: Fix the slope of Evers through Vandehei intersection.

Idea Detail:

New slope of Evers

Idea Author: David M

Number of Seconds 0

Number of Comments 0

Address: 800 Vandehei Ave 82009, United States

Topic Name: Jessup Elementary School

Idea Title: No gatway or other changes

Idea Detail: The existing arrangement of bus stops in the back on Bishop and not in front on Evers where parents drop is probably appropriate IF design of school stays the same. Any anticipated road work should be coordinated with LCSD #1 to see what future plans they have for destruction and rebuilding Jessup in the next few years. In addition, I don't want a gatway concept at Evers and Bishop becuase there could be safety concerns with increased traffic encouraged to come into and out of the neighborhood throught hat intersection. Existing Crosswalk is a must given volume of students coming and going, as is existing speed limit.

Idea Author: Mike S

Number of Seconds 0

Number of Comments 1

Comment 1: Mike, good point. A LCSD#1 Planning Department staff member is on the project steering committee and will be a liaison between the City and the School District so everything is in place for future coordination.
| By Nancy O

Topic Name (Instant Poll): Safety Concerns

Idea Title: Bicyclists

Number of Seconds 1

Idea Title: Pedestrians

Number of Seconds 0

Idea Title: Vehicles

Number of Seconds 0

Comments

Number of Comments 2

Comment 1: Because of it's width, vehicles really move on Evers at some times of day. Would like to see traffic slowed and bicyclists, especially in a kid-friendly residential area, better protected. | By Anne S W

Comment 2: Please consider adding yield and or stop signs the entire length of Evers, including North of Brittany. Flattening the road some should help bicycle safety for those riding on shoulder. A lot of kids do. The large turnsjust North of Vandehei cause concerns as vehicles go too fast and don't always stay in proper lane, but not sure that anything can be done at this point. | By Mike S

Topic Name: Storm Water Drainage

Idea Title: Drainage and pavement destruction

Idea Detail: The drainage problem does not only occur during large storm events, but any time there is any moisture at all. The result is dangerous around Jessup, but along Evers further North. THe large crown in the street and repeated overlays has only exacerbated the problem. I hope that in addition to improving the drainage you will consider flattening the crown somewhat as well.

Idea Author: Mike S

Number of Seconds 0

Number of Comments 1

Comment 1: Thank you Mike for your suggestion. Yes, the enlarged crown will be removed when the street is rebuilt. | By Nancy O

Idea Title: Drainage needs to be improved

Idea Detail: I live at 800 Vandehei, Vandehei and Evers, and all of Western Hills north and west of us drains through the one drainage run right behind our house. At times of a major thunderstorm, like last night, the amount of water draining through that one run can be extremely dangerous especially to small animals and even small children. Something needs to be done to improve the drainage. Also, the slope through the Evers and Vandehei intersection needs to be corrected. On the west side of Evers north of Vandehei the water pools along the west curb. It is destroying the curb, gutter and even the street itself. In winter the problem becomes even worse when that water freezes.

Idea Author: David M

Number of Seconds 0

Number of Comments 1

Comment 1: Thank you David, for this important information. Duly noted. | By Nancy O

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

TECHNICAL MEMORANDUM

To: Nancy Olson, Cheyenne MPO

From: Ayres Associates

Date: August 31, 2015 Project No.: 32-1835.00

Re: Evers Boulevard Traffic Data

Background

The Cheyenne Metropolitan Planning Organization (MPO) has requested a speed and traffic safety evaluation for Evers Boulevard from Bishop Boulevard to Brittany Drive. Hi-Star traffic counters were used to collect speed and volume data along the corridor. Turning movement counts provided by the MPO were used to evaluate the existing roadway geometry. Recent crash data, obtained from WYDOT, was used in combination with general roadway geometric information for the purpose of identifying traffic safety concerns.

The study area included the 1.0 mile segment of Evers Boulevard from Bishop Boulevard to Brittany Drive as shown in Figure 1. The terrain is rolling, sloping down from Brittany Drive to Bishop Boulevard. Evers Boulevard is a collector roadway in the Western Hills neighborhood in northwest Cheyenne, Wyoming. The existing roadway section is 60 feet from back of curb to back of curb. Private residences and Jessup Elementary School are along this section of the corridor, corresponding driveways and alleys face onto Evers Boulevard. Parking is provided on-street throughout the corridor and bike lanes are striped from Bishop Boulevard to Oakhurst Drive. The posted speed limit for the roadway is 30 mph, the speed limit is reduced to 20 mph on the south end of the corridor by Jessup Elementary School during school dropoff and pickup times. The speed and safety study was conducted due to residents' concerns of speeding along the corridor.

Figure 1 : Evers Boulevard Aerial View

Spot Speed Study

A spot speed study was performed Tuesday through Thursday, September 16-18, 2014 at Creighton Street, north of Ranger Drive, and south of Rodeo Avenue. Data collected included 85th percentile speeds, percent of vehicles exceeding the posted speed limit, average speed, and 50th percentile speed. All data was collected using Hi-Star traffic counters; statistics were recorded in 15 minute time periods. The three data collection locations are shown in Figure 1 as black diamonds. Data collected during the spot speed study is provided in Appendix A.

Creighton Street Speed Study

The posted speed limit at the Creighton Street data collection location is 30 mph, with a reduction to 20 mph for southbound traffic during school dropoff and pickup times. The speed data for traffic traveling in the northbound direction resulted in an 85th percentile speed of 21 mph with 3.3% of vehicles exceeding the speed limit. Traffic traveling in the southbound direction resulted in an 85th percentile speed of 35 mph, with 13.4% of vehicles exceeding the speed limit. The speed results for this location are summarized in Table 1.

Table 1 - Spot Speed Study on Evers Boulevard at Creighton Street

	Northbound	Southbound
85th Percentile Speed	21 mph	35 mph
%Exceeding Speed Limit	3.3%	13.4%
Average Speed	12 mph	27 mph
50th Percentile Speed	9 mph	30 mph

North of Ranger Drive

The posted speed limit for the study location north of Ranger Drive is 30 mph for both the northbound and southbound directions. At the location north of Ranger Drive the speed data for the traffic traveling in the northbound direction resulted in an 85th percentile speed of 32 mph with 8.2% of vehicles exceeding the posted speed limit of 30 mph. Similarly in the southbound direction speed data resulted in an 85th percentile speed of 24 mph with 2.7% of vehicles exceeding the speed limit. The results of the speed study at this location are summarized in Table 2.

Table 2 - Spot Speed Study on Evers Boulevard North of Ranger Drive

	Northbound	Southbound
85th Percentile Speed	32 mph	24 mph
%Exceeding Speed Limit	8.2%	2.7%
Average Speed	27 mph	13 mph
50th Percentile Speed	25 mph	9 mph

South of Rodeo Avenue

The posted speed limit for the study location south of Rodeo Avenue is 30 mph for both the northbound and southbound directions. At the location south of Rodeo Avenue the speed data for the traffic traveling in the northbound direction resulted in an 85th percentile speed of 22 mph with 5.5% of vehicles exceeding the speed limit. Traffic traveling in the southbound direction resulted in an 85th percentile speed of 20 mph with 4.6% of vehicles exceeding the speed limit. The results of the speed study south of Rodeo Avenue are shown in Table 3.

Table 3 - Spot Speed Study on Evers Boulevard South of Rodeo Avenue

	Northbound	Southbound
85th Percentile Speed	22 mph	20 mph
%Exceeding Speed Limit	5.5%	4.6%
Average Speed	13 mph	12 mph
50th Percentile Speed	9 mph	9 mph

Crash Data Summary

Historic traffic crash data was reviewed for the 5.5-year time period between January 1, 2009 and August 1, 2014. All crash data was obtained from the Wyoming Department of Transportation.

Over the 5.5-year time period, a total of 10 crashes were reported along the study segment of Evers Boulevard, as shown in Table 4. This total includes crashes reported at intersections and on roadway segments between intersections. The number of crashes per year remained relatively stable from 2009-2012 with 2-3 crashes per year, there were no crashes reported in 2013 or the first portion of 2014. Five of the ten crashes occurred during ice or snow covered roadway conditions. Approximately 50 percent of the crashes occurred during the PM peak time period from 3:00 PM – 7:00 PM and 60 percent occurred during daylight conditions. Three of the total crashes recorded involved a single vehicle collision with a parked vehicle. Two of the crashes resulted in injury; there were no fatal crashes recorded during this time period. Overall, there were no predominant collision patterns along the corridor. However, one-half of the crashes occurred during ice or snow covered roadway conditions. This is consistent with many of the public comments received which have indicated a problem with ice and snow buildup along Evers Boulevard due to lack of appropriate storm water drainage.

Table 4 - Crash Data Summary (2009-2014)

	Crash Type						Crash Severity			
YEAR	HEAD-ON	REAR-END	SS-SAME	RIGHT-ANGLE	ANGLE	FIXED	PDO	INJURY	FATAL	TOTAL
2009			1		2		3	0	0	3
2010	1	1					2	0	0	2
2011		1		1		1	2	1	0	3
2012				1	1		1	1	0	2
2013							0	0	0	0
2014							0	0	0	0
TOTAL	1	2	1	2	3	1	8	2	0	10

The Evers Boulevard crash data results are consistent with the Cheyenne City Street Crash Severity averages. The Wyoming Department of Transportation compiles crash data for the state and categorizes the crashes in various terms, the 2014 compiled crash data is included in Appendix B. The percentage of PDO crashes is 77.8%, Injury crashes are 22.2% of the total, and there were no Fatal crashes recorded during the analysis period. The Cheyenne City Street average is 79.6% PDO crashes, 20.1% Injury crashes, and 0.3% Fatal crashes. The roadway segment crash summary statistics for Evers Boulevard are provided in Appendix B.

Intersection Descriptions

Three intersections were analyzed with this study:

Evers Boulevard/Oakhurst Drive
The intersection of Evers Boulevard and Oakhurst Drive is two-way yield controlled, with the traffic on Oakhurst Drive yielding to Evers Boulevard. The approaches have single through lanes with no additional turn lanes provided.

Evers Boulevard/Vandehei Avenue
The intersection of Evers Boulevard and Vandehei Avenue is two-way stop controlled, with the traffic on Evers Boulevard traveling freely through the intersection. The approaches have single through lanes with no additional turn lanes provided.

Evers Boulevard/Bishop Boulevard
The intersection of Evers Boulevard and Bishop Boulevard is a three leg intersection with Evers Boulevard teeing into Bishop Boulevard. Traffic on Evers Boulevard is stop controlled with the traffic on Bishop Boulevard traveling freely through the intersection. The approaches have single through lanes with no additional turn lanes provided.

Existing Operating Conditions

All analyses of existing and future operating conditions use Synchro 8.0 software and the 2000 Highway Capacity Manual for unsignalized intersections outputs for LOS. Intersection operation is typically evaluated on its Level of Service (LOS) during peak traffic volume conditions. This analysis uses the *2000 Highway Capacity Manual* (HCM) for guidance on reporting LOS for the study intersections. Below is a description for the LOS of traffic entering an intersection:

Table 5 - LOS Criteria

Alpha LOS	Numeric LOS	Signalized Delay (sec/veh)	Unsignalized Delay (sec/veh)	Description
A	1.01 to 2.00	< 10	< 10	No Congestion
B	2.01 to 3.00	> 10 - 20	> 10 - 15	No Congestion
C	3.01 to 4.00	> 20 - 35	> 15 - 25	Minimal Congestion
D	4.01 to 5.00	> 35 - 55	> 25 - 35	Moderate Congestion
E	5.01 to 6.00	> 55 - 80	> 35 - 50	Severe Congestion
F	> 6.00	> 80	> 50	Extreme Congestion

LOS is a numeric ranking with a LOS ‘A’ requiring minimal driver interaction. This allows speed and vehicle path decisions to be unaffected by other roadway users resulting in no congestion and minimal delays. In comparison, LOS ‘F’ requires constant driver interaction. Speed and vehicle paths are totally dictated by interaction with other users resulting in high congestion levels and delays.

2014 Existing Traffic
Existing turning movement counts were provided by the Cheyenne Metropolitan Planning Organization. The turning movement counts for Evers Boulevard and Oakhurst Drive were collected on two different days; during the morning peak from 6:30 AM to 8:45 AM and the afternoon/evening peak from 4 PM to 6 PM on May 20, 2014 and additional afternoon/evening peak from 3 PM to 4 PM over October 7-8, 2014. The turning movement counts for Evers Boulevard and Vandehei Avenue were also collected over two different periods. March 11-12, 2014 counts were collected during the morning peak from 7

AM to 9 AM and the afternoon/evening peak from 4:15 PM to 6 PM, additional afternoon/evening peak counts were collected October 7-8, 2014 from 3 PM to 4:15 PM. The turning movement counts for Evers Boulevard and Bishop Boulevard were collected on March 19, 2014 during the morning peak from 7 AM to 9 AM and the afternoon/evening peak from 3 PM to 6 PM. Turning movement counts collected during these time periods are provided in Appendix C. Table 6 shows the volume to capacity ratio, Level of Service (LOS), and delay for each intersection; all related Synchro analysis is provided in Appendix D.

Table 6 – Existing Traffic Operations

	Evers Blvd. & Oakhurst Dr.		Eastbound (Yield Control)	Westbound (Yield Control)	Northbound (Free)	Southbound (Free)
EXISTING 2014	AM	v/c Ratio	0.03	0.02	0.01	0
		LOS	A	A	A	A
		Delay (sec)	9.3	9.4	1.6	0.7
	PM	v/c Ratio	0.03	0.04	0	0
		LOS	A	A	A	A
		Delay (sec)	9.1	9.3	1.2	2.1

	Evers Blvd. & Vandehei Ave.		Eastbound (Stop Control)	Westbound (Stop Control)	Northbound (Free)	Southbound (Free)
EXISTING 2014	AM	v/c Ratio	0.12	0.11	0.01	0.03
		LOS	B	B	A	A
		Delay (sec)	11.2	11.4	1	3.7
	PM	v/c Ratio	0.08	0.27	0.01	0.03
		LOS	B	B	A	A
		Delay (sec)	10.6	12.3	1.0	5.1

	Evers Blvd. & Bishop Blvd.		Eastbound (Stop Control)	Northbound (Free)	Southbound (Free)
EXISTING 2014	AM	v/c Ratio	0.09	0.01	0.11
		LOS	A	A	-
		Delay (sec)	9.6	2.5	0.0
	PM	v/c Ratio	0.15	0.05	0.07
		LOS	B	A	-
		Delay (sec)	13.0	4.0	0.0

All intersections are currently operating at an LOS B or better during peak hour traffic conditions.

Future Operating Conditions

<u>2017 Traffic</u>

The Evers Boulevard corridor is located in an area that has already been built out. The Western Hills neighborhood is not expected to expand at any point in the future. The Western Hills neighborhood is bordered by Warren Air Force Base to the west, Interstate 25 to the east, existing housing to the south, and the area is built out as far to the north as planned where Evers Boulevard ends at the tee intersection with Laughlin Road. It is expected that the Evers Boulevard traffic volumes will grow at an annual rate of 1.25% per year for the analysis period. This growth rate was provided by the Cheyenne MPO; it is a conservative assumption as this area is virtually at build out. Evers Boulevard is not accounted for in the MPO models because it is such a short collector roadway. Future traffic forecasts are provided in Appendix C.

Table 7 shows the future 2017 traffic operations, summaries of the volume to capacity ratios, LOS, and delay for each intersection are provided. All related Synchro evaluations are provided in Appendix D.

Table 7 - Future 2017 Traffic Operations

	Evers Blvd. & Oakhurst Dr.		Eastbound (Yield Control)	Westbound (Yield Control)	Northbound (Free)	Southbound (Free)
FUTURE 2017	AM	v/c Ratio	0.05	0.08	0.01	0.01
		LOS	A	B	A	A
		Delay (sec)	9.9	10.3	2.5	2.1
	PM	v/c Ratio	0.05	0.10	0.01	0.01
		LOS	A	B	A	A
		Delay (sec)	9.8	10.6	2.3	2.3

	Evers Blvd. & Vandehei Ave.		Eastbound (Stop Control)	Westbound (Stop Control)	Northbound (Free)	Southbound (Free)
FUTURE 2017	AM	v/c Ratio	0.19	0.18	0.01	0.04
		LOS	B	B	A	A
		Delay (sec)	12.6	14.3	1.4	3.7
	PM	v/c Ratio	0.14	0.36	0.03	0.04
		LOS	B	C	A	A
		Delay (sec)	12.1	17.4	1.8	4.6

	Evers Blvd. & Bishop Blvd.		Eastbound (Stop Control)	Northbound (Free)	Southbound (Free)
FUTURE 2017	AM	v/c Ratio	0.13	0.03	0.13
		LOS	B	A	-
		Delay (sec)	10.4	3.2	0.0
	PM	v/c Ratio	0.19	0.06	0.08
		LOS	B	A	-
		Delay (sec)	11.9	3.8	0.0

In the future year of 2017 operations at all intersections are similar to the existing. The only movement that has an LOS C is westbound Vandehei Avenue during the PM peak period; all other movements are operating at an LOS B or better.

<u>2037 Traffic</u>

Traffic volumes for 2037 were calculated using an annual growth rate of 1.25% for the analysis period, as provided by the Cheyenne MPO. The operating conditions including volume to capacity ratio, LOS, and delay are shown in Table 8. Future traffic forecasts are provided in Appendix C, related Synchro evaluations for the 2037 traffic volumes are located in Appendix D.

Table 8 – Future 2037 Traffic Operations

EXISTING 2037	Evers Blvd. & Oakhurst Dr.		Eastbound (Yield Control)	Westbound (Yield Control)	Northbound (Free)	Southbound (Free)
	AM	v/c Ratio	0.08	0.08	0.01	0.01
		LOS	B	B	A	A
		Delay (sec)	10.6	10.7	2.0	1.7
	PM	v/c Ratio	0.08	0.11	0.01	0.01
		LOS	B	B	A	A
		Delay (sec)	10.1	10.8	1.9	2.1

EXISTING 2037	Evers Blvd. & Vandehei Ave.		Eastbound (Stop Control)	Westbound (Stop Control)	Northbound (Free)	Southbound (Free)
	AM	v/c Ratio	0.22	0.27	0.03	0.06
		LOS	B	C	A	A
		Delay (sec)	14.4	17.5	1.7	3.8
	PM	v/c Ratio	0.17	0.51	0.03	0.04
		LOS	B	C	A	A
		Delay (sec)	13.0	24.3	1.6	4.7

EXISTING 2037	Evers Blvd. & Bishop Blvd.		Eastbound (Stop Control)	Northbound (Free)	Southbound (Free)
	AM	v/c Ratio	0.2	0.05	0.18
		LOS	B	A	-
		Delay (sec)	12.7	3.8	0.0
	PM	v/c Ratio	0.31	0.09	0.12
		LOS	C	A	-
		Delay (sec)	17.9	4.2	0.0

The traffic operations in 2037 show the operations at Oakhurst Drive to remain at an LOS B or better. The operations at Vandehei Avenue remain similar to the 2017 operations with a change during the AM peak to an LOS C for the westbound through movement. The LOS for movements at Bishop Boulevard remains the same as 2017 operations.

Conclusions and Recommendations – Speed Crash and Intersection Capacity

The following conclusions were drawn from the spot speed study:

- At the speed data location at Creighton Street northbound traffic is traveling at an 85th speed of 21 mph which is below the posted speed limit of 30 mph. Southbound traffic was traveling near the posted speed limit with an 85^{th} 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 with an 85^{th} percentile speed of 32 mph and northbound vehicles were traveling under the posted speed limit with an 85^{th} 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 85^{th} 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 85th percentile speeds determined 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 slope of the roadway. The posted speed limit of 30 mph for the Evers Boulevard corridor is appropriate based on the 85th percentile speed from the traffic data collected.

The following conclusions were drawn 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 ten crashes reported 2 were injury crashes, no fatal crashes were recorded.
- Five of the ten 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 minor yield controlled. 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 conclusions were drawn 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.

Geometric Design Considerations

Horizontal Curves

Evers Boulevard is signed with a speed limit of 30 mph. The *City of Cheyenne Unified Development Code* requires that Collector roadways have a design speed of 35 mph. There are two horizontal curves along Evers Boulevard which do not meet the criteria for this design speed or the posted speed limit in accordance with the AASHTO *Policy on Geometric Design of Highways and Streets*, 6th Edition.

The existing horizontal curve between Vandehei Avenue and Ranger Drive, adjacent to the cul-de-sac of Alder Court, has a centerline radius of 210 feet as shown on the *Replat of Western Hills Tenth Filing* dated August 15, 1978. The existing horizontal curve between Dogwood Avenue and Silver Sage

Avenue has a centerline radius of 164.6 feet as shown on the *Replat of Western Hills Tenth Filing* dated August 15, 1978. These curve locations are shown in Figure 2.

Figure 2 - Evers Boulevard Centerline Curve Radii

Table 3-13b: Minimum Radii and Superelevation for Low-Speed Urban Streets, of the AASHTO *Policy on Geometric Design of Highways and Streets*, 6th Edition is included on the following page. The following conclusions are drawn from this table:

- A curve with a radius of 210 feet, such as the curve adjacent to Alder Court, meets a design speed (V_d) of 30 mph with a superelevation rate (e) of 6.0%.
    - A superelevation rate of 6% meets the criteria established in the City of Cheyenne Uniform Development Code for a Collector Roadway however this is not desirable in an urban area nor is it feasible given topography and the existing homes along this right of way.
    - Using a design speed (V_d) of 25 mph this curve meets the AASHTO criteria with a normal crown or reverse crown roadway section.

- A curve with a radius of 164.5 feet, such as the curve north of Dogwood Avenue, meets the design speed (V_d) of 25 mph with a superelevation rate (*e*) of 2.4% but does not meet a design speed of any greater than 25 mph. There is enough space within the existing right of way to construct Evers Boulevard with a centerline radius of 167 feet in this location, which would result in this curve meeting a 25 mph design speed with a normal crown section.

Table 3-13b. Minimum Radii and Superelevation for Low-Speed Urban Streets

U.S. Customary							
	V_d = 15 mph	V_d = 20 mph	V_d = 25 mph	V_d = 30 mph	V_d = 35 mph	V_d = 40 mph	V_d = 45 mph
e (%)	*R* (ft)	*R* (ft)	*R* (ft)	*R* (ft)	*R* (ft)	*R* (ft)	*R* (ft)
−6.0	58	127	245	429	681	1067	1500
−5.0	56	121	231	400	628	970	1350
−4.0	54	116	219	375	583	889	1227
−3.0	52	111	208	353	544	821	1125
−2.8	51	110	206	349	537	808	1107
−2.6	51	109	204	345	530	796	1089
−2.4	51	108	202	341	524	784	1071
−2.2	50	108	200	337	517	773	1055
−2.0	50	107	198	333	510	762	1039
−1.5	49	105	194	324	495	736	1000
0	47	99	181	300	454	667	900
1.5	45	94	170	279	419	610	818
2.0	44	92	167	273	408	593	794
2.2	44	91	165	270	404	586	785
2.4	44	91	164	268	400	580	776
2.6	43	90	163	265	396	573	767
2.8	43	89	161	263	393	567	758
3.0	43	89	160	261	389	561	750
3.2	43	88	159	259	385	556	742
3.4	42	88	158	256	382	550	734
3.6	42	87	157	254	378	544	726
3.8	42	87	155	252	375	539	718
4.0	42	86	154	250	371	533	711
4.2	41	85	153	248	368	528	703
4.4	41	85	152	246	365	523	696
4.6	41	84	151	244	361	518	689
4.8	41	84	150	242	358	513	682
5.0	41	83	149	240	355	508	675
5.2	40	83	148	238	352	503	668
5.4	40	82	147	236	349	498	662
5.6	40	82	146	234	346	494	655
5.8	40	81	145	233	343	489	649
6.0	39	81	144	231	340	485	643
6.2	39	80	143	229	337	480	637
6.4	39	80	142	227	335	476	631
6.6	39	79	141	226	332	472	625
6.8	39	79	140	224	329	468	619
7.0	38	78	139	222	327	464	614
7.2	38	78	138	221	324	460	608
7.4	38	78	137	219	322	456	603
7.6	38	77	136	217	319	452	597
7.8	38	77	135	216	317	448	592
8.0	38	76	134	214	314	444	587
8.2	37	76	134	213	312	441	582
8.4	37	75	133	211	309	437	577
8.6	37	75	132	210	307	434	572
8.8	37	74	131	208	305	430	567
9.0	37	74	130	207	302	427	563
9.2	36	74	129	205	300	423	558
9.4	36	73	129	204	298	420	553
9.6	36	73	128	203	296	417	549
9.8	36	72	127	201	294	413	544
10.0	36	72	126	200	292	410	540
10.2	36	72	126	199	290	407	536
10.4	35	71	125	197	288	404	531
10.6	35	71	124	196	286	401	527
10.8	35	71	123	195	284	398	523
11.0	35	70	123	194	282	395	519
11.2	35	70	122	192	280	392	515
11.4	35	69	121	191	278	389	511
11.6	34	69	120	190	276	386	508
11.8	34	69	120	189	274	384	504
12.0	34	68	119	188	272	381	500

Notes:

1. Computed using Superelevation Distribution Method 2.
2. Superelevation may be optional on low-speed urban streets.
3. Negative superelevation values beyond −2.0 percent should be used for unpaved surfaces such as gravel, crushed stone, and earth. However, a normal cross slope of −2.5 percent may be used on paved surfaces in areas with intense rainfall.

Jessup Elementary Safety Improvements

Jessup Elementary currently has one crosswalk across Evers Boulevard. The existing crosswalk is 60 feet long, on the north side of the Creighton Street intersection. Many students are dropped off south of Creighton Street and do not use the designated crosswalk which would require them to cross Creighton Street and then Evers Boulevard. Instead many pedestrians cross Evers south of Creighton Street where there is no crosswalk, resulting in the pedestrians walking in between cars parked along the curb. Several changes to the existing configuration will provide a safer crossing location.

- Crosswalks are to be provided on both sides of Creighton Street, eliminating the need for students to cross Creighton Street to reach the crosswalk.
- Sidewalks on the north side of Creighton Street as well as the east side of Evers Boulevard are constructed as bulbouts with no allowed on-street parking thus reducing the total crossing distance from 60 feet to 50 feet.
- Street parking both between the crosswalks and 50 feet on the approach side of the crosswalk is eliminated which allows for greater pedestrian visibility and increases the overall safety of the crossing.

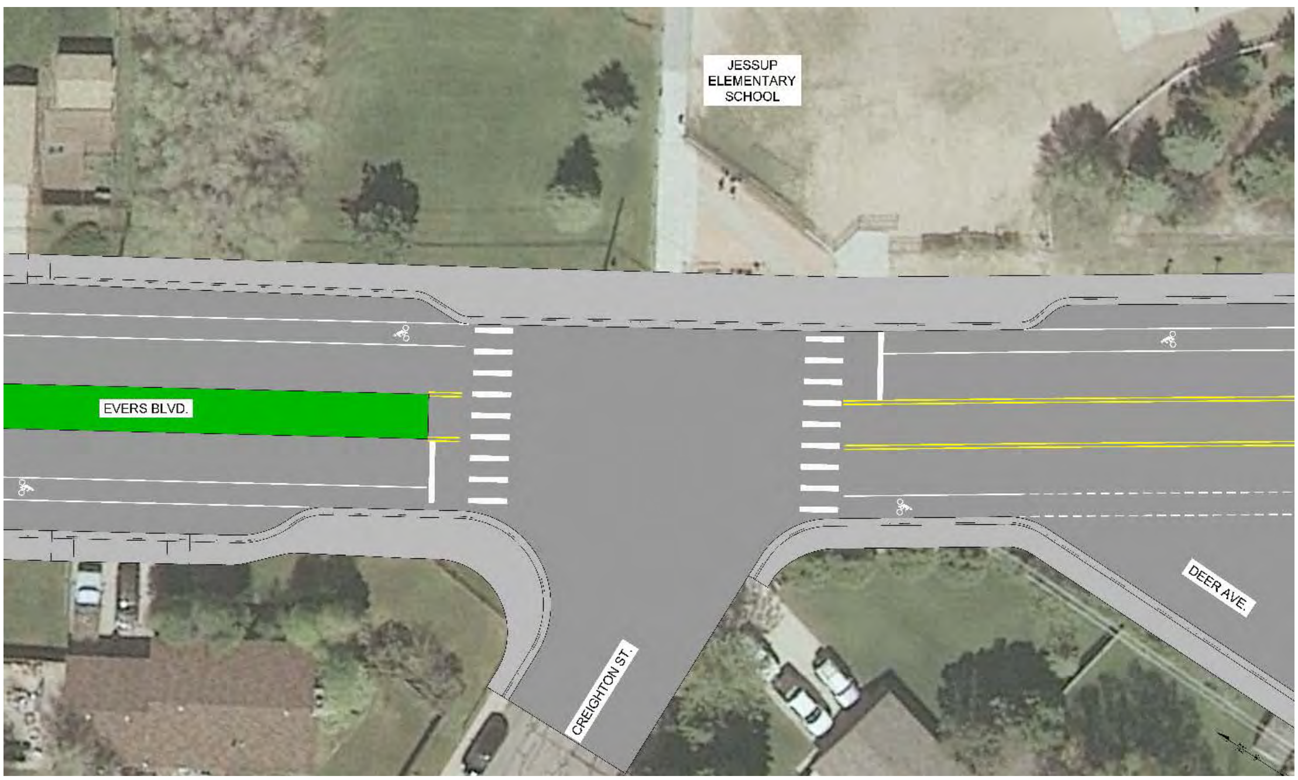


Figure 3 - Jessup Elementary Additional Crosswalks and Bulbouts

Intersection Alignment

Two existing intersections meet Evers Boulevard at undesirable angles. These intersections are Ranger Drive on the west side of Evers Boulevard and Deer Avenue 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 reduce the crossing distance for pedestrians.

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

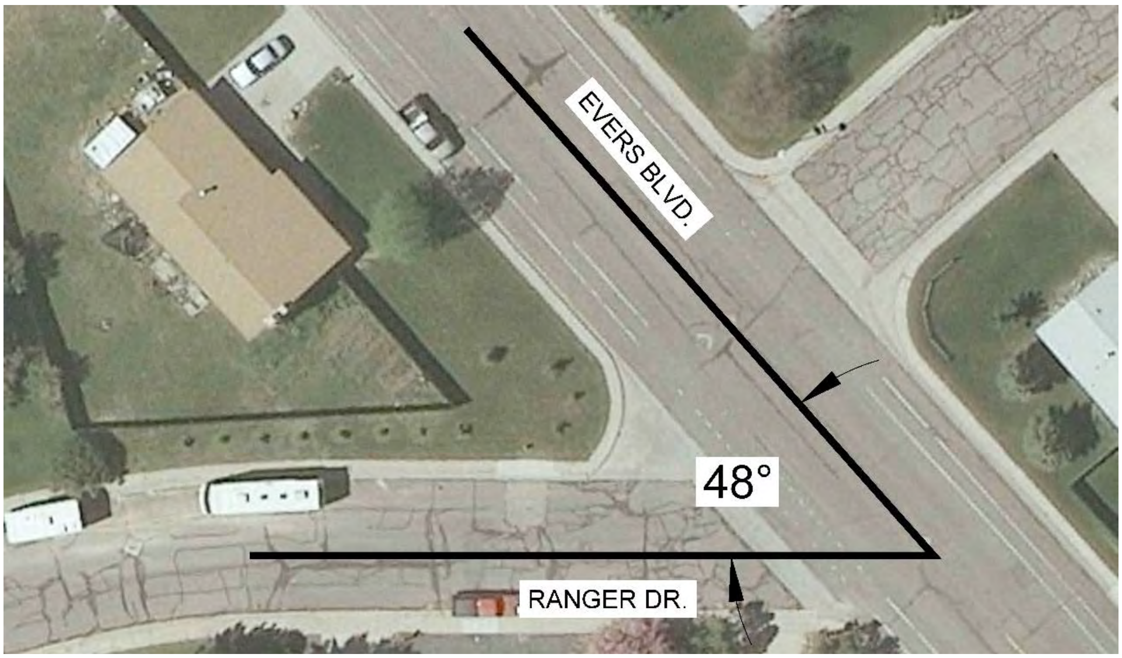


Figure 4 - Ranger Drive Existing Alignment

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 intersects Evers Boulevard at a 32 degree angle

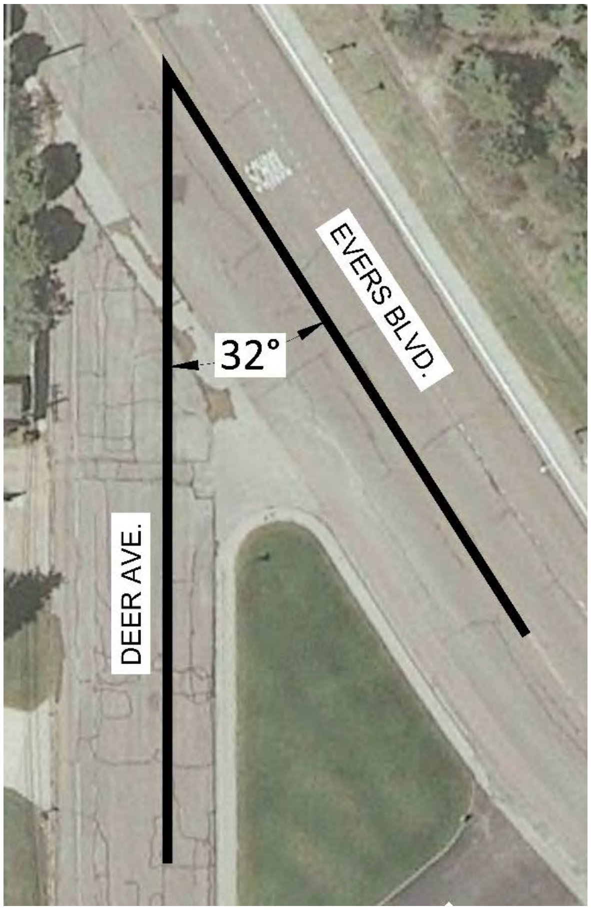


Figure 5 - Deer Avenue Existing Alignment

Figure 6 - 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 6 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.

Geometric Design Conclusions and Recommendations

- From AASHTO criteria an appropriate operating speed for the horizontal curves between Silver Sage Avenue and Ranger Drive is 25 mph. In order to address this operating condition in the existing 30 mph posted speed limit zone, curve warning signs and advisory speed signs should be placed at these two curves.
- It is recommended that the crossing at Jessup Elementary include two crosswalks and sidewalk bulbouts to improve the safety for students.
- It is recommended that the intersection of Deer Avenue and Evers Boulevard be reconfigured to a ninety degree intersection.

Appendix B: Evers Boulevard Traffic Data

- Technical Memo
  - Appendix A: Speed Spot Study Data

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Creighton

A study of vehicle traffic was conducted with HI-STAR unit number 6156. The study was done in the NB lane at Creighton in Cheyenne, WY in Laramie county. The study began on Sep/16/2014 at 12:00:00 PM and concluded on Sep/18/2014 at 12:00:00 PM, lasting a total of 48.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 1209 vehicles passed through the location with a peak volume of 35 on Sep/17/2014 at [13:00-13:15] and a minimum volume of 0 on Sep/16/2014 at [19:30-19:45]. The AADT count for this study was 605.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 9 MPH range or lower. The average speed for all classifed vehicles was 12 MPH with 3.27% vehicles exceeding the posted speed of 30 MPH. The HI-STAR found 0.00 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 9MPH and the 85th percentile was 21.40 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
345	213	104	50	30	28	16	9	1	0	0	0	0	0	0					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Problem with the battery detected. Try discharging and fully charging it

Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 719 which represents 90 percent of the total classified vehicles. The number of Vans & Pickups in the study was 45 which represents 6 percent of the total classified vehicles. The number of Busses & Trucks in the study was 16 which represents 2 percent of the total classified vehicles. The number of Tractor Tailers in the study was 16 which represents 2 percent of the total classified vehicles.

< to 17	18 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to 61	62 to >												
719	45	9	7	10	2	4	0												

CHART 2

HEADWAY

During the peak traffic period, on Sep/17/2014 at [13:00-13:15] the average headway between vehicles was 25 seconds. During the slowest traffic period, on Sep/16/2014 at [19:30-19:45] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 52.00 and 125.00 degrees F.

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6156	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: Creighton	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 1209
County: Laramie	AADT Factor: 1	AADT Count: 605

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue,Sep/16/2014				
[12:00-12:15]	10	11 MPH	115 F	---
[12:15-12:30]	12	8 MPH	107 F	---
[12:30-12:45]	17	11 MPH	105 F	---
[12:45-13:00]	16	8 MPH	107 F	---
[13:00-13:15]	34	10 MPH	103 F	---
[13:15-13:30]	21	13 MPH	101 F	---
[13:30-13:45]	20	11 MPH	101 F	---
[13:45-14:00]	16	13 MPH	99 F	---
[14:00-14:15]	26	13 MPH	99 F	---
[14:15-14:30]	17	11 MPH	97 F	---
[14:30-14:45]	12	11 MPH	97 F	---
[14:45-15:00]	13	11 MPH	93 F	---
[15:00-15:15]	12	15 MPH	89 F	---
[15:15-15:30]	13	11 MPH	87 F	---
[15:30-15:45]	7	15 MPH	85 F	---
[15:45-16:00]	15	9 MPH	83 F	---
[16:00-16:15]	15	16 MPH	80 F	---
[16:15-16:30]	6	13 MPH	78 F	---
[16:30-16:45]	11	16 MPH	76 F	---
[16:45-17:00]	7	10 MPH	76 F	---
[17:00-17:15]	9	10 MPH	74 F	---
[17:15-17:30]	8	12 MPH	72 F	---
[17:30-17:45]	4	10 MPH	72 F	---
[17:45-18:00]	4	11 MPH	70 F	---
[18:00-18:15]	3	18 MPH	70 F	---
[18:15-18:30]	3	13 MPH	68 F	---
[18:30-18:45]	4	18 MPH	68 F	---
[18:45-19:00]	3	24 MPH	68 F	---
[19:00-19:15]	2	12 MPH	68 F	---
[19:15-19:30]	1	0 MPH	68 F	---
[19:30-19:45]	0	0 MPH	68 F	---
[19:45-20:00]	1	0 MPH	66 F	---
[20:00-20:15]	1	18 MPH	66 F	---
[20:15-20:30]	0	0 MPH	66 F	---
[20:30-20:45]	0	0 MPH	66 F	---
[20:45-21:00]	0	0 MPH	66 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6156	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: Creighton	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 1209
County: Laramie	AADT Factor: 1	AADT Count: 605

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue,Sep/16/2014				
[21:00-21:15]	1	0 MPH	66 F	---
[21:15-21:30]	0	0 MPH	64 F	---
[21:30-21:45]	0	0 MPH	64 F	---
[21:45-22:00]	1	4 MPH	62 F	---
[22:00-22:15]	0	0 MPH	62 F	---
[22:15-22:30]	0	0 MPH	60 F	---
[22:30-22:45]	0	0 MPH	60 F	---
[22:45-23:00]	0	0 MPH	60 F	---
[23:00-23:15]	0	0 MPH	58 F	---
[23:15-23:30]	0	0 MPH	58 F	---
[23:30-23:45]	0	0 MPH	58 F	---
[23:45-00:00]	0	0 MPH	58 F	---
Tue,Sep/16/2014	345	10 MPH	77 F	
Wed,Sep/17/2014				
[00:00-00:15]	0	0 MPH	58 F	---
[00:15-00:30]	0	0 MPH	58 F	---
[00:30-00:45]	0	0 MPH	58 F	---
[00:45-01:00]	0	0 MPH	56 F	---
[01:00-01:15]	0	0 MPH	56 F	---
[01:15-01:30]	0	0 MPH	56 F	---
[01:30-01:45]	0	0 MPH	56 F	---
[01:45-02:00]	1	4 MPH	56 F	---
[02:00-02:15]	0	0 MPH	56 F	---
[02:15-02:30]	0	0 MPH	54 F	---
[02:30-02:45]	3	16 MPH	54 F	---
[02:45-03:00]	2	4 MPH	54 F	---
[03:00-03:15]	0	0 MPH	54 F	---
[03:15-03:30]	1	4 MPH	54 F	---
[03:30-03:45]	0	0 MPH	54 F	---
[03:45-04:00]	2	0 MPH	52 F	---
[04:00-04:15]	4	17 MPH	52 F	---
[04:15-04:30]	5	23 MPH	54 F	---
[04:30-04:45]	4	9 MPH	54 F	---
[04:45-05:00]	6	18 MPH	54 F	---
[05:00-05:15]	3	18 MPH	54 F	---
[05:15-05:30]	6	14 MPH	56 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6156	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: Creighton	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 1209
County: Laramie	AADT Factor: 1	AADT Count: 605

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[05:30-05:45]	32	10 MPH	56 F	---
[05:45-06:00]	28	11 MPH	58 F	---
[06:00-06:15]	2	4 MPH	58 F	---
[06:15-06:30]	10	8 MPH	60 F	---
[06:30-06:45]	2	4 MPH	66 F	---
[06:45-07:00]	0	0 MPH	76 F	---
[07:00-07:15]	5	13 MPH	83 F	---
[07:15-07:30]	10	14 MPH	87 F	---
[07:30-07:45]	5	21 MPH	93 F	---
[07:45-08:00]	8	9 MPH	97 F	---
[08:00-08:15]	3	10 MPH	99 F	---
[08:15-08:30]	7	11 MPH	103 F	---
[08:30-08:45]	15	14 MPH	107 F	---
[08:45-09:00]	10	13 MPH	109 F	---
[09:00-09:15]	7	7 MPH	113 F	---
[09:15-09:30]	14	22 MPH	115 F	---
[09:30-09:45]	11	11 MPH	113 F	---
[09:45-10:00]	4	9 MPH	109 F	---
[10:00-10:15]	10	12 MPH	115 F	---
[10:15-10:30]	10	12 MPH	117 F	---
[10:30-10:45]	6	11 MPH	117 F	---
[10:45-11:00]	2	28 MPH	119 F	---
[11:00-11:15]	8	30 MPH	123 F	---
[11:15-11:30]	13	15 MPH	121 F	---
[11:30-11:45]	11	17 MPH	123 F	---
[11:45-12:00]	4	9 MPH	117 F	---
[12:00-12:15]	3	13 MPH	113 F	---
[12:15-12:30]	27	11 MPH	113 F	---
[12:30-12:45]	12	13 MPH	109 F	---
[12:45-13:00]	22	19 MPH	105 F	---
[13:00-13:15]	35	9 MPH	101 F	---
[13:15-13:30]	25	16 MPH	97 F	---
[13:30-13:45]	10	11 MPH	95 F	---
[13:45-14:00]	12	17 MPH	91 F	---
[14:00-14:15]	16	17 MPH	89 F	---
[14:15-14:30]	26	14 MPH	89 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6156	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: Creighton	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 1209
County: Laramie	AADT Factor: 1	AADT Count: 605

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[14:30-14:45]	25	17 MPH	91 F	---
[14:45-15:00]	14	15 MPH	89 F	---
[15:00-15:15]	14	16 MPH	89 F	---
[15:15-15:30]	12	13 MPH	87 F	---
[15:30-15:45]	14	11 MPH	83 F	---
[15:45-16:00]	9	12 MPH	82 F	---
[16:00-16:15]	7	15 MPH	78 F	---
[16:15-16:30]	9	9 MPH	76 F	---
[16:30-16:45]	13	14 MPH	76 F	---
[16:45-17:00]	9	7 MPH	74 F	---
[17:00-17:15]	3	8 MPH	74 F	---
[17:15-17:30]	9	7 MPH	72 F	---
[17:30-17:45]	5	19 MPH	72 F	---
[17:45-18:00]	5	18 MPH	70 F	---
[18:00-18:15]	5	13 MPH	68 F	---
[18:15-18:30]	1	0 MPH	68 F	---
[18:30-18:45]	4	14 MPH	66 F	---
[18:45-19:00]	5	18 MPH	66 F	---
[19:00-19:15]	1	4 MPH	66 F	---
[19:15-19:30]	0	0 MPH	64 F	---
[19:30-19:45]	1	0 MPH	64 F	---
[19:45-20:00]	1	28 MPH	64 F	---
[20:00-20:15]	0	0 MPH	64 F	---
[20:15-20:30]	0	0 MPH	62 F	---
[20:30-20:45]	0	0 MPH	62 F	---
[20:45-21:00]	0	0 MPH	62 F	---
[21:00-21:15]	0	0 MPH	62 F	---
[21:15-21:30]	0	0 MPH	60 F	---
[21:30-21:45]	0	0 MPH	60 F	---
[21:45-22:00]	0	0 MPH	60 F	---
[22:00-22:15]	0	0 MPH	60 F	---
[22:15-22:30]	0	0 MPH	60 F	---
[22:30-22:45]	0	0 MPH	58 F	---
[22:45-23:00]	0	0 MPH	58 F	---
[23:00-23:15]	1	0 MPH	58 F	---
[23:15-23:30]	0	0 MPH	58 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6156	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: Creighton	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 1209
County: Laramie	AADT Factor: 1	AADT Count: 605

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[23:30-23:45]	0	0 MPH	56 F	---
[23:45-00:00]	0	0 MPH	56 F	---
Wed,Sep/17/2014	629	9 MPH	77 F	
Thu,Sep/18/2014				
[00:00-00:15]	1	12 MPH	56 F	---
[00:15-00:30]	0	0 MPH	56 F	---
[00:30-00:45]	0	0 MPH	56 F	---
[00:45-01:00]	0	0 MPH	56 F	---
[01:00-01:15]	0	0 MPH	56 F	---
[01:15-01:30]	1	12 MPH	54 F	---
[01:30-01:45]	0	0 MPH	56 F	---
[01:45-02:00]	0	0 MPH	54 F	---
[02:00-02:15]	0	0 MPH	54 F	---
[02:15-02:30]	0	0 MPH	54 F	---
[02:30-02:45]	2	18 MPH	54 F	---
[02:45-03:00]	0	0 MPH	54 F	---
[03:00-03:15]	0	0 MPH	54 F	---
[03:15-03:30]	0	0 MPH	54 F	---
[03:30-03:45]	0	0 MPH	54 F	---
[03:45-04:00]	1	4 MPH	54 F	---
[04:00-04:15]	2	5 MPH	54 F	---
[04:15-04:30]	6	11 MPH	54 F	---
[04:30-04:45]	3	10 MPH	54 F	---
[04:45-05:00]	3	4 MPH	54 F	---
[05:00-05:15]	7	11 MPH	56 F	---
[05:15-05:30]	7	13 MPH	56 F	---
[05:30-05:45]	35	8 MPH	58 F	---
[05:45-06:00]	27	14 MPH	58 F	---
[06:00-06:15]	3	4 MPH	58 F	---
[06:15-06:30]	2	11 MPH	62 F	---
[06:30-06:45]	6	13 MPH	66 F	---
[06:45-07:00]	4	9 MPH	78 F	---
[07:00-07:15]	5	10 MPH	85 F	---
[07:15-07:30]	5	11 MPH	91 F	---
[07:30-07:45]	3	22 MPH	95 F	---
[07:45-08:00]	4	4 MPH	99 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6156	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: Creighton	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 1209
County: Laramie	AADT Factor: 1	AADT Count: 605

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Thu,Sep/18/2014				
[08:00-08:15]	8	12 MPH	103 F	---
[08:15-08:30]	10	9 MPH	105 F	---
[08:30-08:45]	6	7 MPH	109 F	---
[08:45-09:00]	5	21 MPH	111 F	---
[09:00-09:15]	12	9 MPH	113 F	---
[09:15-09:30]	11	19 MPH	115 F	---
[09:30-09:45]	7	17 MPH	119 F	---
[09:45-10:00]	10	7 MPH	119 F	---
[10:00-10:15]	4	8 MPH	121 F	---
[10:15-10:30]	7	9 MPH	123 F	---
[10:30-10:45]	3	7 MPH	123 F	---
[10:45-11:00]	2	8 MPH	123 F	---
[11:00-11:15]	3	16 MPH	123 F	---
[11:15-11:30]	9	9 MPH	125 F	---
[11:30-11:45]	3	11 MPH	125 F	---
[11:45-12:00]	8	21 MPH	123 F	---
Thu,Sep/18/2014	235	9 MPH	80 F	
Sep/16/2014 12:00:00 PM Sep/18/2014 12:00:00 PM	1209	9 MPH	78 F	

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: Creighton

A study of vehicle traffic was conducted with HI-STAR unit number 6153. The study was done in the SB lane at Creighton in Cheyenne, WY in Laramie county. The study began on Sep/16/2014 at 12:00:00 PM and concluded on Sep/18/2014 at 12:00:00 PM, lasting a total of 48.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 871 vehicles passed through the location with a peak volume of 25 on Sep/17/2014 at [05:30-05:45] and a minimum volume of 0 on Sep/16/2014 at [18:00-18:15]. The AADT count for this study was 436.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 30 - 35 MPH range or lower. The average speed for all classifed vehicles was 27 MPH with 13.43% vehicles exceeding the posted speed of 30 MPH. The HI-STAR found 0.12 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 30MPH and the 85th percentile was 34.69 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
8	51	109	124	222	227	82	25	3	1	3	0	0	0	1					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Problem with the battery detected. Try discharging and fully charging it

Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 588 which represents 69 percent of the total classified vehicles. The number of Vans & Pickups in the study was 239 which represents 28 percent of the total classified vehicles. The number of Busses & Trucks in the study was 18 which represents 2 percent of the total classified vehicles. The number of Tractor Tailers in the study was 11 which represents 1 percent of the total classified vehicles.

< to 17	18 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to 61	62 to >												
588	239	12	6	1	7	2	1												

CHART 2

HEADWAY

During the peak traffic period, on Sep/17/2014 at [05:30-05:45] the average headway between vehicles was 34.615 seconds. During the slowest traffic period, on Sep/16/2014 at [18:00-18:15] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 52.00 and 128.00 degrees F.

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6153	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: Creighton	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 871
County: Laramie	AADT Factor: 1	AADT Count: 436

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue,Sep/16/2014				
[12:00-12:15]	4	42 MPH	119 F	---
[12:15-12:30]	11	22 MPH	111 F	---
[12:30-12:45]	13	17 MPH	109 F	---
[12:45-13:00]	17	18 MPH	111 F	---
[13:00-13:15]	11	15 MPH	105 F	---
[13:15-13:30]	10	27 MPH	103 F	---
[13:30-13:45]	9	29 MPH	103 F	---
[13:45-14:00]	11	30 MPH	103 F	---
[14:00-14:15]	4	32 MPH	99 F	---
[14:15-14:30]	8	33 MPH	93 F	---
[14:30-14:45]	5	31 MPH	91 F	---
[14:45-15:00]	5	31 MPH	89 F	---
[15:00-15:15]	14	30 MPH	85 F	---
[15:15-15:30]	11	27 MPH	83 F	---
[15:30-15:45]	5	32 MPH	82 F	---
[15:45-16:00]	5	30 MPH	80 F	---
[16:00-16:15]	5	33 MPH	78 F	---
[16:15-16:30]	4	28 MPH	76 F	---
[16:30-16:45]	4	25 MPH	76 F	---
[16:45-17:00]	1	18 MPH	74 F	---
[17:00-17:15]	5	27 MPH	72 F	---
[17:15-17:30]	1	18 MPH	72 F	---
[17:30-17:45]	5	34 MPH	70 F	---
[17:45-18:00]	5	29 MPH	70 F	---
[18:00-18:15]	0	0 MPH	68 F	---
[18:15-18:30]	1	32 MPH	68 F	---
[18:30-18:45]	1	32 MPH	66 F	---
[18:45-19:00]	0	0 MPH	66 F	---
[19:00-19:15]	1	32 MPH	66 F	---
[19:15-19:30]	0	0 MPH	68 F	---
[19:30-19:45]	1	28 MPH	68 F	---
[19:45-20:00]	0	0 MPH	66 F	---
[20:00-20:15]	1	32 MPH	66 F	---
[20:15-20:30]	1	28 MPH	66 F	---
[20:30-20:45]	0	0 MPH	64 F	---
[20:45-21:00]	0	0 MPH	64 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6153	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: Creighton	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 871
County: Laramie	AADT Factor: 1	AADT Count: 436

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue,Sep/16/2014				
[21:00-21:15]	0	0 MPH	64 F	---
[21:15-21:30]	0	0 MPH	64 F	---
[21:30-21:45]	0	0 MPH	64 F	---
[21:45-22:00]	0	0 MPH	62 F	---
[22:00-22:15]	0	0 MPH	60 F	---
[22:15-22:30]	0	0 MPH	60 F	---
[22:30-22:45]	0	0 MPH	60 F	---
[22:45-23:00]	0	0 MPH	58 F	---
[23:00-23:15]	0	0 MPH	58 F	---
[23:15-23:30]	0	0 MPH	58 F	---
[23:30-23:45]	0	0 MPH	58 F	---
[23:45-00:00]	0	0 MPH	58 F	---
Tue,Sep/16/2014	179	24 MPH	77 F	
Wed,Sep/17/2014				
[00:00-00:15]	0	0 MPH	56 F	---
[00:15-00:30]	0	0 MPH	56 F	---
[00:30-00:45]	0	0 MPH	56 F	---
[00:45-01:00]	0	0 MPH	56 F	---
[01:00-01:15]	0	0 MPH	56 F	---
[01:15-01:30]	1	28 MPH	56 F	---
[01:30-01:45]	1	38 MPH	56 F	---
[01:45-02:00]	1	22 MPH	54 F	---
[02:00-02:15]	1	22 MPH	54 F	---
[02:15-02:30]	1	38 MPH	54 F	---
[02:30-02:45]	1	32 MPH	54 F	---
[02:45-03:00]	1	28 MPH	54 F	---
[03:00-03:15]	5	34 MPH	54 F	---
[03:15-03:30]	0	0 MPH	52 F	---
[03:30-03:45]	6	33 MPH	52 F	---
[03:45-04:00]	4	29 MPH	52 F	---
[04:00-04:15]	9	32 MPH	52 F	---
[04:15-04:30]	10	30 MPH	52 F	---
[04:30-04:45]	13	28 MPH	54 F	---
[04:45-05:00]	4	34 MPH	54 F	---
[05:00-05:15]	12	32 MPH	56 F	---
[05:15-05:30]	7	23 MPH	56 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6153	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: Creighton	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 871
County: Laramie	AADT Factor: 1	AADT Count: 436

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[05:30-05:45]	25	17 MPH	56 F	---
[05:45-06:00]	10	16 MPH	58 F	---
[06:00-06:15]	4	25 MPH	64 F	---
[06:15-06:30]	8	26 MPH	74 F	---
[06:30-06:45]	2	30 MPH	78 F	---
[06:45-07:00]	5	28 MPH	85 F	---
[07:00-07:15]	5	30 MPH	89 F	---
[07:15-07:30]	6	33 MPH	93 F	---
[07:30-07:45]	4	30 MPH	97 F	---
[07:45-08:00]	6	23 MPH	99 F	---
[08:00-08:15]	8	29 MPH	103 F	---
[08:15-08:30]	6	32 MPH	105 F	---
[08:30-08:45]	9	30 MPH	111 F	---
[08:45-09:00]	6	27 MPH	113 F	---
[09:00-09:15]	3	28 MPH	117 F	---
[09:15-09:30]	8	28 MPH	119 F	---
[09:30-09:45]	14	31 MPH	117 F	---
[09:45-10:00]	6	29 MPH	111 F	---
[10:00-10:15]	6	29 MPH	117 F	---
[10:15-10:30]	6	30 MPH	119 F	---
[10:30-10:45]	8	32 MPH	121 F	---
[10:45-11:00]	7	31 MPH	121 F	---
[11:00-11:15]	11	30 MPH	126 F	---
[11:15-11:30]	5	33 MPH	123 F	---
[11:30-11:45]	6	30 MPH	126 F	---
[11:45-12:00]	9	20 MPH	121 F	---
[12:00-12:15]	4	29 MPH	117 F	---
[12:15-12:30]	8	19 MPH	117 F	---
[12:30-12:45]	13	21 MPH	113 F	---
[12:45-13:00]	18	15 MPH	107 F	---
[13:00-13:15]	17	21 MPH	103 F	---
[13:15-13:30]	10	28 MPH	99 F	---
[13:30-13:45]	8	33 MPH	97 F	---
[13:45-14:00]	2	30 MPH	91 F	---
[14:00-14:15]	7	30 MPH	89 F	---
[14:15-14:30]	6	31 MPH	89 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6153	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: Creighton	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 871
County: Laramie	AADT Factor: 1	AADT Count: 436

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[14:30-14:45]	8	30 MPH	89 F	---
[14:45-15:00]	8	33 MPH	89 F	---
[15:00-15:15]	7	35 MPH	87 F	---
[15:15-15:30]	3	26 MPH	85 F	---
[15:30-15:45]	7	30 MPH	82 F	---
[15:45-16:00]	5	32 MPH	80 F	---
[16:00-16:15]	5	30 MPH	76 F	---
[16:15-16:30]	8	30 MPH	76 F	---
[16:30-16:45]	5	28 MPH	74 F	---
[16:45-17:00]	3	26 MPH	74 F	---
[17:00-17:15]	5	27 MPH	72 F	---
[17:15-17:30]	4	28 MPH	70 F	---
[17:30-17:45]	2	35 MPH	70 F	---
[17:45-18:00]	1	32 MPH	68 F	---
[18:00-18:15]	3	26 MPH	68 F	---
[18:15-18:30]	2	30 MPH	66 F	---
[18:30-18:45]	0	0 MPH	66 F	---
[18:45-19:00]	4	29 MPH	66 F	---
[19:00-19:15]	0	0 MPH	64 F	---
[19:15-19:30]	3	33 MPH	64 F	---
[19:30-19:45]	0	0 MPH	64 F	---
[19:45-20:00]	0	0 MPH	64 F	---
[20:00-20:15]	0	0 MPH	62 F	---
[20:15-20:30]	0	0 MPH	62 F	---
[20:30-20:45]	0	0 MPH	62 F	---
[20:45-21:00]	0	0 MPH	62 F	---
[21:00-21:15]	0	0 MPH	60 F	---
[21:15-21:30]	0	0 MPH	60 F	---
[21:30-21:45]	0	0 MPH	60 F	---
[21:45-22:00]	0	0 MPH	60 F	---
[22:00-22:15]	0	0 MPH	58 F	---
[22:15-22:30]	0	0 MPH	58 F	---
[22:30-22:45]	0	0 MPH	58 F	---
[22:45-23:00]	0	0 MPH	58 F	---
[23:00-23:15]	0	0 MPH	58 F	---
[23:15-23:30]	0	0 MPH	56 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6153	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: Creighton	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 871
County: Laramie	AADT Factor: 1	AADT Count: 436

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[23:30-23:45]	0	0 MPH	56 F	---
[23:45-00:00]	0	0 MPH	56 F	---
Wed,Sep/17/2014	446	28 MPH	78 F	
Thu,Sep/18/2014				
[00:00-00:15]	0	0 MPH	56 F	---
[00:15-00:30]	0	0 MPH	56 F	---
[00:30-00:45]	0	0 MPH	54 F	---
[00:45-01:00]	0	0 MPH	54 F	---
[01:00-01:15]	0	0 MPH	54 F	---
[01:15-01:30]	0	0 MPH	54 F	---
[01:30-01:45]	0	0 MPH	54 F	---
[01:45-02:00]	1	32 MPH	54 F	---
[02:00-02:15]	0	0 MPH	54 F	---
[02:15-02:30]	1	22 MPH	54 F	---
[02:30-02:45]	0	0 MPH	54 F	---
[02:45-03:00]	3	27 MPH	54 F	---
[03:00-03:15]	0	0 MPH	54 F	---
[03:15-03:30]	4	33 MPH	54 F	---
[03:30-03:45]	8	33 MPH	54 F	---
[03:45-04:00]	6	28 MPH	54 F	---
[04:00-04:15]	4	34 MPH	54 F	---
[04:15-04:30]	8	33 MPH	54 F	---
[04:30-04:45]	12	31 MPH	54 F	---
[04:45-05:00]	10	27 MPH	56 F	---
[05:00-05:15]	8	33 MPH	56 F	---
[05:15-05:30]	7	24 MPH	56 F	---
[05:30-05:45]	24	17 MPH	58 F	---
[05:45-06:00]	11	16 MPH	58 F	---
[06:00-06:15]	4	18 MPH	62 F	---
[06:15-06:30]	5	28 MPH	72 F	---
[06:30-06:45]	3	33 MPH	78 F	---
[06:45-07:00]	7	29 MPH	85 F	---
[07:00-07:15]	7	27 MPH	91 F	---
[07:15-07:30]	5	37 MPH	95 F	---
[07:30-07:45]	11	31 MPH	97 F	---
[07:45-08:00]	4	34 MPH	101 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6153	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: Creighton	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 871
County: Laramie	AADT Factor: 1	AADT Count: 436

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Thu,Sep/18/2014				
[08:00-08:15]	4	34 MPH	105 F	---
[08:15-08:30]	8	34 MPH	109 F	---
[08:30-08:45]	6	28 MPH	111 F	---
[08:45-09:00]	6	33 MPH	115 F	---
[09:00-09:15]	6	28 MPH	117 F	---
[09:15-09:30]	8	29 MPH	119 F	---
[09:30-09:45]	9	30 MPH	121 F	---
[09:45-10:00]	4	26 MPH	121 F	---
[10:00-10:15]	5	33 MPH	123 F	---
[10:15-10:30]	6	30 MPH	125 F	---
[10:30-10:45]	5	28 MPH	125 F	---
[10:45-11:00]	5	33 MPH	125 F	---
[11:00-11:15]	7	33 MPH	126 F	---
[11:15-11:30]	3	29 MPH	128 F	---
[11:30-11:45]	4	33 MPH	126 F	---
[11:45-12:00]	7	27 MPH	125 F	---
Thu,Sep/18/2014	246	28 MPH	82 F	
Sep/16/2014 12:00:00 PM Sep/18/2014 12:00:00 PM	871	28 MPH	78 F	

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: N of Ranger

A study of vehicle traffic was conducted with HI-STAR unit number 6154. The study was done in the NB lane at N of Ranger in Cheyenne, WY in Laramie county. The study began on Sep/16/2014 at 12:00:00 PM and concluded on Sep/18/2014 at 12:00:00 PM, lasting a total of 48.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 820 vehicles passed through the location with a peak volume of 25 on Sep/16/2014 at [21:00-21:15] and a minimum volume of 0 on Sep/17/2014 at [19:15-19:30]. The AADT count for this study was 410.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 25 - 30 MPH range or lower. The average speed for all classifed vehicles was 27 MPH with 8.24% vehicles exceeding the posted speed of 30 MPH. The HI-STAR found 0.12 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 25MPH and the 85th percentile was 32.22 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
1	22	41	266	306	99	29	13	11	4	8	1	0	0	0					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Problem with the battery detected. Try discharging and fully charging it
Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 549 which represents 69 percent of the total classified vehicles. The number of Vans & Pickups in the study was 193 which represents 24 percent of the total classified vehicles. The number of Busses & Trucks in the study was 32 which represents 4 percent of the total classified vehicles. The number of Tractor Tailers in the study was 27 which represents 3 percent of the total classified vehicles.

< to 17	18 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to 61	62 to >												
549	193	23	9	11	7	5	4												

CHART 2

HEADWAY

During the peak traffic period, on Sep/16/2014 at [21:00-21:15] the average headway between vehicles was 34.615 seconds. During the slowest traffic period, on Sep/17/2014 at [19:15-19:30] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 54.00 and 125.00 degrees F.

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6154	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: N of Ranger	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 820
County: Laramie	AADT Factor: 1	AADT Count: 410

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue,Sep/16/2014				
[12:00-12:15]	2	23 MPH	54 F	---
[12:15-12:30]	8	29 MPH	54 F	---
[12:30-12:45]	18	27 MPH	54 F	---
[12:45-13:00]	12	27 MPH	54 F	---
[13:00-13:15]	1	22 MPH	56 F	---
[13:15-13:30]	3	24 MPH	60 F	---
[13:30-13:45]	6	28 MPH	60 F	---
[13:45-14:00]	18	26 MPH	66 F	---
[14:00-14:15]	11	28 MPH	74 F	---
[14:15-14:30]	5	30 MPH	76 F	---
[14:30-14:45]	7	26 MPH	82 F	---
[14:45-15:00]	3	34 MPH	85 F	---
[15:00-15:15]	1	22 MPH	89 F	---
[15:15-15:30]	3	24 MPH	91 F	---
[15:30-15:45]	2	28 MPH	95 F	---
[15:45-16:00]	5	26 MPH	97 F	---
[16:00-16:15]	3	31 MPH	99 F	---
[16:15-16:30]	7	33 MPH	101 F	---
[16:30-16:45]	5	29 MPH	107 F	---
[16:45-17:00]	9	25 MPH	109 F	---
[17:00-17:15]	6	31 MPH	111 F	---
[17:15-17:30]	4	29 MPH	113 F	---
[17:30-17:45]	6	29 MPH	117 F	---
[17:45-18:00]	4	23 MPH	117 F	---
[18:00-18:15]	4	26 MPH	107 F	---
[18:15-18:30]	7	29 MPH	113 F	---
[18:30-18:45]	5	26 MPH	119 F	---
[18:45-19:00]	4	28 MPH	113 F	---
[19:00-19:15]	5	26 MPH	121 F	---
[19:15-19:30]	6	28 MPH	123 F	---
[19:30-19:45]	9	21 MPH	121 F	---
[19:45-20:00]	6	34 MPH	123 F	---
[20:00-20:15]	4	29 MPH	113 F	---
[20:15-20:30]	5	27 MPH	115 F	---
[20:30-20:45]	14	27 MPH	115 F	---
[20:45-21:00]	6	28 MPH	111 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6154	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: N of Ranger	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 820
County: Laramie	AADT Factor: 1	AADT Count: 410

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue,Sep/16/2014				
[21:00-21:15]	25	25 MPH	105 F	---
[21:15-21:30]	25	25 MPH	101 F	---
[21:30-21:45]	14	31 MPH	99 F	---
[21:45-22:00]	7	27 MPH	95 F	---
[22:00-22:15]	9	28 MPH	91 F	---
[22:15-22:30]	5	26 MPH	89 F	---
[22:30-22:45]	9	29 MPH	91 F	---
[22:45-23:00]	11	27 MPH	95 F	---
[23:00-23:15]	7	25 MPH	95 F	---
[23:15-23:30]	5	30 MPH	93 F	---
[23:30-23:45]	5	26 MPH	89 F	---
[23:45-00:00]	11	28 MPH	83 F	---
Tue,Sep/16/2014	357	27 MPH	95 F	
Wed,Sep/17/2014				
[00:00-00:15]	6	25 MPH	82 F	---
[00:15-00:30]	3	31 MPH	78 F	---
[00:30-00:45]	4	26 MPH	76 F	---
[00:45-01:00]	8	24 MPH	76 F	---
[01:00-01:15]	3	26 MPH	76 F	---
[01:15-01:30]	1	28 MPH	74 F	---
[01:30-01:45]	7	22 MPH	72 F	---
[01:45-02:00]	5	28 MPH	72 F	---
[02:00-02:15]	3	27 MPH	70 F	---
[02:15-02:30]	0	0 MPH	70 F	---
[02:30-02:45]	1	28 MPH	68 F	---
[02:45-03:00]	1	32 MPH	68 F	---
[03:00-03:15]	1	22 MPH	66 F	---
[03:15-03:30]	1	28 MPH	66 F	---
[03:30-03:45]	2	27 MPH	66 F	---
[03:45-04:00]	0	0 MPH	66 F	---
[04:00-04:15]	0	0 MPH	66 F	---
[04:15-04:30]	0	0 MPH	64 F	---
[04:30-04:45]	0	0 MPH	64 F	---
[04:45-05:00]	1	32 MPH	64 F	---
[05:00-05:15]	1	12 MPH	64 F	---
[05:15-05:30]	0	0 MPH	62 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6154	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: N of Ranger	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 820
County: Laramie	AADT Factor: 1	AADT Count: 410

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[05:30-05:45]	0	0 MPH	62 F	---
[05:45-06:00]	0	0 MPH	62 F	---
[06:00-06:15]	0	0 MPH	62 F	---
[06:15-06:30]	0	0 MPH	60 F	---
[06:30-06:45]	0	0 MPH	60 F	---
[06:45-07:00]	0	0 MPH	60 F	---
[07:00-07:15]	0	0 MPH	60 F	---
[07:15-07:30]	0	0 MPH	60 F	---
[07:30-07:45]	0	0 MPH	58 F	---
[07:45-08:00]	0	0 MPH	58 F	---
[08:00-08:15]	0	0 MPH	58 F	---
[08:15-08:30]	0	0 MPH	58 F	---
[08:30-08:45]	0	0 MPH	58 F	---
[08:45-09:00]	0	0 MPH	56 F	---
[09:00-09:15]	0	0 MPH	56 F	---
[09:15-09:30]	0	0 MPH	56 F	---
[09:30-09:45]	1	22 MPH	56 F	---
[09:45-10:00]	0	0 MPH	56 F	---
[10:00-10:15]	0	0 MPH	56 F	---
[10:15-10:30]	1	32 MPH	56 F	---
[10:30-10:45]	0	0 MPH	56 F	---
[10:45-11:00]	1	28 MPH	56 F	---
[11:00-11:15]	0	0 MPH	56 F	---
[11:15-11:30]	0	0 MPH	56 F	---
[11:30-11:45]	2	25 MPH	56 F	---
[11:45-12:00]	1	28 MPH	56 F	---
[12:00-12:15]	2	28 MPH	56 F	---
[12:15-12:30]	2	23 MPH	56 F	---
[12:30-12:45]	14	28 MPH	56 F	---
[12:45-13:00]	9	28 MPH	56 F	---
[13:00-13:15]	8	26 MPH	56 F	---
[13:15-13:30]	7	27 MPH	60 F	---
[13:30-13:45]	4	26 MPH	62 F	---
[13:45-14:00]	21	26 MPH	68 F	---
[14:00-14:15]	10	27 MPH	74 F	---
[14:15-14:30]	3	20 MPH	78 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6154	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: N of Ranger	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 820
County: Laramie	AADT Factor: 1	AADT Count: 410

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[14:30-14:45]	2	23 MPH	82 F	---
[14:45-15:00]	3	29 MPH	87 F	---
[15:00-15:15]	1	28 MPH	91 F	---
[15:15-15:30]	8	29 MPH	95 F	---
[15:30-15:45]	5	22 MPH	97 F	---
[15:45-16:00]	5	26 MPH	101 F	---
[16:00-16:15]	5	25 MPH	105 F	---
[16:15-16:30]	8	30 MPH	107 F	---
[16:30-16:45]	6	27 MPH	111 F	---
[16:45-17:00]	3	33 MPH	113 F	---
[17:00-17:15]	9	24 MPH	115 F	---
[17:15-17:30]	8	32 MPH	117 F	---
[17:30-17:45]	11	27 MPH	119 F	---
[17:45-18:00]	7	28 MPH	121 F	---
[18:00-18:15]	8	26 MPH	121 F	---
[18:15-18:30]	2	22 MPH	123 F	---
[18:30-18:45]	5	32 MPH	123 F	---
[18:45-19:00]	2	27 MPH	123 F	---
[19:00-19:15]	4	25 MPH	125 F	---
[19:15-19:30]	0	0 MPH	125 F	---
[19:30-19:45]	5	26 MPH	125 F	---
[19:45-20:00]	2	23 MPH	125 F	---
[20:00-20:15]	8	26 MPH	125 F	---
[20:15-20:30]	5	34 MPH	123 F	---
[20:30-20:45]	6	27 MPH	121 F	---
[20:45-21:00]	9	26 MPH	121 F	---
[21:00-21:15]	23	26 MPH	121 F	---
[21:15-21:30]	16	24 MPH	119 F	---
[21:30-21:45]	14	28 MPH	117 F	---
[21:45-22:00]	9	26 MPH	115 F	---
[22:00-22:15]	6	27 MPH	113 F	---
[22:15-22:30]	10	25 MPH	109 F	---
[22:30-22:45]	15	25 MPH	105 F	---
[22:45-23:00]	14	27 MPH	103 F	---
[23:00-23:15]	9	26 MPH	101 F	---
[23:15-23:30]	4	30 MPH	97 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6154	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: N of Ranger	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 820
County: Laramie	AADT Factor: 1	AADT Count: 410

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[23:30-23:45]	6	27 MPH	93 F	---
[23:45-00:00]	10	29 MPH	89 F	---
Wed,Sep/17/2014	407	26 MPH	82 F	
Thu,Sep/18/2014				
[00:00-00:15]	4	24 MPH	87 F	---
[00:15-00:30]	7	28 MPH	85 F	---
[00:30-00:45]	5	23 MPH	83 F	---
[00:45-01:00]	7	26 MPH	82 F	---
[01:00-01:15]	0	0 MPH	80 F	---
[01:15-01:30]	4	27 MPH	78 F	---
[01:30-01:45]	6	27 MPH	76 F	---
[01:45-02:00]	3	23 MPH	76 F	---
[02:00-02:15]	2	28 MPH	76 F	---
[02:15-02:30]	0	0 MPH	74 F	---
[02:30-02:45]	1	22 MPH	74 F	---
[02:45-03:00]	1	28 MPH	74 F	---
[03:00-03:15]	1	32 MPH	74 F	---
[03:15-03:30]	0	0 MPH	74 F	---
[03:30-03:45]	0	0 MPH	72 F	---
[03:45-04:00]	1	22 MPH	72 F	---
[04:00-04:15]	0	0 MPH	72 F	---
[04:15-04:30]	0	0 MPH	70 F	---
[04:30-04:45]	0	0 MPH	70 F	---
[04:45-05:00]	1	12 MPH	68 F	---
[05:00-05:15]	1	22 MPH	68 F	---
[05:15-05:30]	0	0 MPH	68 F	---
[05:30-05:45]	0	0 MPH	66 F	---
[05:45-06:00]	1	28 MPH	66 F	---
[06:00-06:15]	0	0 MPH	66 F	---
[06:15-06:30]	0	0 MPH	66 F	---
[06:30-06:45]	0	0 MPH	64 F	---
[06:45-07:00]	0	0 MPH	64 F	---
[07:00-07:15]	0	0 MPH	64 F	---
[07:15-07:30]	0	0 MPH	64 F	---
[07:30-07:45]	0	0 MPH	62 F	---
[07:45-08:00]	0	0 MPH	62 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6154	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: N of Ranger	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 820
County: Laramie	AADT Factor: 1	AADT Count: 410

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Thu,Sep/18/2014				
[08:00-08:15]	0	0 MPH	62 F	---
[08:15-08:30]	1	22 MPH	62 F	---
[08:30-08:45]	0	0 MPH	60 F	---
[08:45-09:00]	0	0 MPH	60 F	---
[09:00-09:15]	0	0 MPH	60 F	---
[09:15-09:30]	0	0 MPH	60 F	---
[09:30-09:45]	0	0 MPH	60 F	---
[09:45-10:00]	0	0 MPH	60 F	---
[10:00-10:15]	0	0 MPH	60 F	---
[10:15-10:30]	2	30 MPH	60 F	---
[10:30-10:45]	0	0 MPH	60 F	---
[10:45-11:00]	1	28 MPH	60 F	---
[11:00-11:15]	4	37 MPH	60 F	---
[11:15-11:30]	0	0 MPH	62 F	---
[11:30-11:45]	2	25 MPH	62 F	---
[11:45-12:00]	1	23 MPH	60 F	---
Thu,Sep/18/2014	56	0 MPH	68 F	
Sep/16/2014 12:00:00 PM Sep/18/2014 12:00:00 PM	820	26 MPH	82 F	

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: N of Ranger

A study of vehicle traffic was conducted with HI-STAR unit number 6151. The study was done in the SB lane at N of Ranger in Cheyenne, WY in Laramie county. The study began on Sep/16/2014 at 12:00:00 PM and concluded on Sep/18/2014 at 12:00:00 PM, lasting a total of 48.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 671 vehicles passed through the location with a peak volume of 21 on Sep/16/2014 at [13:45-14:00] and a minimum volume of 0 on Sep/16/2014 at [12:15-12:30]. The AADT count for this study was 336.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 9 MPH range or lower. The average speed for all classifed vehicles was 13 MPH with 2.69% vehicles exceeding the posted speed of 30 MPH. The HI-STAR found 0.21 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 9MPH and the 85th percentile was 23.52 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
182	143	55	44	27	20	9	3	0	0	0	0	0	0	1					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Problem with the battery detected. Try discharging and fully charging it

Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 431 which represents 89 percent of the total classified vehicles. The number of Vans & Pickups in the study was 30 which represents 6 percent of the total classified vehicles. The number of Busses & Trucks in the study was 16 which represents 3 percent of the total classified vehicles. The number of Tractor Tailers in the study was 7 which represents 1 percent of the total classified vehicles.

< to 17	18 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to 61	62 to >												
431	30	13	3	2	3	1	1												

CHART 2

HEADWAY

During the peak traffic period, on Sep/16/2014 at [13:45-14:00] the average headway between vehicles was 40.909 seconds. During the slowest traffic period, on Sep/16/2014 at [12:15-12:30] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 54.00 and 130.00 degrees F.

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6151	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: N of Ranger	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 671
County: Laramie	AADT Factor: 1	AADT Count: 336

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue,Sep/16/2014				
[12:00-12:15]	1	12 MPH	54 F	---
[12:15-12:30]	0	0 MPH	54 F	---
[12:30-12:45]	5	5 MPH	56 F	---
[12:45-13:00]	4	22 MPH	56 F	---
[13:00-13:15]	1	18 MPH	56 F	---
[13:15-13:30]	10	12 MPH	60 F	---
[13:30-13:45]	10	17 MPH	64 F	---
[13:45-14:00]	21	13 MPH	64 F	---
[14:00-14:15]	5	17 MPH	72 F	---
[14:15-14:30]	2	33 MPH	76 F	---
[14:30-14:45]	1	12 MPH	82 F	---
[14:45-15:00]	1	0 MPH	85 F	---
[15:00-15:15]	5	10 MPH	89 F	---
[15:15-15:30]	3	8 MPH	93 F	---
[15:30-15:45]	6	15 MPH	97 F	---
[15:45-16:00]	3	8 MPH	99 F	---
[16:00-16:15]	2	18 MPH	103 F	---
[16:15-16:30]	7	11 MPH	105 F	---
[16:30-16:45]	8	7 MPH	109 F	---
[16:45-17:00]	3	22 MPH	113 F	---
[17:00-17:15]	4	14 MPH	115 F	---
[17:15-17:30]	2	4 MPH	119 F	---
[17:30-17:45]	9	17 MPH	119 F	---
[17:45-18:00]	11	15 MPH	121 F	---
[18:00-18:15]	6	17 MPH	113 F	---
[18:15-18:30]	5	6 MPH	117 F	---
[18:30-18:45]	8	13 MPH	125 F	---
[18:45-19:00]	5	15 MPH	119 F	---
[19:00-19:15]	5	8 MPH	126 F	---
[19:15-19:30]	7	24 MPH	128 F	---
[19:30-19:45]	5	14 MPH	126 F	---
[19:45-20:00]	4	11 MPH	130 F	---
[20:00-20:15]	3	5 MPH	119 F	---
[20:15-20:30]	5	7 MPH	121 F	---
[20:30-20:45]	10	12 MPH	121 F	---
[20:45-21:00]	17	16 MPH	115 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6151	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: N of Ranger	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 671
County: Laramie	AADT Factor: 1	AADT Count: 336

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue,Sep/16/2014				
[21:00-21:15]	15	12 MPH	107 F	---
[21:15-21:30]	10	8 MPH	103 F	---
[21:30-21:45]	5	15 MPH	99 F	---
[21:45-22:00]	5	20 MPH	97 F	---
[22:00-22:15]	3	5 MPH	91 F	---
[22:15-22:30]	3	23 MPH	91 F	---
[22:30-22:45]	8	14 MPH	91 F	---
[22:45-23:00]	7	8 MPH	97 F	---
[23:00-23:15]	8	11 MPH	97 F	---
[23:15-23:30]	6	11 MPH	93 F	---
[23:30-23:45]	5	8 MPH	87 F	---
[23:45-00:00]	5	17 MPH	83 F	---
Tue,Sep/16/2014	284	12 MPH	97 F	
Wed,Sep/17/2014				
[00:00-00:15]	7	13 MPH	82 F	---
[00:15-00:30]	4	8 MPH	78 F	---
[00:30-00:45]	5	10 MPH	76 F	---
[00:45-01:00]	1	22 MPH	76 F	---
[01:00-01:15]	5	15 MPH	76 F	---
[01:15-01:30]	2	4 MPH	74 F	---
[01:30-01:45]	3	17 MPH	72 F	---
[01:45-02:00]	5	9 MPH	72 F	---
[02:00-02:15]	1	32 MPH	70 F	---
[02:15-02:30]	3	10 MPH	70 F	---
[02:30-02:45]	2	23 MPH	68 F	---
[02:45-03:00]	2	12 MPH	68 F	---
[03:00-03:15]	1	4 MPH	68 F	---
[03:15-03:30]	1	4 MPH	66 F	---
[03:30-03:45]	1	28 MPH	66 F	---
[03:45-04:00]	0	0 MPH	66 F	---
[04:00-04:15]	0	0 MPH	66 F	---
[04:15-04:30]	1	12 MPH	64 F	---
[04:30-04:45]	0	0 MPH	64 F	---
[04:45-05:00]	0	0 MPH	64 F	---
[05:00-05:15]	2	4 MPH	64 F	---
[05:15-05:30]	0	0 MPH	62 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6151	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: N of Ranger	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 671
County: Laramie	AADT Factor: 1	AADT Count: 336

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[05:30-05:45]	0	0 MPH	62 F	---
[05:45-06:00]	0	0 MPH	62 F	---
[06:00-06:15]	0	0 MPH	62 F	---
[06:15-06:30]	0	0 MPH	60 F	---
[06:30-06:45]	0	0 MPH	60 F	---
[06:45-07:00]	0	0 MPH	60 F	---
[07:00-07:15]	0	0 MPH	60 F	---
[07:15-07:30]	0	0 MPH	60 F	---
[07:30-07:45]	1	4 MPH	60 F	---
[07:45-08:00]	0	0 MPH	58 F	---
[08:00-08:15]	0	0 MPH	58 F	---
[08:15-08:30]	0	0 MPH	58 F	---
[08:30-08:45]	0	0 MPH	58 F	---
[08:45-09:00]	0	0 MPH	58 F	---
[09:00-09:15]	0	0 MPH	56 F	---
[09:15-09:30]	0	0 MPH	58 F	---
[09:30-09:45]	0	0 MPH	58 F	---
[09:45-10:00]	0	0 MPH	58 F	---
[10:00-10:15]	0	0 MPH	56 F	---
[10:15-10:30]	0	0 MPH	56 F	---
[10:30-10:45]	0	0 MPH	56 F	---
[10:45-11:00]	0	0 MPH	56 F	---
[11:00-11:15]	0	0 MPH	56 F	---
[11:15-11:30]	1	28 MPH	56 F	---
[11:30-11:45]	3	5 MPH	56 F	---
[11:45-12:00]	1	12 MPH	56 F	---
[12:00-12:15]	1	0 MPH	56 F	---
[12:15-12:30]	3	10 MPH	56 F	---
[12:30-12:45]	1	32 MPH	56 F	---
[12:45-13:00]	1	32 MPH	56 F	---
[13:00-13:15]	7	14 MPH	58 F	---
[13:15-13:30]	5	7 MPH	62 F	---
[13:30-13:45]	8	11 MPH	66 F	---
[13:45-14:00]	17	11 MPH	66 F	---
[14:00-14:15]	1	0 MPH	72 F	---
[14:15-14:30]	4	8 MPH	76 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6151	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: N of Ranger	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 671
County: Laramie	AADT Factor: 1	AADT Count: 336

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[14:30-14:45]	3	0 MPH	82 F	---
[14:45-15:00]	5	19 MPH	87 F	---
[15:00-15:15]	3	8 MPH	91 F	---
[15:15-15:30]	7	9 MPH	97 F	---
[15:30-15:45]	3	13 MPH	99 F	---
[15:45-16:00]	3	16 MPH	103 F	---
[16:00-16:15]	2	0 MPH	107 F	---
[16:15-16:30]	5	10 MPH	109 F	---
[16:30-16:45]	6	13 MPH	113 F	---
[16:45-17:00]	4	13 MPH	115 F	---
[17:00-17:15]	5	16 MPH	119 F	---
[17:15-17:30]	6	12 MPH	121 F	---
[17:30-17:45]	7	14 MPH	121 F	---
[17:45-18:00]	3	16 MPH	123 F	---
[18:00-18:15]	2	0 MPH	125 F	---
[18:15-18:30]	5	4 MPH	126 F	---
[18:30-18:45]	4	10 MPH	128 F	---
[18:45-19:00]	5	12 MPH	128 F	---
[19:00-19:15]	3	22 MPH	128 F	---
[19:15-19:30]	6	22 MPH	130 F	---
[19:30-19:45]	7	13 MPH	130 F	---
[19:45-20:00]	6	7 MPH	130 F	---
[20:00-20:15]	6	19 MPH	128 F	---
[20:15-20:30]	2	16 MPH	126 F	---
[20:30-20:45]	10	15 MPH	126 F	---
[20:45-21:00]	17	13 MPH	125 F	---
[21:00-21:15]	17	15 MPH	123 F	---
[21:15-21:30]	6	8 MPH	121 F	---
[21:30-21:45]	6	19 MPH	121 F	---
[21:45-22:00]	5	17 MPH	119 F	---
[22:00-22:15]	3	8 MPH	115 F	---
[22:15-22:30]	11	13 MPH	113 F	---
[22:30-22:45]	4	7 MPH	109 F	---
[22:45-23:00]	10	11 MPH	107 F	---
[23:00-23:15]	8	11 MPH	101 F	---
[23:15-23:30]	7	19 MPH	97 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6151	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: N of Ranger	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 671
County: Laramie	AADT Factor: 1	AADT Count: 336

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[23:30-23:45]	6	11 MPH	93 F	---
[23:45-00:00]	7	14 MPH	89 F	---
Wed,Sep/17/2014	325	9 MPH	83 F	
Thu,Sep/18/2014				
[00:00-00:15]	6	16 MPH	87 F	---
[00:15-00:30]	2	13 MPH	85 F	---
[00:30-00:45]	8	17 MPH	83 F	---
[00:45-01:00]	9	10 MPH	82 F	---
[01:00-01:15]	3	4 MPH	80 F	---
[01:15-01:30]	7	19 MPH	78 F	---
[01:30-01:45]	9	16 MPH	76 F	---
[01:45-02:00]	3	13 MPH	76 F	---
[02:00-02:15]	2	4 MPH	76 F	---
[02:15-02:30]	2	11 MPH	74 F	---
[02:30-02:45]	0	0 MPH	74 F	---
[02:45-03:00]	0	0 MPH	74 F	---
[03:00-03:15]	2	8 MPH	74 F	---
[03:15-03:30]	0	0 MPH	74 F	---
[03:30-03:45]	1	0 MPH	72 F	---
[03:45-04:00]	1	22 MPH	72 F	---
[04:00-04:15]	0	0 MPH	72 F	---
[04:15-04:30]	1	0 MPH	70 F	---
[04:30-04:45]	0	0 MPH	70 F	---
[04:45-05:00]	0	0 MPH	70 F	---
[05:00-05:15]	1	4 MPH	68 F	---
[05:15-05:30]	0	0 MPH	68 F	---
[05:30-05:45]	0	0 MPH	66 F	---
[05:45-06:00]	0	0 MPH	66 F	---
[06:00-06:15]	0	0 MPH	66 F	---
[06:15-06:30]	1	28 MPH	66 F	---
[06:30-06:45]	0	0 MPH	64 F	---
[06:45-07:00]	0	0 MPH	64 F	---
[07:00-07:15]	0	0 MPH	64 F	---
[07:15-07:30]	0	0 MPH	64 F	---
[07:30-07:45]	0	0 MPH	64 F	---
[07:45-08:00]	0	0 MPH	62 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6151	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: N of Ranger	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 671
County: Laramie	AADT Factor: 1	AADT Count: 336

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Thu,Sep/18/2014				
[08:00-08:15]	0	0 MPH	62 F	---
[08:15-08:30]	0	0 MPH	62 F	---
[08:30-08:45]	0	0 MPH	62 F	---
[08:45-09:00]	0	0 MPH	60 F	---
[09:00-09:15]	0	0 MPH	60 F	---
[09:15-09:30]	1	0 MPH	60 F	---
[09:30-09:45]	0	0 MPH	60 F	---
[09:45-10:00]	0	0 MPH	60 F	---
[10:00-10:15]	0	0 MPH	60 F	---
[10:15-10:30]	0	0 MPH	60 F	---
[10:30-10:45]	0	0 MPH	60 F	---
[10:45-11:00]	0	0 MPH	60 F	---
[11:00-11:15]	0	0 MPH	62 F	---
[11:15-11:30]	1	18 MPH	62 F	---
[11:30-11:45]	1	22 MPH	62 F	---
[11:45-12:00]	1	75 MPH	62 F	---
Thu,Sep/18/2014	62	0 MPH	68 F	
Sep/16/2014 12:00:00 PM Sep/18/2014 12:00:00 PM	671	8 MPH	83 F	

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: S of Rodeo

A study of vehicle traffic was conducted with HI-STAR unit number 6152. The study was done in the NB lane at S of Rodeo in Cheyenne, WY in Laramie county. The study began on Sep/16/2014 at 12:00:00 PM and concluded on Sep/18/2014 at 12:00:00 PM, lasting a total of 48.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 629 vehicles passed through the location with a peak volume of 26 on Sep/17/2014 at [15:45-16:00] and a minimum volume of 0 on Sep/16/2014 at [22:00-22:15]. The AADT count for this study was 315.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 9 MPH range or lower. The average speed for all classifed vehicles was 13 MPH with 5.45% vehicles exceeding the posted speed of 30 MPH. The HI-STAR found 0.00 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 9MPH and the 85th percentile was 22.21 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
203	143	59	34	17	12	10	10	7	0	0	0	0	0	0					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Problem with the battery detected. Try discharging and fully charging it

Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 450 which represents 91 percent of the total classified vehicles. The number of Vans & Pickups in the study was 24 which represents 5 percent of the total classified vehicles. The number of Busses & Trucks in the study was 17 which represents 3 percent of the total classified vehicles. The number of Tractor Tailers in the study was 4 which represents 1 percent of the total classified vehicles.

< to 17	18 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to 61	62 to >												
450	24	15	2	2	0	2	0												

CHART 2

HEADWAY

During the peak traffic period, on Sep/17/2014 at [15:45-16:00] the average headway between vehicles was 33.333 seconds. During the slowest traffic period, on Sep/16/2014 at [22:00-22:15] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 56.00 and 125.00 degrees F.

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6152	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: S of Rodeo	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 629
County: Laramie	AADT Factor: 1	AADT Count: 315

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue,Sep/16/2014				
[12:00-12:15]	6	13 MPH	107 F	---
[12:15-12:30]	4	23 MPH	111 F	---
[12:30-12:45]	7	7 MPH	111 F	---
[12:45-13:00]	6	15 MPH	113 F	---
[13:00-13:15]	3	9 MPH	115 F	---
[13:15-13:30]	3	40 MPH	117 F	---
[13:30-13:45]	9	9 MPH	119 F	---
[13:45-14:00]	5	10 MPH	119 F	---
[14:00-14:15]	3	8 MPH	119 F	---
[14:15-14:30]	2	8 MPH	113 F	---
[14:30-14:45]	4	9 MPH	117 F	---
[14:45-15:00]	1	0 MPH	119 F	---
[15:00-15:15]	4	14 MPH	115 F	---
[15:15-15:30]	5	21 MPH	111 F	---
[15:30-15:45]	7	10 MPH	111 F	---
[15:45-16:00]	20	10 MPH	105 F	---
[16:00-16:15]	12	7 MPH	103 F	---
[16:15-16:30]	5	18 MPH	103 F	---
[16:30-16:45]	4	30 MPH	103 F	---
[16:45-17:00]	9	16 MPH	99 F	---
[17:00-17:15]	4	21 MPH	99 F	---
[17:15-17:30]	11	13 MPH	97 F	---
[17:30-17:45]	12	18 MPH	91 F	---
[17:45-18:00]	5	7 MPH	87 F	---
[18:00-18:15]	6	16 MPH	85 F	---
[18:15-18:30]	9	10 MPH	83 F	---
[18:30-18:45]	3	12 MPH	82 F	---
[18:45-19:00]	16	11 MPH	80 F	---
[19:00-19:15]	6	8 MPH	78 F	---
[19:15-19:30]	5	7 MPH	76 F	---
[19:30-19:45]	3	15 MPH	76 F	---
[19:45-20:00]	6	22 MPH	74 F	---
[20:00-20:15]	5	27 MPH	74 F	---
[20:15-20:30]	5	12 MPH	72 F	---
[20:30-20:45]	4	5 MPH	72 F	---
[20:45-21:00]	2	15 MPH	70 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6152	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: S of Rodeo	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 629
County: Laramie	AADT Factor: 1	AADT Count: 315

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue,Sep/16/2014				
[21:00-21:15]	4	12 MPH	70 F	---
[21:15-21:30]	1	4 MPH	68 F	---
[21:30-21:45]	1	22 MPH	68 F	---
[21:45-22:00]	3	5 MPH	68 F	---
[22:00-22:15]	0	0 MPH	70 F	---
[22:15-22:30]	0	0 MPH	70 F	---
[22:30-22:45]	0	0 MPH	68 F	---
[22:45-23:00]	1	0 MPH	68 F	---
[23:00-23:15]	3	15 MPH	68 F	---
[23:15-23:30]	1	4 MPH	66 F	---
[23:30-23:45]	0	0 MPH	66 F	---
[23:45-00:00]	0	0 MPH	66 F	---
Tue,Sep/16/2014	235	10 MPH	90 F	
Wed,Sep/17/2014				
[00:00-00:15]	0	0 MPH	66 F	---
[00:15-00:30]	0	0 MPH	66 F	---
[00:30-00:45]	0	0 MPH	64 F	---
[00:45-01:00]	0	0 MPH	64 F	---
[01:00-01:15]	0	0 MPH	64 F	---
[01:15-01:30]	0	0 MPH	62 F	---
[01:30-01:45]	0	0 MPH	62 F	---
[01:45-02:00]	0	0 MPH	62 F	---
[02:00-02:15]	0	0 MPH	60 F	---
[02:15-02:30]	0	0 MPH	60 F	---
[02:30-02:45]	0	0 MPH	60 F	---
[02:45-03:00]	0	0 MPH	60 F	---
[03:00-03:15]	0	0 MPH	60 F	---
[03:15-03:30]	0	0 MPH	60 F	---
[03:30-03:45]	0	0 MPH	60 F	---
[03:45-04:00]	0	0 MPH	58 F	---
[04:00-04:15]	0	0 MPH	58 F	---
[04:15-04:30]	0	0 MPH	58 F	---
[04:30-04:45]	0	0 MPH	58 F	---
[04:45-05:00]	0	0 MPH	58 F	---
[05:00-05:15]	0	0 MPH	58 F	---
[05:15-05:30]	0	0 MPH	56 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6152	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: S of Rodeo	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 629
County: Laramie	AADT Factor: 1	AADT Count: 315

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[05:30-05:45]	0	0 MPH	56 F	---
[05:45-06:00]	1	12 MPH	56 F	---
[06:00-06:15]	0	0 MPH	56 F	---
[06:15-06:30]	0	0 MPH	56 F	---
[06:30-06:45]	1	12 MPH	56 F	---
[06:45-07:00]	1	0 MPH	56 F	---
[07:00-07:15]	2	11 MPH	56 F	---
[07:15-07:30]	2	8 MPH	56 F	---
[07:30-07:45]	2	18 MPH	56 F	---
[07:45-08:00]	2	32 MPH	58 F	---
[08:00-08:15]	4	11 MPH	58 F	---
[08:15-08:30]	3	15 MPH	58 F	---
[08:30-08:45]	9	15 MPH	60 F	---
[08:45-09:00]	6	13 MPH	62 F	---
[09:00-09:15]	2	4 MPH	72 F	---
[09:15-09:30]	5	19 MPH	78 F	---
[09:30-09:45]	3	5 MPH	83 F	---
[09:45-10:00]	1	0 MPH	87 F	---
[10:00-10:15]	4	14 MPH	91 F	---
[10:15-10:30]	0	0 MPH	95 F	---
[10:30-10:45]	6	16 MPH	97 F	---
[10:45-11:00]	2	12 MPH	101 F	---
[11:00-11:15]	4	10 MPH	103 F	---
[11:15-11:30]	6	11 MPH	107 F	---
[11:30-11:45]	7	10 MPH	109 F	---
[11:45-12:00]	5	14 MPH	113 F	---
[12:00-12:15]	2	13 MPH	115 F	---
[12:15-12:30]	9	20 MPH	115 F	---
[12:30-12:45]	3	7 MPH	113 F	---
[12:45-13:00]	6	13 MPH	115 F	---
[13:00-13:15]	1	22 MPH	115 F	---
[13:15-13:30]	3	27 MPH	117 F	---
[13:30-13:45]	2	23 MPH	121 F	---
[13:45-14:00]	8	8 MPH	125 F	---
[14:00-14:15]	5	12 MPH	119 F	---
[14:15-14:30]	9	13 MPH	123 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6152	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: S of Rodeo	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 629
County: Laramie	AADT Factor: 1	AADT Count: 315

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[14:30-14:45]	5	15 MPH	119 F	---
[14:45-15:00]	1	12 MPH	113 F	---
[15:00-15:15]	10	8 MPH	113 F	---
[15:15-15:30]	6	9 MPH	113 F	---
[15:30-15:45]	3	16 MPH	107 F	---
[15:45-16:00]	26	13 MPH	101 F	---
[16:00-16:15]	7	6 MPH	97 F	---
[16:15-16:30]	8	8 MPH	97 F	---
[16:30-16:45]	9	14 MPH	91 F	---
[16:45-17:00]	5	17 MPH	89 F	---
[17:00-17:15]	3	25 MPH	89 F	---
[17:15-17:30]	12	13 MPH	89 F	---
[17:30-17:45]	10	16 MPH	89 F	---
[17:45-18:00]	7	7 MPH	87 F	---
[18:00-18:15]	6	16 MPH	85 F	---
[18:15-18:30]	11	13 MPH	82 F	---
[18:30-18:45]	7	17 MPH	80 F	---
[18:45-19:00]	2	13 MPH	78 F	---
[19:00-19:15]	6	15 MPH	76 F	---
[19:15-19:30]	7	26 MPH	76 F	---
[19:30-19:45]	6	22 MPH	74 F	---
[19:45-20:00]	5	14 MPH	74 F	---
[20:00-20:15]	2	25 MPH	72 F	---
[20:15-20:30]	7	9 MPH	72 F	---
[20:30-20:45]	3	13 MPH	70 F	---
[20:45-21:00]	3	15 MPH	70 F	---
[21:00-21:15]	5	11 MPH	68 F	---
[21:15-21:30]	2	4 MPH	68 F	---
[21:30-21:45]	1	4 MPH	68 F	---
[21:45-22:00]	3	4 MPH	66 F	---
[22:00-22:15]	2	5 MPH	66 F	---
[22:15-22:30]	1	22 MPH	66 F	---
[22:30-22:45]	0	0 MPH	66 F	---
[22:45-23:00]	0	0 MPH	64 F	---
[23:00-23:15]	0	0 MPH	64 F	---
[23:15-23:30]	0	0 MPH	64 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6152	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: S of Rodeo	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 629
County: Laramie	AADT Factor: 1	AADT Count: 315

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[23:30-23:45]	0	0 MPH	64 F	---
[23:45-00:00]	1	0 MPH	64 F	---
Wed,Sep/17/2014	318	9 MPH	79 F	
Thu,Sep/18/2014				
[00:00-00:15]	0	0 MPH	62 F	---
[00:15-00:30]	0	0 MPH	62 F	---
[00:30-00:45]	0	0 MPH	62 F	---
[00:45-01:00]	0	0 MPH	62 F	---
[01:00-01:15]	0	0 MPH	62 F	---
[01:15-01:30]	0	0 MPH	60 F	---
[01:30-01:45]	0	0 MPH	60 F	---
[01:45-02:00]	0	0 MPH	60 F	---
[02:00-02:15]	0	0 MPH	60 F	---
[02:15-02:30]	0	0 MPH	60 F	---
[02:30-02:45]	0	0 MPH	60 F	---
[02:45-03:00]	0	0 MPH	58 F	---
[03:00-03:15]	0	0 MPH	58 F	---
[03:15-03:30]	0	0 MPH	58 F	---
[03:30-03:45]	0	0 MPH	58 F	---
[03:45-04:00]	0	0 MPH	58 F	---
[04:00-04:15]	0	0 MPH	58 F	---
[04:15-04:30]	1	12 MPH	58 F	---
[04:30-04:45]	0	0 MPH	58 F	---
[04:45-05:00]	0	0 MPH	58 F	---
[05:00-05:15]	0	0 MPH	56 F	---
[05:15-05:30]	0	0 MPH	56 F	---
[05:30-05:45]	0	0 MPH	56 F	---
[05:45-06:00]	0	0 MPH	56 F	---
[06:00-06:15]	0	0 MPH	56 F	---
[06:15-06:30]	0	0 MPH	56 F	---
[06:30-06:45]	0	0 MPH	56 F	---
[06:45-07:00]	1	4 MPH	56 F	---
[07:00-07:15]	1	12 MPH	56 F	---
[07:15-07:30]	1	12 MPH	56 F	---
[07:30-07:45]	5	18 MPH	56 F	---
[07:45-08:00]	3	18 MPH	58 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6152	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: S of Rodeo	Lane: NB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 629
County: Laramie	AADT Factor: 1	AADT Count: 315

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Thu,Sep/18/2014				
[08:00-08:15]	0	0 MPH	58 F	---
[08:15-08:30]	3	5 MPH	58 F	---
[08:30-08:45]	13	13 MPH	60 F	---
[08:45-09:00]	3	5 MPH	62 F	---
[09:00-09:15]	1	12 MPH	68 F	---
[09:15-09:30]	3	18 MPH	78 F	---
[09:30-09:45]	2	13 MPH	83 F	---
[09:45-10:00]	4	11 MPH	89 F	---
[10:00-10:15]	4	17 MPH	95 F	---
[10:15-10:30]	0	0 MPH	97 F	---
[10:30-10:45]	3	17 MPH	101 F	---
[10:45-11:00]	4	5 MPH	105 F	---
[11:00-11:15]	5	5 MPH	109 F	---
[11:15-11:30]	8	6 MPH	111 F	---
[11:30-11:45]	5	11 MPH	113 F	---
[11:45-12:00]	6	5 MPH	117 F	---
Thu,Sep/18/2014	76	0 MPH	68 F	
Sep/16/2014 12:00:00 PM Sep/18/2014 12:00:00 PM	629	8 MPH	79 F	

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: Cheyenne
Street: S of Rodeo

A study of vehicle traffic was conducted with HI-STAR unit number 6158. The study was done in the SB lane at S of Rodeo in Cheyenne, WY in Laramie county. The study began on Sep/16/2014 at 12:00:00 PM and concluded on Sep/18/2014 at 12:00:00 PM, lasting a total of 48.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 678 vehicles passed through the location with a peak volume of 18 on Sep/18/2014 at [08:15-08:30] and a minimum volume of 0 on Sep/16/2014 at [21:45-22:00]. The AADT count for this study was 339.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 9 MPH range or lower. The average speed for all classifed vehicles was 12 MPH with 4.63% vehicles exceeding the posted speed of 30 MPH. The HI-STAR found 0.00 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 9MPH and the 85th percentile was 19.93 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
249	142	68	28	19	9	14	9	2	0	0	0	0	0	0					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Problem with the battery detected. Try discharging and fully charging it

Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 485 which represents 90 percent of the total classified vehicles. The number of Vans & Pickups in the study was 28 which represents 5 percent of the total classified vehicles. The number of Busses & Trucks in the study was 20 which represents 4 percent of the total classified vehicles. The number of Tractor Tailers in the study was 7 which represents 1 percent of the total classified vehicles.

< to 17	18 to 23	24 to 27	28 to 31	32 to 37	38 to 43	44 to 61	62 to >												
485	28	12	8	4	0	2	1												

CHART 2

HEADWAY

During the peak traffic period, on Sep/18/2014 at [08:15-08:30] the average headway between vehicles was 47.368 seconds. During the slowest traffic period, on Sep/16/2014 at [21:45-22:00] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 56.00 and 126.00 degrees F.

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6158	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: S of Rodeo	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 678
County: Laramie	AADT Factor: 1	AADT Count: 339

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue,Sep/16/2014				
[12:00-12:15]	5	8 MPH	109 F	---
[12:15-12:30]	4	11 MPH	111 F	---
[12:30-12:45]	7	12 MPH	113 F	---
[12:45-13:00]	10	10 MPH	115 F	---
[13:00-13:15]	4	16 MPH	115 F	---
[13:15-13:30]	9	11 MPH	117 F	---
[13:30-13:45]	3	12 MPH	119 F	---
[13:45-14:00]	3	19 MPH	121 F	---
[14:00-14:15]	4	12 MPH	121 F	---
[14:15-14:30]	3	18 MPH	115 F	---
[14:30-14:45]	4	11 MPH	119 F	---
[14:45-15:00]	1	4 MPH	121 F	---
[15:00-15:15]	7	18 MPH	117 F	---
[15:15-15:30]	11	13 MPH	113 F	---
[15:30-15:45]	9	16 MPH	113 F	---
[15:45-16:00]	5	7 MPH	105 F	---
[16:00-16:15]	11	13 MPH	105 F	---
[16:15-16:30]	3	16 MPH	105 F	---
[16:30-16:45]	9	14 MPH	105 F	---
[16:45-17:00]	4	24 MPH	103 F	---
[17:00-17:15]	4	15 MPH	101 F	---
[17:15-17:30]	8	13 MPH	95 F	---
[17:30-17:45]	2	5 MPH	89 F	---
[17:45-18:00]	16	8 MPH	87 F	---
[18:00-18:15]	7	8 MPH	83 F	---
[18:15-18:30]	3	16 MPH	82 F	---
[18:30-18:45]	6	14 MPH	80 F	---
[18:45-19:00]	6	15 MPH	78 F	---
[19:00-19:15]	3	19 MPH	78 F	---
[19:15-19:30]	2	4 MPH	76 F	---
[19:30-19:45]	1	0 MPH	76 F	---
[19:45-20:00]	3	10 MPH	74 F	---
[20:00-20:15]	1	4 MPH	74 F	---
[20:15-20:30]	4	11 MPH	72 F	---
[20:30-20:45]	1	0 MPH	72 F	---
[20:45-21:00]	2	4 MPH	70 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6158	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: S of Rodeo	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 678
County: Laramie	AADT Factor: 1	AADT Count: 339

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue,Sep/16/2014				
[21:00-21:15]	2	20 MPH	70 F	---
[21:15-21:30]	2	12 MPH	68 F	---
[21:30-21:45]	4	15 MPH	68 F	---
[21:45-22:00]	0	0 MPH	68 F	---
[22:00-22:15]	0	0 MPH	70 F	---
[22:15-22:30]	0	0 MPH	70 F	---
[22:30-22:45]	1	22 MPH	68 F	---
[22:45-23:00]	1	18 MPH	68 F	---
[23:00-23:15]	1	0 MPH	68 F	---
[23:15-23:30]	1	0 MPH	66 F	---
[23:30-23:45]	0	0 MPH	66 F	---
[23:45-00:00]	1	0 MPH	66 F	---
Tue,Sep/16/2014	198	12 MPH	91 F	
Wed,Sep/17/2014				
[00:00-00:15]	1	4 MPH	66 F	---
[00:15-00:30]	0	0 MPH	66 F	---
[00:30-00:45]	0	0 MPH	64 F	---
[00:45-01:00]	0	0 MPH	64 F	---
[01:00-01:15]	0	0 MPH	64 F	---
[01:15-01:30]	0	0 MPH	62 F	---
[01:30-01:45]	0	0 MPH	62 F	---
[01:45-02:00]	0	0 MPH	62 F	---
[02:00-02:15]	0	0 MPH	60 F	---
[02:15-02:30]	0	0 MPH	60 F	---
[02:30-02:45]	0	0 MPH	60 F	---
[02:45-03:00]	1	12 MPH	60 F	---
[03:00-03:15]	0	0 MPH	60 F	---
[03:15-03:30]	0	0 MPH	60 F	---
[03:30-03:45]	1	0 MPH	58 F	---
[03:45-04:00]	0	0 MPH	58 F	---
[04:00-04:15]	0	0 MPH	58 F	---
[04:15-04:30]	0	0 MPH	58 F	---
[04:30-04:45]	0	0 MPH	58 F	---
[04:45-05:00]	0	0 MPH	58 F	---
[05:00-05:15]	1	4 MPH	56 F	---
[05:15-05:30]	0	0 MPH	56 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6158	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: S of Rodeo	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 678
County: Laramie	AADT Factor: 1	AADT Count: 339

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[05:30-05:45]	4	11 MPH	56 F	---
[05:45-06:00]	1	22 MPH	56 F	---
[06:00-06:15]	1	4 MPH	56 F	---
[06:15-06:30]	4	12 MPH	56 F	---
[06:30-06:45]	1	4 MPH	56 F	---
[06:45-07:00]	6	9 MPH	56 F	---
[07:00-07:15]	5	11 MPH	56 F	---
[07:15-07:30]	5	11 MPH	56 F	---
[07:30-07:45]	5	7 MPH	56 F	---
[07:45-08:00]	13	12 MPH	58 F	---
[08:00-08:15]	12	17 MPH	58 F	---
[08:15-08:30]	12	10 MPH	60 F	---
[08:30-08:45]	14	13 MPH	68 F	---
[08:45-09:00]	5	11 MPH	74 F	---
[09:00-09:15]	4	14 MPH	78 F	---
[09:15-09:30]	2	23 MPH	83 F	---
[09:30-09:45]	1	4 MPH	87 F	---
[09:45-10:00]	5	13 MPH	91 F	---
[10:00-10:15]	5	9 MPH	95 F	---
[10:15-10:30]	6	5 MPH	97 F	---
[10:30-10:45]	7	13 MPH	99 F	---
[10:45-11:00]	3	15 MPH	103 F	---
[11:00-11:15]	1	28 MPH	105 F	---
[11:15-11:30]	6	7 MPH	109 F	---
[11:30-11:45]	6	6 MPH	113 F	---
[11:45-12:00]	3	21 MPH	115 F	---
[12:00-12:15]	3	13 MPH	119 F	---
[12:15-12:30]	7	9 MPH	117 F	---
[12:30-12:45]	7	9 MPH	115 F	---
[12:45-13:00]	5	8 MPH	117 F	---
[13:00-13:15]	5	8 MPH	117 F	---
[13:15-13:30]	4	22 MPH	119 F	---
[13:30-13:45]	7	9 MPH	121 F	---
[13:45-14:00]	6	24 MPH	126 F	---
[14:00-14:15]	3	0 MPH	121 F	---
[14:15-14:30]	5	11 MPH	126 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6158	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: S of Rodeo	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 678
County: Laramie	AADT Factor: 1	AADT Count: 339

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[14:30-14:45]	2	5 MPH	121 F	---
[14:45-15:00]	4	12 MPH	115 F	---
[15:00-15:15]	7	16 MPH	117 F	---
[15:15-15:30]	9	12 MPH	115 F	---
[15:30-15:45]	11	10 MPH	107 F	---
[15:45-16:00]	12	17 MPH	101 F	---
[16:00-16:15]	5	5 MPH	99 F	---
[16:15-16:30]	5	18 MPH	97 F	---
[16:30-16:45]	6	18 MPH	91 F	---
[16:45-17:00]	4	5 MPH	89 F	---
[17:00-17:15]	5	16 MPH	89 F	---
[17:15-17:30]	7	11 MPH	89 F	---
[17:30-17:45]	6	9 MPH	87 F	---
[17:45-18:00]	10	10 MPH	87 F	---
[18:00-18:15]	6	11 MPH	85 F	---
[18:15-18:30]	5	8 MPH	82 F	---
[18:30-18:45]	8	7 MPH	80 F	---
[18:45-19:00]	6	18 MPH	78 F	---
[19:00-19:15]	4	13 MPH	76 F	---
[19:15-19:30]	7	7 MPH	76 F	---
[19:30-19:45]	4	9 MPH	74 F	---
[19:45-20:00]	2	12 MPH	74 F	---
[20:00-20:15]	1	0 MPH	72 F	---
[20:15-20:30]	1	0 MPH	72 F	---
[20:30-20:45]	1	12 MPH	70 F	---
[20:45-21:00]	4	7 MPH	70 F	---
[21:00-21:15]	1	22 MPH	68 F	---
[21:15-21:30]	2	4 MPH	68 F	---
[21:30-21:45]	0	0 MPH	68 F	---
[21:45-22:00]	0	0 MPH	66 F	---
[22:00-22:15]	0	0 MPH	66 F	---
[22:15-22:30]	0	0 MPH	66 F	---
[22:30-22:45]	0	0 MPH	64 F	---
[22:45-23:00]	0	0 MPH	64 F	---
[23:00-23:15]	0	0 MPH	64 F	---
[23:15-23:30]	0	0 MPH	64 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6158	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: S of Rodeo	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 678
County: Laramie	AADT Factor: 1	AADT Count: 339

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Wed,Sep/17/2014				
[23:30-23:45]	0	0 MPH	64 F	---
[23:45-00:00]	0	0 MPH	62 F	---
Wed,Sep/17/2014	338	8 MPH	79 F	
Thu,Sep/18/2014				
[00:00-00:15]	1	0 MPH	62 F	---
[00:15-00:30]	0	0 MPH	62 F	---
[00:30-00:45]	0	0 MPH	62 F	---
[00:45-01:00]	0	0 MPH	62 F	---
[01:00-01:15]	0	0 MPH	60 F	---
[01:15-01:30]	0	0 MPH	60 F	---
[01:30-01:45]	0	0 MPH	60 F	---
[01:45-02:00]	0	0 MPH	60 F	---
[02:00-02:15]	0	0 MPH	60 F	---
[02:15-02:30]	0	0 MPH	60 F	---
[02:30-02:45]	0	0 MPH	60 F	---
[02:45-03:00]	0	0 MPH	58 F	---
[03:00-03:15]	0	0 MPH	58 F	---
[03:15-03:30]	0	0 MPH	58 F	---
[03:30-03:45]	0	0 MPH	58 F	---
[03:45-04:00]	0	0 MPH	58 F	---
[04:00-04:15]	0	0 MPH	58 F	---
[04:15-04:30]	0	0 MPH	58 F	---
[04:30-04:45]	0	0 MPH	58 F	---
[04:45-05:00]	0	0 MPH	56 F	---
[05:00-05:15]	1	0 MPH	56 F	---
[05:15-05:30]	1	12 MPH	56 F	---
[05:30-05:45]	1	0 MPH	56 F	---
[05:45-06:00]	1	4 MPH	56 F	---
[06:00-06:15]	0	0 MPH	56 F	---
[06:15-06:30]	3	5 MPH	56 F	---
[06:30-06:45]	0	0 MPH	56 F	---
[06:45-07:00]	2	5 MPH	56 F	---
[07:00-07:15]	6	18 MPH	56 F	---
[07:15-07:30]	12	7 MPH	56 F	---
[07:30-07:45]	7	12 MPH	58 F	---
[07:45-08:00]	10	13 MPH	58 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6158	Begin: Sep/16/2014 12:00:00 PM	End: Sep/18/2014 12:00:00 PM
Street: S of Rodeo	Lane: SB	Hours: 48.00
State: WY	Oper:	Period: 15
City: Cheyenne	Posted: 30	Raw Count: 678
County: Laramie	AADT Factor: 1	AADT Count: 339

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Thu,Sep/18/2014				
[08:00-08:15]	7	24 MPH	58 F	---
[08:15-08:30]	18	15 MPH	60 F	---
[08:30-08:45]	14	9 MPH	68 F	---
[08:45-09:00]	5	6 MPH	76 F	---
[09:00-09:15]	4	15 MPH	80 F	---
[09:15-09:30]	6	36 MPH	83 F	---
[09:30-09:45]	6	11 MPH	89 F	---
[09:45-10:00]	5	7 MPH	93 F	---
[10:00-10:15]	5	16 MPH	97 F	---
[10:15-10:30]	3	17 MPH	97 F	---
[10:30-10:45]	5	11 MPH	101 F	---
[10:45-11:00]	1	0 MPH	107 F	---
[11:00-11:15]	4	5 MPH	109 F	---
[11:15-11:30]	4	13 MPH	113 F	---
[11:30-11:45]	5	8 MPH	115 F	---
[11:45-12:00]	5	9 MPH	117 F	---
Thu,Sep/18/2014	142	0 MPH	69 F	
Sep/16/2014 12:00:00 PM Sep/18/2014 12:00:00 PM	678	8 MPH	80 F	

Appendix B: Evers Boulevard Traffic Data

- Technical Memo
    - Appendix B: Crash Data

2014 CITY/TOWN PDO CRASHES WITH TYPE OF ROAD

	Interstate	Primary	Secondary	City Street	County Road	State Highway	FAU M-Routs	Service Roads	Others	Total
Casper	90	227	0	600	12	0	647	17	1	**1594**
Cheyenne	273	200	0	234	61	0	539	2	0	**1309**
Cody	0	78	0	52	4	0	35	0	0	**169**
Douglas	29	34	0	42	3	0	33	0	0	**141**
Evanston	23	5	0	15	0	0	13	0	0	**56**
Gillette	26	152	0	220	44	0	239	0	1	**682**
Green River	21	32	0	34	0	0	39	0	0	**126**
Lander	0	38	0	24	3	0	33	0	0	**98**
Laramie	42	135	0	179	2	0	149	1	0	**508**
Powell	0	10	0	18	2	0	26	0	0	**56**
Rawlins	15	22	0	36	0	0	46	0	0	**119**
Riverton	0	104	0	96	15	0	20	0	1	**236**
Rock Springs	55	82	0	119	21	0	141	5	0	**423**
Sheridan	40	72	0	98	7	0	144	0	0	**361**
Torrington	0	19	0	22	2	0	23	0	0	**66**
Worland	0	12	0	20	3	0	18	0	0	**53**
All Others	42	233	29	385	1	1	0	0	2	**693**
Others	0	26	0	43	4	0	47	1	1	**122**
Total	**656**	**1481**	**29**	**2237**	**184**	**1**	**2192**	**26**	**6**	**6812**

2014 CITY/TOWN INJURY CRASHES WITH TYPE OF ROAD

	Interstate	Primary	Secondary	City Street	County Road	FAU M-Routs	Service Roads	Others	Total
Casper	22	59	0	83	7	166	7	0	**344**
Cheyenne	54	84	0	59	23	201	4	0	**425**
Cody	0	24	0	3	0	6	0	0	**33**
Douglas	6	11	0	4	0	10	0	0	**31**
Evanston	4	2	0	4	1	7	0	0	**18**
Gillette	6	72	0	37	11	74	0	0	**200**
Green River	4	5	0	7	0	9	0	0	**25**
Lander	0	6	0	4	0	4	0	1	**15**
Laramie	11	28	0	20	1	46	0	0	**106**
Powell	0	3	0	6	1	4	0	0	**14**
Rawlins	4	10	0	6	0	6	1	0	**27**
Riverton	0	30	0	13	6	8	0	0	**57**
Rock Springs	8	44	1	24	5	33	5	0	**120**
Sheridan	4	16	0	11	1	27	0	0	**59**
Torrington	0	5	0	5	1	3	0	0	**14**
Worland	0	5	0	3	1	2	0	0	**11**
All Others	10	55	4	44	1	0	0	1	**115**
Others	0	10	0	10	0	11	0	0	**31**
Total	**133**	**469**	**5**	**343**	**59**	**617**	**17**	**2**	**1645**

2014 CITY/TOWN FATAL CRASHES
WITH TYPE OF ROAD

	Interstate	Primary	City Street	County Road	FAU M-Routs	Service Roads	Total
Casper	1	1	1	1	3	0	**7**
Cheyenne	1	3	1	0	3	0	**8**
Cody	0	0	1	0	0	0	**1**
Douglas	0	0	0	0	1	0	**1**
Gillette	0	1	0	1	0	0	**2**
Riverton	0	1	0	0	0	0	**1**
Rock Springs	1	0	0	1	0	1	**3**
Sheridan	0	0	0	0	1	0	**1**
Torrington	0	1	0	0	0	0	**1**
All Others	0	0	2	0	0	0	**2**
Total	**3**	**7**	**5**	**3**	**8**	**1**	**27**

ROADWAY CRASH STATISTICS

AYRES ASSOCIATES

ROADWAY: Evers Boulevard from Bishop Boulevard to Brittany Drive
MUNICIPALITY: Cheyenne COUNTY: Laramie STATE: WY
PERIOD: 5 YEARS 7 MONTHS FROM: 1/1/2009 TO: 8/1/2014

PROJECT ID: 32-1835.00 | PREPARED BY: SMC | DATE: 9/5/2014

ROADWAY CHARACTERISTICS

ROADWAY TYPE: URBAN STREET
CLASSIFICATION: MINOR COLLECTOR
CROSS SECTION: MINOR STOP CONTROLLED
DEER CRASHES INCLUDED IN ANALYSIS: NO

SEGMENT LENGTH (MI): 1
AREA TYPE: URBAN
ROADWAY AADT (2011): 859
POSTED SPEED: 30

CRASH STATISTICS

CRASH FREQUENCY & SEVERITY				
YEAR	PDO	INJURY	FATAL	TOTAL
2009	3	0	0	3
2010	2	0	0	2
2011	2	1	0	3
2012	0	1	0	1
2013	0	0	0	0
2014	0	0	0	0
TOTAL	7	2	0	9
PERCENT	77.8%	22.2%	0.0%	100.0%
YEAR AVG.	1.25	0.36	0.00	1.61

CRASH RATES	CHEYENNE CITY STREET AVG. %
PDO CRASH RATE	79.6%
INJURY CRASH RATE	20.1%
FATAL CRASH RATE	0.3%

LIGHT CONDITIONS		%
DAY	6	60.0%
DARK	4	40.0%
TOTAL	10	100.0%

ROAD CONDITIONS		%
DRY	5	50.0%
WET	0	0.0%
SNOW	1	10.0%
ICE	4	40.0%
OTHER	0	0.0%
TOTAL	10	100.0%

CRASH TYPE		%
ANGLE	3	30.0%
REAR-END	2	20.0%
HEAD-ON	1	10.0%
SS-SAME	1	10.0%
SS-OPPOSITE	0	0.0%
PEDESTRIAN	0	0.0%
BICYCLE	0	0.0%
FIXED	1	10.0%
NOT FIXED	0	0.0%
RIGHT-ANGLE	2	20.0%
OVERTURN	0	0.0%
OTHR/UNKN	0	0.0%
TOTAL	10	100.0%

DAY AND TIME							
DAY OF WEEK	*EARLY MORNING* 12:00 AM TO 5:59 AM	*AM PEAK* 6:00 AM TO 9:59 AM	*MIDDAY* 10:00 AM TO 2:59 PM	*PM PEAK* 3:00 PM TO 6:59 PM	*LATE EVENING* 7:00 PM TO 11:59 PM	TOTAL	
MONDAY	0	0	1	0	0	1	Weekday
TUESDAY	0	0	0	0	0	0	
WEDNESDAY	0	0	0	1	0	1	
THURSDAY	0	1	0	0	0	1	
FRIDAY	0	1	0	1	2	4	
SATURDAY	0	0	2	0	0	2	Weekend
SUNDAY	0	0	0	0	1	1	
TOTAL	0	2	3	2	3	10	

Notes: PDO is property damage only crash.

EXHIBIT B
ROADWAY CRASH STATISTICS
Evers Boulevard from Bishop Boulevard to Brittany Drive

Q:\32-1835 Evers\Traffic\[Evers Segment Crash Statistics.xls]SEGMENT

ROADWAY CRASH DATA

AYRES ASSOCIATES

ROADWAY: Evers Boulevard from Bishop Boulevard to Brittany Drive
MUNICIPALITY: Cheyenne COUNTY: Laramie STATE: WY
PERIOD: 5 YEARS 7 MONTHS FROM: 1/1/2009 TO: 8/1/2014

PROJECT ID: PREPARED BY: SMC DATE: 9/5/2014

CRASH DETAILS

REF. NUMBER	LABEL	DATE	DAY OF WEEK	TIME OF DAY	SEVERITY	MANNER OF COLLISION	ACCIDENT TYPE	LIGHT COND.	ROAD COND.
02517		1/24/2009	SATURDAY	1 PM	PDO	ANGLE	PARKED MV	DARK NL	ICE
03704		2/13/2009	FRIDAY	8 PM	PDO	ANGLE	PARKED MV	DARK NL	ICE
13967		10/2/2009	FRIDAY	3 PM	PDO	SSS	MV IN TRANS.	DAY	DRY
15902		11/11/2010	THURSDAY	7 AM	PDO	REAR-END	MV IN TRANS.	DAY	SNOW
16320		11/12/2010	FRIDAY	7 AM	PDO	HEAD-ON	MV IN TRANS.	DAY	ICE
01257		1/15/2011	SATURDAY	2 PM	INJ	ANGLE	MV IN TRANS.	DAY	DRY
07925		4/27/2011	WEDNESDAY	3 PM	PDO	REAR-END	MV IN TRANS.	DAY	DRY
17221		12/12/2011	MONDAY	11 AM	PDO	NO C	OTHER FIXED	DAY	ICE
03263		3/9/2012	FRIDAY	10 PM	INJ	ANGLE	MV IN TRANS.	DARK LT	DRY
11349		9/9/2012	SUNDAY	9 PM	PDO	ANGLE	MV IN TRANS.	DUSK	DRY

Notes:

EXHIBIT B
ROADWAY CRASH DATA
Evers Boulevard from Bishop Boulevard to Brittany Drive

Q:\32-1835 Evers\Traffic\[Evers Segment Crash Statistics.xls]SEGMENT

ROADWAY CRASH STATISTICS

AYRES ASSOCIATES

ROADWAY:	Evers Boulevard from Bishop Boulevard to Brittany Drive						
MUNICIPALITY:	Cheyenne			COUNTY:	Laramie	STATE:	WY
PERIOD: 5	YEARS	7	MONTHS	FROM:	1/1/2009	TO:	8/1/2014
PROJECT ID:	32-1835.00	PREPARED BY:	SMC	DATE:	9/5/2014		

ROADWAY CHARACTERISTICS

ROADWAY TYPE: URBAN STREET
CLASSIFICATION: MINOR COLLECTOR
CROSS SECTION: MINOR STOP CONTROLLED
DEER CRASHES INCLUDED IN ANALYSIS: NO

SEGMENT LENGTH (MI): 1
AREA TYPE: URBAN
ROADWAY AADT (2011): 859
POSTED SPEED: 30

CRASH STATISTICS

CRASH FREQUENCY & SEVERITY				
YEAR	PDO	INJURY	FATAL	TOTAL
2009	3	0	0	3
2010	2	0	0	2
2011	2	1	0	3
2012	0	1	0	1
2013	0	0	0	0
2014	0	0	0	0
TOTAL	7	2	0	9
PERCENT	77.8%	22.2%	0.0%	100.0%
YEAR AVG.	1.25	0.36	0.00	1.61

CRASH RATES	CHEYENNE CITY STREET AVG. %
PDO CRASH RATE	79.6%
INJURY CRASH RATE	20.1%
FATAL CRASH RATE	0.3%

LIGHT CONDITIONS		%
DAY	6	60.0%
DARK	4	40.0%
TOTAL	10	100.0%

ROAD CONDITIONS		%
DRY	5	50.0%
WET	0	0.0%
SNOW	1	10.0%
ICE	4	40.0%
OTHER	0	0.0%
TOTAL	10	100.0%

CRASH TYPE		%
ANGLE	3	30.0%
REAR-END	2	20.0%
HEAD-ON	1	10.0%
SS-SAME	1	10.0%
SS-OPPOSITE	0	0.0%
PEDESTRIAN	0	0.0%
BICYCLE	0	0.0%
FIXED	1	10.0%
NOT FIXED	0	0.0%
RIGHT-ANGLE	2	20.0%
OVERTURN	0	0.0%
OTHR/UNKN	0	0.0%
TOTAL	10	100.0%

DAY AND TIME							
DAY OF WEEK	*EARLY MORNING* 12:00 AM TO 5:59 AM	*AM PEAK* 6:00 AM TO 9:59 AM	*MIDDAY* 10:00 AM TO 2:59 PM	*PM PEAK* 3:00 PM TO 6:59 PM	*LATE EVENING* 7:00 PM TO 11:59 PM	TOTAL	
MONDAY	0	0	1	0	0	1	Weekday
TUESDAY	0	0	0	0	0	0	
WEDNESDAY	0	0	0	1	0	1	
THURSDAY	0	1	0	0	0	1	
FRIDAY	0	1	0	1	2	4	
SATURDAY	0	0	2	0	0	2	Weekend
SUNDAY	0	0	0	0	1	1	
TOTAL	0	2	3	2	3	10	

Notes: MVM is million vehicle miles. Crash rate calculated based on crash per 100 million vehicle miles traveled along the segment of roadway. PDO is property damage only crash.

EXHIBIT B
ROADWAY CRASH STATISTICS
Evers Boulevard from Bishop Boulevard to Brittany Drive

Q:\32-1835 Evers\Traffic\[Evers Segment Crash Statistics.xls]SEGMENT

ROADWAY CRASH DATA

AYRES ASSOCIATES

ROADWAY: Evers Boulevard from Bishop Boulevard to Brittany Drive
MUNICIPALITY: Cheyenne COUNTY: Laramie STATE: WY
PERIOD: 5 YEARS 7 MONTHS FROM: 1/1/2009 TO: 8/1/2014

PROJECT ID: PREPARED BY: SMC DATE: 9/5/2014

CRASH DETAILS

REF. NUMBER	LABEL	DATE	DAY OF WEEK	TIME OF DAY	SEVERITY	MANNER OF COLLISION	ACCIDENT TYPE	LIGHT COND.	ROAD COND.
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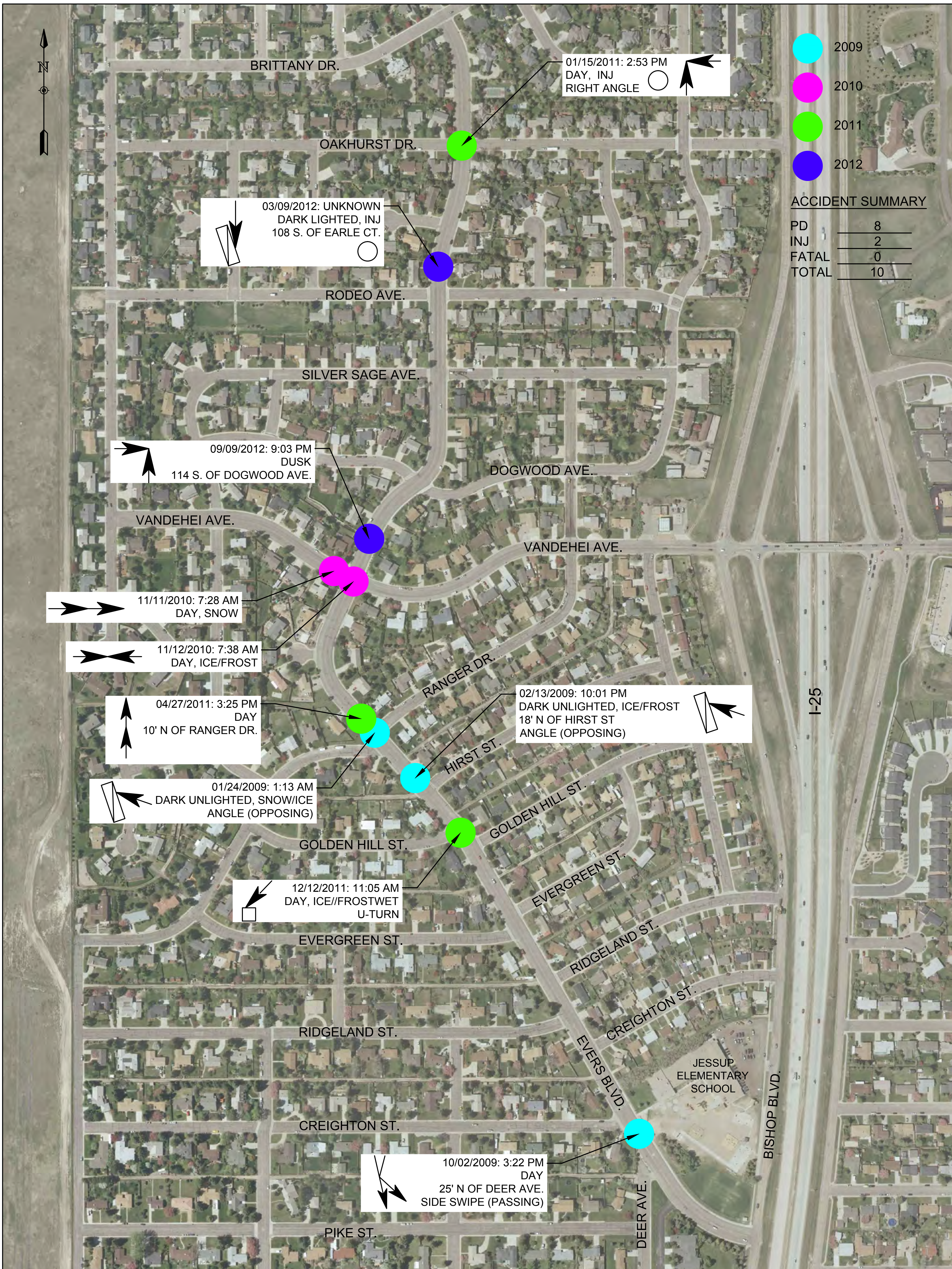
03704		2/13/2009	FRIDAY	8 PM	PDO	ANGLE	PARKED MV	DARK NL	ICE
13967		10/2/2009	FRIDAY	3 PM	PDO	SSS	MV IN TRANS.	DAY	DRY
15902		11/11/2010	THURSDAY	7 AM	PDO	REAR-END	MV IN TRANS.	DAY	SNOW
16320		11/12/2010	FRIDAY	7 AM	PDO	HEAD-ON	MV IN TRANS.	DAY	ICE
01257		1/15/2011	SATURDAY	2 PM	INJ	ANGLE	MV IN TRANS.	DAY	DRY
07925		4/27/2011	WEDNESDAY	3 PM	PDO	REAR-END	MV IN TRANS.	DAY	DRY
17221		12/12/2011	MONDAY	11 AM	PDO	NO C	OTHER FIXED	DAY	ICE
03263		3/9/2012	FRIDAY	10 PM	INJ	ANGLE	MV IN TRANS.	DARK LT	DRY
11349		9/9/2012	SUNDAY	9 PM	PDO	ANGLE	MV IN TRANS.	DUSK	DRY

Notes:

EXHIBIT B
ROADWAY CRASH DATA
Evers Boulevard from Bishop Boulevard to Brittany Drive

ROADWAY COLLISION DIAGRAM



SYMBOLS	TYPES OF COLLISIONS	SHOW FOR EACH ACCIDENT
MOVING VEHICLE	REAR END	1. DAY, DATE, AND TIME
PARKED VEHICLE	HEAD ON	2. WEATHER AND ROAD SURFACE - IF UNUSUAL CONDITION EXISTED
FIXED OBJECT	RIGHT ANGLE	3. LIGHT CONDITION - IF BETWEEN DUSK AND DAWN
INJURY ACCIDENT	ANGLE (FRONT TO SIDE)	
	SIDE SWIPE	

SEGMENT EVERS BLVD. : FROM BISHOP BLVD. TO BRITTANY DR.

PERIOD 5 YEARS : FROM JAN 1, 2009 TO AUGUST 2014

CITY CHEYENNE PREPARED BY: SAMANTHA CAMPBELL

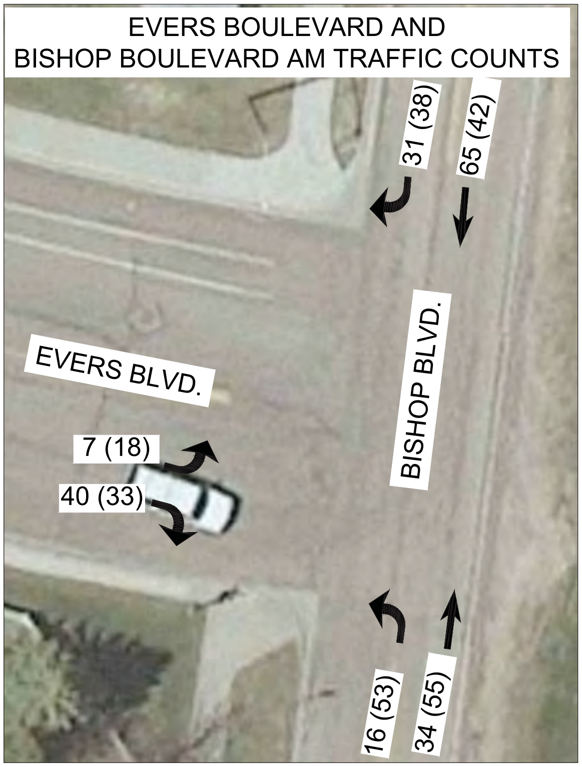
COUNTY LARAMIE DATE PREPARED: 09/05/2014

Appendix B: Evers Boulevard Traffic Data

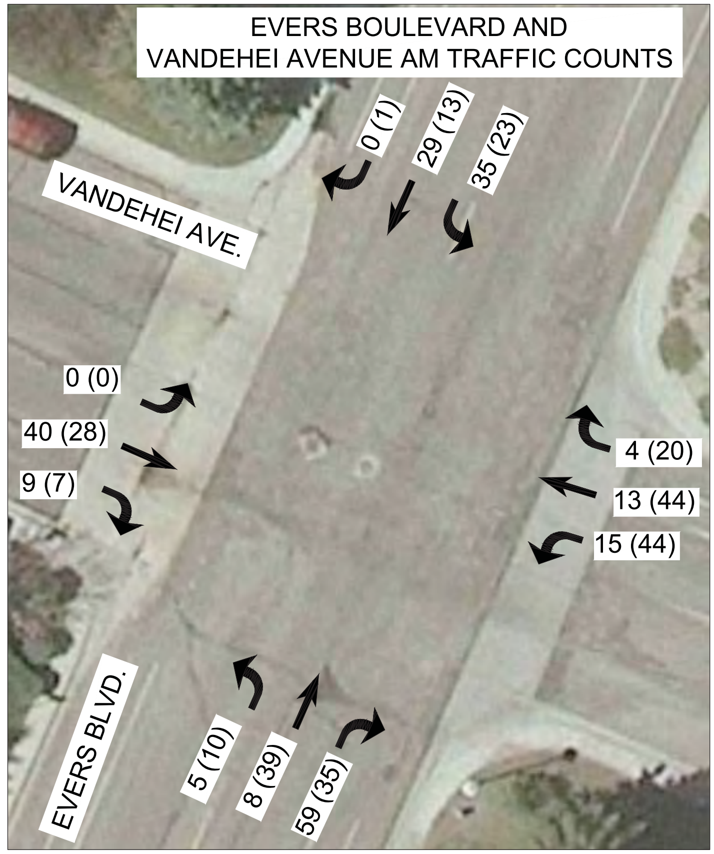
- Technical Memo
    - Appendix C: Turning Movement Counts & Future Traffic Forecasts

EXISTING INTERSECTION TRAFFIC COUNTS

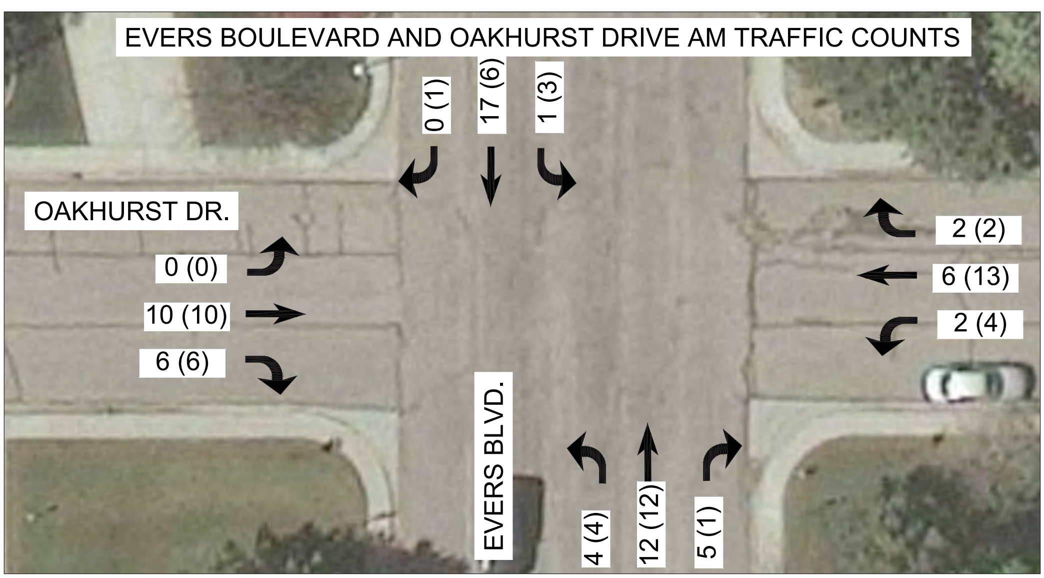
AM PEAK (PM PEAK)



EVERS BOULEVARD AND BISHOP BOULEVARD AM TRAFFIC COUNTS



EVERS BOULEVARD AND VANDEHEI AVENUE AM TRAFFIC COUNTS

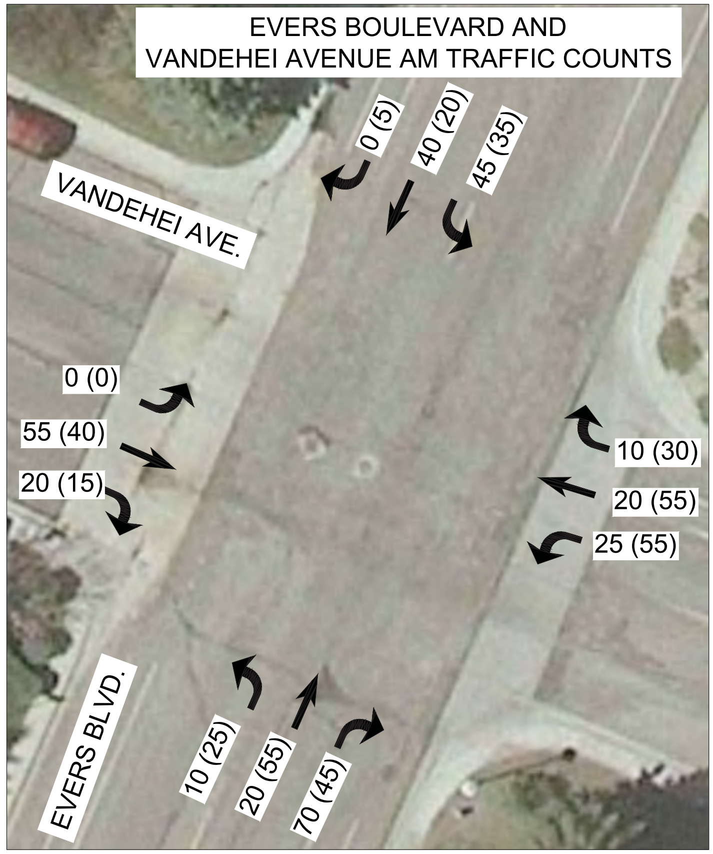


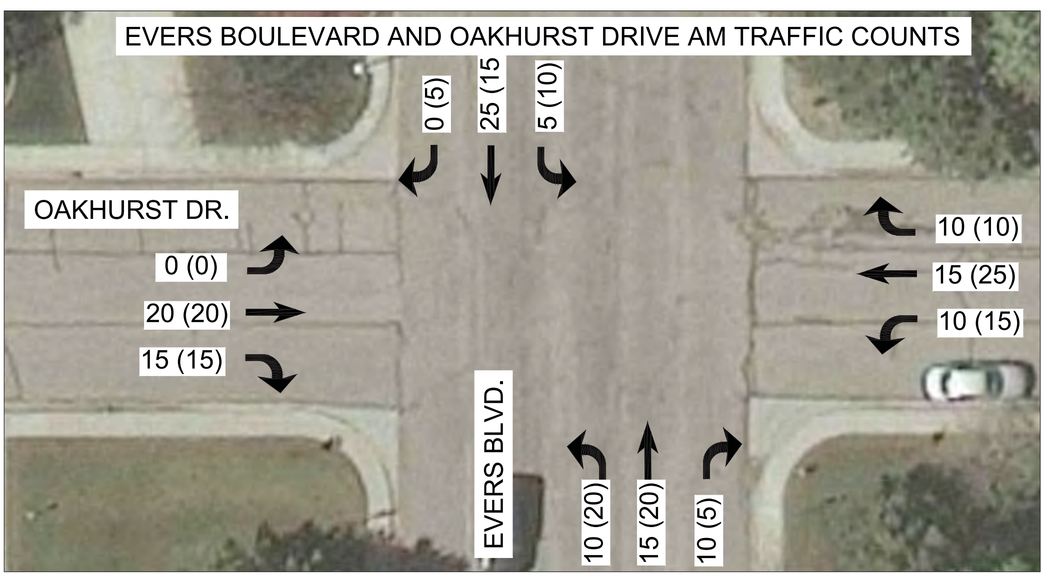
EVERS BOULEVARD AND OAKHURST DRIVE AM TRAFFIC COUNTS

AYRES ASSOCIATES

2017 INTERSECTION TRAFFIC COUNTS

AM PEAK (PM PEAK)

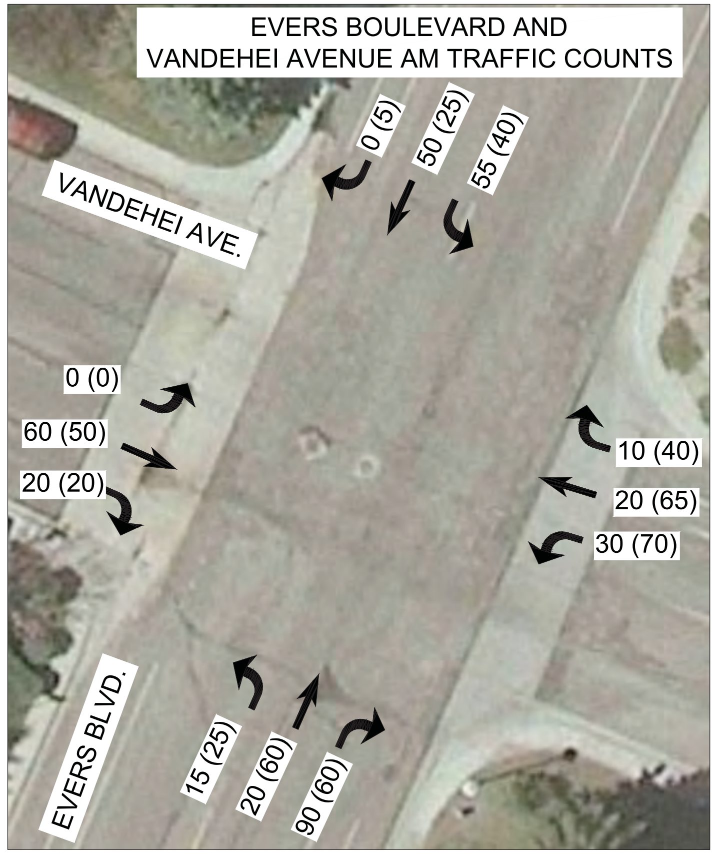


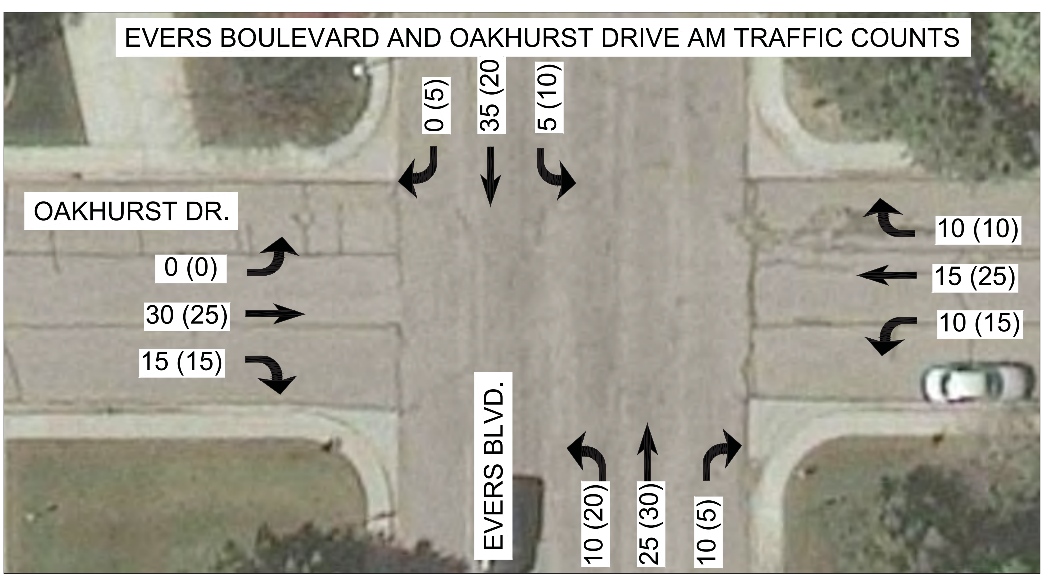


AYRES ASSOCIATES

2037 INTERSECTION TRAFFIC COUNTS

AM PEAK (PM PEAK)





Manual Intersection Turn Movement Count

Location: Bishop Boulevard at Evers Boulevard
Date: March 19th, 2014
Day: Wednesday

EXISTING AM PEAK HOUR: 7:30-8:30	SB BISHOP			EB EVERS			NB BISHOP			Period Total
	Thru	Right	Peds	Left	Right	Peds	Left	Thru	Peds	
7:00-7:15										
7:15-7:30	16	0	0	4	13	1	4	13	0	50
7:30-7:45	**23**	**1**	**0**	**0**	**10**	0	**3**	**11**	**0**	**48**
7:45-8:00	**18**	**1**	**0**	**0**	**14**	1	**3**	**3**	**0**	**39**
8:00-8:15	**4**	**3**	**0**	**2**	**7**	4	**5**	**9**	**0**	**30**
8:15-8:30	**20**	**26**	**0**	**5**	**9**	1	**5**	**11**	**0**	**76**
8:30-8:45	13	4	0	1	12	0	4	6	0	40
8:45-9:00	8	1	0	1	3	0	4	8	0	25
Peak Hour Turns	**65**	**31**	**0**	**7**	**40**	**6**	**16**	**34**	**0**	**193**
Entry Volume	**96**			**47**			**50**			**193**
Exit Volume	**41**			**47**			**105**			**193**
2 Way Day Est	**1713**			**1175**			**1938**			**2413**
Peak Hour Factor	**0.71**	**0.3**		**0.35**	**0.71**		**0.8**	**0.77**		

EXISTING PM PEAK HOUR: 3:15-4:15	SB BISHOP			EB EVERS			NB BISHOP			Period Total
	Thru	Right	Peds	Left	Right	Peds	Left	Thru	Peds	
3:00-3:15	11	7	0	4	7	5	12	9	0	50
3:15-3:30	**5**	**14**	**0**	**2**	**3**	**0**	**11**	**7**	**0**	**42**
3:30-3:45	**17**	**11**	**0**	**14**	**15**	**7**	**16**	**17**	**0**	**90**
3:45-4:00	**9**	**9**	**0**	**1**	**8**	**2**	**8**	**11**	**0**	**46**
4:00-4:15	**11**	**4**	**0**	**1**	**7**	**0**	**18**	**20**	**0**	**61**
4:15-4:30	3	3	0	1	7	0	12	12	0	38
4:30-4:45	6	2	0	6	3	9	18	25	0	60
4:45-5:00	4	3	0	0	5	2	11	17	0	40
5:00-5:15	9	2	0	2	8	3	19	19	0	59
5:15-5:30	8	1	0	2	12	0	16	16	0	55
5:30-5:45	8	0	0	1	3	1	7	11	0	30
5:45-6:00	4	2	0	2	5	1	16	5	0	34
Peak Hour Turns	**42**	**38**	**0**	**18**	**33**	**9**	**53**	**55**	**0**	**239**
Entry Volume	**80**			**51**			**108**			**239**
Exit Volume	**73**			**91**			**75**			**239**
2 Way Day Est	**1913**			**1775**			**2288**			**2390**
Peak Hour Factor	**0.62**	**0.68**		**0.32**	**0.55**		**0.74**	**0.69**		

Notes:

School buses double parked during AM drop off (8:15-8:30) block SB lane & could encourage kids between buses.
Pedestrian volume significant during High School and Middle School let out before 3 PM.
2 Bicycles part of NB Bishop>Evers turn volume
PM school buses stagger arrivals & departures (3:30-4:00).

Location: **Bishop Boulevard at Evers Boulevard**

*Assume 1.25% growth rate and future forecasts in 2017

2017 AM PEAK HOUR: 7:30-8:30	SB BISHOP			EB EVERS			NB BISHOP			Period Total
	Thru	Right	Peds	Left	Right	Peds	Left	Thru	Peds	
7:00-7:15										
7:15-7:30	20	0	0	5	15	5	5	15	0	60
7:30-7:45	**25**	**5**	**0**	**0**	**15**	**0**	**5**	**15**	**0**	**65**
7:45-8:00	**20**	**5**	**0**	**0**	**15**	**5**	**5**	**5**	**0**	**50**
8:00-8:15	**5**	**5**	**0**	**5**	**10**	**5**	**10**	**10**	**0**	**45**
8:15-8:30	**25**	**30**	**0**	**10**	**10**	**5**	**10**	**15**	**0**	**100**
8:30-8:45	15	5	0	5	15	0	5	10	0	55
8:45-9:00	10	5	0	5	5	0	5	10	0	40
Future Peak Hour Turns	**75**	**45**	**0**	**15**	**50**	**15**	**30**	**45**	**0**	**260**
Future Entry Volume	**120**			**65**			**75**			**260**
Future Exit Volume	**60**			**75**			**125**			**260**
Future 2 Way Day Est	**2250**			**1750**			**2500**			**3250**

2017 PM PEAK HOUR: 3:15-4:15	SB BISHOP			EB EVERS			NB BISHOP			Period Total
	Thru	Right	Peds	Left	Right	Peds	Left	Thru	Peds	
3:00-3:15	15	10	0	5	10	10	15	10	0	65
3:15-3:30	**10**	**15**	**0**	**5**	**5**	**0**	**15**	**10**	**0**	**60**
3:30-3:45	**20**	**15**	**0**	**15**	**20**	**10**	**20**	**20**	**0**	**110**
3:45-4:00	**10**	**10**	**0**	**5**	**10**	**5**	**10**	**15**	**0**	**60**
4:00-4:15	**15**	**5**	**0**	**5**	**10**	**0**	**20**	**25**	**0**	**80**
4:15-4:30	5	5	0	5	10	0	15	15	0	55
4:30-4:45	10	5	0	10	5	10	20	30	0	80
4:45-5:00	5	5	0	0	10	5	15	20	0	55
5:00-5:15	10	5	0	5	10	5	20	20	0	70
5:15-5:30	10	5	0	5	15	0	20	20	0	75
5:30-5:45	10	0	0	5	5	5	10	15	0	45
5:45-6:00	5	5	0	5	10	5	20	10	0	55
Future Peak Hour Turns	**55**	**45**	**0**	**30**	**45**	**15**	**65**	**70**	**0**	**310**
Future Entry Volume	**100**			**75**			**135**			**310**
Future Exit Volume	**100**			**110**			**100**			**310**
Future 2 Way Day Est	**2500**			**2313**			**2938**			**3875**

.

Location: **Bishop Boulevard at Evers Boulevard**

*Assume 1.25% growth rate and future forecasts in 2037

2037 AM PEAK HOUR: 7:30-8:30	**SB BISHOP**			**EB EVERS**			**NB BISHOP**			**Period Total**
	Thru	**Right**	**Peds**	**Left**	**Right**	**Peds**	**Left**	**Thru**	**Peds**	
7:00-7:15	0	0	0	0	0	0	0	0	0	
7:15-7:30	30	0	0	10	20	10	10	20	0	90
7:30-7:45	**35**	**10**	**0**	**0**	**20**	**0**	**10**	**20**	**0**	**95**
7:45-8:00	**30**	**10**	**0**	**0**	**20**	**10**	**10**	**10**	**0**	**80**
8:00-8:15	**10**	**10**	**0**	**10**	**15**	**10**	**15**	**15**	**0**	**75**
8:15-8:30	**35**	**40**	**0**	**15**	**15**	**10**	**15**	**20**	**0**	**140**
8:30-8:45	20	10	0	10	20	0	10	15	0	85
8:45-9:00	15	10	0	10	10	0	10	15	0	70
Future Peak Hour Turns	**110**	**70**	**0**	**25**	**70**	**30**	**50**	**65**	**0**	**390**
Future Entry Volume	**180**			**95**			**115**			**390**
Future Exit Volume	**90**			**120**			**180**			**390**
Future 2 Way Day Est	**3375**			**2688**			**3688**			**4875**

2037 PM PEAK HOUR: 3:15-4:15	**SB BISHOP**			**EB EVERS**			**NB BISHOP**			**Period Total**
	Thru	**Right**	**Peds**	**Left**	**Right**	**Peds**	**Left**	**Thru**	**Peds**	
3:00-3:15	20	15	0	10	15	15	20	15	0	95
3:15-3:30	**15**	**20**	**0**	**10**	**10**	**0**	**20**	**15**	**0**	**90**
3:30-3:45	**30**	**20**	**0**	**20**	**30**	**15**	**30**	**30**	**0**	**160**
3:45-4:00	**15**	**15**	**0**	**10**	**15**	**10**	**15**	**20**	**0**	**90**
4:00-4:15	**20**	**10**	**0**	**10**	**15**	**0**	**30**	**35**	**0**	**120**
4:15-4:30	10	10	0	10	15	0	20	20	0	85
4:30-4:45	15	10	0	15	10	15	30	40	0	120
4:45-5:00	10	10	0	0	15	10	20	30	0	85
5:00-5:15	15	10	0	10	15	10	30	30	0	110
5:15-5:30	15	10	0	10	20	0	30	30	0	115
5:30-5:45	15	0	0	10	10	10	15	20	0	70
5:45-6:00	10	10	0	10	15	10	30	15	0	90
Future Peak Hour Turns	**80**	**65**	**0**	**50**	**70**	**25**	**95**	**100**	**0**	**460**
Future Entry Volume	**145**			**120**			**195**			**460**
Future Exit Volume	**150**			**160**			**150**			**460**
Future 2 Way Day Est	**3688**			**3500**			**4313**			**5750**

Manual Intersection Turn Movement Count

Location: Evers Boulevard at Vandehei Avenue
Date: March 11-12, 2014 October 7-8, 2014
Day: Wed PM-Thur AM

EXISTING AM PEAK HOUR:	SB EVERS				EB VANDEHEI				NB EVERS				WB VANDEHEI				Period Total
7:30-8:30	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
7:00-7:15	14	2	0	1	0	9	0	0	0	2	5	0	1	1	1	0	36
7:15-7:30	6	2	0	0	0	10	2	0	1	0	12	0	2	1	2	0	38
7:30-7:45	**9**	**4**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**2**	**17**	**0**	**3**	**3**	**0**	**0**	**48**
7:45-8:00	**12**	**1**	**0**	**0**	**0**	**15**	**2**	**0**	**1**	**0**	**9**	**0**	**1**	**7**	**2**	**0**	**50**
8:00-8:15	**7**	**11**	**0**	**0**	**0**	**9**	**2**	**0**	**0**	**1**	**10**	**0**	**3**	**3**	**2**	**0**	**48**
8:15-8:30	**7**	**13**	**0**	**0**	**0**	**6**	**5**	**0**	**4**	**5**	**23**	**0**	**8**	**0**	**0**	**0**	**71**
8:30-8:45	2	0	0	0	0	6	1	1	2	4	17	0	4	2	0	0	39
8:45-9:00	5	2	0	0	0	6	0	0	1	1	6	0	2	3	4	0	30
Pk Hr Total	**35**	**29**	**0**	**0**	**0**	**40**	**9**	**0**	**5**	**8**	**59**	**0**	**15**	**13**	**4**	**0**	**217**
Approach Total		**64**				**49**				**72**				**32**			**217**
Exit Volume		**12**				**18**				**53**				**134**			**0**
2 Way Day Est		**950**				**838**				**1563**				**2075**			**2713**
Peak Hour Factor	**0.73**	**0.56**	**#DIV/0!**		**#DIV/0!**	**0.67**	**0.45**		**0.31**	**0.4**	**0.64**		**0.47**	**0.46**	**0.5**		

EXISTING PM PEAK HOUR:	SB EVERS				EB VANDEHEI				NB EVERS				WB VANDEHEI				Period Total
3:15-4:15	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
3:00-3:15	3	6	1	0	0	10	2	0	2	7	7	0	9	9	4	0	60
3:15-3:30	**4**	**3**	**0**	**0**	**0**	**10**	**4**	**1**	**1**	**2**	**4**	**1**	**4**	**6**	**4**	**0**	**44**
3:30-3:45	**3**	**3**	**0**	**1**	**0**	**9**	**1**	**0**	**2**	**10**	**17**	**0**	**18**	**11**	**2**	**0**	**77**
3:45-4:00	**10**	**3**	**0**	**1**	**0**	**4**	**0**	**0**	**5**	**16**	**10**	**2**	**10**	**18**	**9**	**3**	**91**
4:00-4:15	**6**	**4**	**1**	**0**	**0**	**5**	**2**	**1**	**2**	**11**	**4**	**2**	**12**	**9**	**5**	**0**	**64**
4:15-4:30	4	1	0	0	0	3	0	0	2	3	5	0	7	7	9		41
4:30-4:45	2	2	0	0	0	2	0	1	0	3	4	0	7	9	6		36
4:45-5:00	**7**	**1**	**0**	**0**	**0**	**6**	**0**	**0**	**1**	**7**	**10**	**0**	**10**	**6**	**6**	**2**	**56**
5:00-5:15	**7**	**2**	**0**	**0**	**1**	**3**	**1**	**0**	**1**	**10**	**8**	**0**	**6**	**7**	**6**	**2**	**54**
5:15-5:30	**10**	**3**	**0**	**0**	**0**	**5**	**1**	**0**	**4**	**5**	**7**	**0**	**6**	**8**	**10**		**59**
5:30-5:45	**5**	**4**	**0**	**0**	**0**	**9**	**0**	**0**	**1**	**4**	**2**	**0**	**9**	**9**	**4**	**5**	**52**
5:45-6:00	7	0	0	0	0	10	2	0	0	1	7	0	8	6	2		43
Pk Hr Total	**23**	**13**	**1**	**2**	**0**	**28**	**7**	**2**	**10**	**39**	**35**	**5**	**44**	**44**	**20**	**3**	**221**
Approach Total		**37**				**35**				**84**				**108**			**264**
Exit Volume		**59**				**55**				**64**				**86**			**0**
2 Way Day Est		**1200**				**1125**				**1850**				**2425**			**2640**
Peak Hour Factor	**0.58**	**0.81**	**0.25**		**#DIV/0!**	**0.7**	**0.44**		**0.5**	**0.61**	**0.51**		**0.61**	**0.61**	**0.56**		

Location: **Evers Boulevard at Vandehei Avenue**

*Assume 1.25% growth rate and future forecasts in 2017

2017 AM PEAK HOUR:	**SB EVERS**				**EB VANDEHEI**				**NB EVERS**				**WB VANDEHEI**				**Period Total**
7:30-8:30	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	
7:00-7:15	15	5	0	5	0	10	0	0	0	5	10	0	5	5	5	0	65
7:15-7:30	10	5	0	0	0	15	5	0	5	0	15	0	5	5	5	0	70
7:30-7:45	**10**	**5**	**0**	**0**	**0**	**15**	**0**	**0**	**0**	**5**	**20**	**0**	**5**	**5**	**0**	**0**	**65**
7:45-8:00	**15**	**5**	**0**	**0**	**0**	**20**	**5**	**0**	**5**	**0**	**10**	**0**	**5**	**10**	**5**	**0**	**80**
8:00-8:15	**10**	**15**	**0**	**0**	**0**	**10**	**5**	**0**	**0**	**5**	**15**	**0**	**5**	**5**	**5**	**0**	**75**
8:15-8:30	**10**	**15**	**0**	**0**	**0**	**10**	**10**	**0**	**5**	**10**	**25**	**0**	**10**	**0**	**0**	**0**	**95**
8:30-8:45	5	0	0	0	0	10	5	5	5	5	20	0	5	5	0	0	65
8:45-9:00	10	5	0	0	0	10	0	0	5	5	10	0	5	5	5	0	60
Future Peak Hour Turns	**45**	**40**	**0**	**0**	**0**	**55**	**20**	**0**	**10**	**20**	**70**	**0**	**25**	**20**	**10**	**0**	**315**
Future Entry Volume	**85**				**75**				**100**				**55**				**315**
Future Exit Volume	**30**				**30**				**85**				**170**				**315**
Future 2 Way Day Est	**1438**				**1313**				**2313**				**2813**				**3938**

2017 PM PEAK HOUR:	**SB EVERS**				**EB VANDEHEI**				**NB EVERS**				**WB VANDEHEI**				**Period Total**
3:15-4:15	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	
3:00-3:15	5	10	5	0	0	15	5	0	5	10	10	0	10	10	5	0	90
3:15-3:30	**5**	**5**	**0**	**0**	**0**	**15**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**10**	**5**	**0**	**75**
3:30-3:45	**5**	**5**	**0**	**5**	**0**	**10**	**5**	**0**	**5**	**15**	**20**	**0**	**20**	**15**	**5**	**0**	**110**
3:45-4:00	**15**	**5**	**0**	**5**	**0**	**5**	**0**	**0**	**10**	**20**	**15**	**5**	**15**	**20**	**10**	**5**	**130**
4:00-4:15	**10**	**5**	**5**	**0**	**0**	**10**	**5**	**5**	**5**	**15**	**5**	**5**	**15**	**10**	**10**	**0**	**105**
4:15-4:30	5	5	0	0	0	5	0	0	5	5	10	0	10	10	10	0	65
4:30-4:45	5	5	0	0	0	5	0	5	0	5	5	0	10	10	10	0	60
4:45-5:00	10	5	0	0	0	10	0	0	5	10	15	0	15	10	10	5	**95**
5:00-5:15	10	5	0	0	5	5	5	0	5	15	10	0	10	10	10	5	**95**
5:15-5:30	15	5	0	0	0	10	5	0	5	10	10	0	10	10	15	0	**95**
5:30-5:45	10	5	0	0	0	10	0	0	5	5	5	0	10	10	5	10	**75**
5:45-6:00	10	0	0	0	0	15	5	0	0	5	10	0	10	10	5	0	70
Future Peak Hour Turns	**35**	**20**	**5**	**10**	**0**	**40**	**15**	**10**	**25**	**55**	**45**	**15**	**55**	**55**	**30**	**5**	**360**
Future Entry Volume	**60**				**55**				**125**				**140**				**380**
Future Exit Volume	**85**				**85**				**90**				**120**				**380**
Future 2 Way Day Est	**1813**				**1750**				**2688**				**3250**				**4750**

Location: **Evers Boulevard at Vandehei Avenue**

*Assume 1.25% growth rate and future forecasts in 2037

2037 AM PEAK HOUR:	**SB EVERS**				**EB VANDEHEI**				**NB EVERS**				**WB VANDEHEI**				**Period Tota**
7:30-8:30	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	
7:00-7:15	20	5	0	5	0	15	0	0	0	5	10	0	5	5	5	0	75
7:15-7:30	10	5	0	0	0	15	5	0	5	0	20	0	5	5	5	0	75
7:30-7:45	**15**	**10**	**0**	**0**	**0**	**15**	**0**	**0**	**0**	**5**	**25**	**0**	**5**	**5**	**0**	**0**	**80**
7:45-8:00	**20**	**5**	**0**	**0**	**0**	**20**	**5**	**0**	**5**	**0**	**15**	**0**	**5**	**10**	**5**	**0**	**90**
8:00-8:15	**10**	**15**	**0**	**0**	**0**	**15**	**5**	**0**	**0**	**5**	**15**	**0**	**5**	**5**	**5**	**0**	**80**
8:15-8:30	**10**	**20**	**0**	**0**	**0**	**10**	**10**	**0**	**10**	**10**	**35**	**0**	**15**	**0**	**0**	**0**	**120**
8:30-8:45	5	0	0	0	0	10	5	5	5	10	25	0	10	5	0	0	80
8:45-9:00	10	5	0	0	0	10	0	0	5	5	10	0	5	5	10	0	65
Future Peak Hour Turns	**55**	**50**	**0**	**0**	**0**	**60**	**20**	**0**	**15**	**20**	**90**	**0**	**30**	**20**	**10**	**0**	**370**
Future Entry Volume	**105**				**80**				**125**				**60**				**370**
Future Exit Volume	**30**				**35**				**100**				**205**				**370**
Future 2 Way Day Est	**1688**				**1438**				**2813**				**3313**				**4625**

2037 PM PEAK HOUR:	**SB EVERS**				**EB VANDEHEI**				**NB EVERS**				**WB VANDEHEI**				**Period Tota**
3:15-4:15	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	
3:00-3:15	5	10	5	0	0	15	5	0	5	10	10	0	15	15	10	0	105
3:15-3:30	**10**	**5**	**0**	**0**	**0**	**15**	**10**	**5**	**5**	**5**	**10**	**5**	**10**	**10**	**10**	**0**	**100**
3:30-3:45	**5**	**5**	**0**	**5**	**0**	**15**	**5**	**0**	**5**	**15**	**25**	**0**	**25**	**15**	**5**	**0**	**125**
3:45-4:00	**15**	**5**	**0**	**5**	**0**	**10**	**0**	**0**	**10**	**25**	**15**	**5**	**15**	**25**	**15**	**5**	**150**
4:00-4:15	**10**	**10**	**5**	**0**	**0**	**10**	**5**	**5**	**5**	**15**	**10**	**5**	**20**	**15**	**10**	**0**	**125**
4:15-4:30	10	5	0	0	0	5	0	0	5	5	10	0	10	10	15	0	75
4:30-4:45	5	5	0	0	0	5	0	5	0	5	10	0	10	15	10	0	70
4:45-5:00	10	5	0	0	0	10	0	0	5	10	15	0	15	10	10	5	**95**
5:00-5:15	10	5	0	0	5	5	5	0	5	15	15	0	10	10	10	5	**100**
5:15-5:30	15	5	0	0	0	10	5	0	10	10	10	0	10	15	15	0	**105**
5:30-5:45	10	10	0	0	0	15	0	0	5	10	5	0	15	15	10	10	**105**
5:45-6:00	10	0	0	0	0	15	5	0	0	5	10	0	15	10	5	0	75
Future Peak Hour Turns	**40**	**25**	**5**	**10**	**0**	**50**	**20**	**10**	**25**	**60**	**60**	**15**	**70**	**65**	**40**	**5**	**405**
Future Entry Volume	**70**				**70**				**145**				**175**				**460**
Future Exit Volume	**100**				**95**				**115**				**150**				**460**
Future 2 Way Day Est	**2125**				**2063**				**3250**				**4063**				**5750**

Manual Intersection Turn Movement Count

Location: Evers Boulevard at Oakhurst Drive
Date: 20-May-14 October 7-8, 2014
Day: Tuesday

EXISTING AM PEAK HOUR: 7:45-8:45	SB EVERS				EB OAKHURST				NB EVERS				WB Oakhurst				Period Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
6:30-6:45	1	1						1			1						3
6:45-7:00	1	2				4	2						1				10
7:00-7:15	1	2		2		2		2	1		2		1			3	9
7:15-7:30	1	3				4	4	1		1	1		1	5	1		21
7:30-7:45	1	1	1			7				3				2			15
7:45-8:00		**2**				**4**	**1**		**3**		**3**			**2**			**15**
8:00-8:15		**2**				**1**	**3**						**1**	**2**			**9**
8:15-8:30	**1**	**9**				**1**	**2**	**1**		**8**			**1**	**2**	**1**		**25**
8:30-8:45		**4**				**4**			**1**	**4**	**2**	**1**			**1**		**16**
Pk Hr Total	**1**	**17**	**0**	**0**	**0**	**10**	**6**	**1**	**4**	**12**	**5**	**1**	**2**	**6**	**2**	**0**	**67**
Approach Total		**18**				**16**				**21**				**10**			**65**
Exit Volume		**14**				**10**				**25**				**16**			**65**
2 Way Day Est		**400**				**325**				**575**				**325**			**813**
Peak Hour Factor	**0.25**	**0.47**				**0.63**	**0.5**		**0.33**	**0.38**	**0.42**		**0.5**	**0.75**	**0.5**		

EXISTING PM PEAK HOUR: 4:30-5:30	SB EVERS				EB OAKHURST				NB EVERS				WB Oakhurst				Period Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
3:00-3:15		3	1			3		2		3	1	2	1	3			15
3:15-3:30		9		4		4	1	2	1	2				3			20
3:30-3:45	1	5				2	1			4	1			2			16
3:45-4:00		2	1	2		1		1	1	2		2	1	1		1	9
4:00-4:15		3				3	2		1	4			2	2			17
4:15-4:30		2	1			2		1	1	2	1	1	1	5			15
4:30-4:45			**1**			**2**		**1**	**1**	**4**				**3**	**1**		**12**
4:45-5:00	**1**	**1**				**2**	**3**	**1**	**1**	**2**			**1**	**2**	**1**		**14**
5:00-5:15	**2**	**1**				**2**	**1**		**1**	**2**			**2**	**3**			**14**
5:15-5:30		**4**				**4**	**2**		**1**	**4**	**1**		**1**	**5**		**1**	**22**
5:30-5:45										3	2			6			11
5:45-6:00		6				1			1	3				4			15
Pk Hr Total	**3**	**6**	**1**	**0**	**0**	**10**	**6**	**2**	**4**	**12**	**1**	**0**	**4**	**13**	**2**	**1**	**61**
Approach Total		**10**				**16**				**17**				**19**			**62**
Exit Volume		**14**				**18**				**16**				**14**			**62**
2 Way Day Est		**240**				**340**				**330**				**330**			**620**
Peak Hour Factor	**0.38**	**0.38**	**0.25**			**0.63**	**0.5**		**1**	**0.75**	**0.25**		**0.5**	**0.65**	**0.5**		

Location: **Evers Boulevard at Oakhurst Drive**

*Assume 1.25% growth rate and future forecasts in 2017

2017 AM PEAK HOUR:	**SB EVERS**				**EB OAKHURST**				**NB EVERS**				**WB Oakhurst**				**Period Total**
7:45-8:45	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	
6:30-6:45	5	5	0	0	0	0	0	5	0	0	5	0	0	0	0	0	15
6:45-7:00	5	5	0	0	0	5	5	0	0	0	0	0	5	0	0	0	25
7:00-7:15	5	5	0	5	0	5	0	5	5	0	5	0	5	0	0	5	30
7:15-7:30	5	5	0	0	0	5	5	5	0	5	5	0	5	10	5	0	50
7:30-7:45	5	5	5	0	0	10	0	0	0	5	0	0	0	5	0	0	35
7:45-8:00	**0**	**5**	**0**	**0**	**0**	**5**	**5**	**0**	**5**	**0**	**5**	**0**	**0**	**5**	**0**	**0**	**30**
8:00-8:15	**0**	**5**	**0**	**0**	**0**	**5**	**5**	**0**	**0**	**0**	**0**	**0**	**5**	**5**	**0**	**0**	**25**
8:15-8:30	**5**	**10**	**0**	**0**	**0**	**5**	**5**	**5**	**0**	**10**	**0**	**0**	**5**	**5**	**5**	**0**	**50**
8:30-8:45	**0**	**5**	**0**	**0**	**0**	**5**	**0**	**0**	**5**	**5**	**5**	**5**	**0**	**0**	**5**	**0**	**30**
Future Peak Hour Turns	**5**	**25**	**0**	**0**	**0**	**20**	**15**	**5**	**10**	**15**	**10**	**5**	**10**	**15**	**10**	**0**	**145**
Future Entry Volume		**30**				**35**				**35**				**35**			**135**
Future Exit Volume		**25**				**25**				**50**				**35**			**135**
Future 2 Way Day Est		**688**				**750**				**1063**				**875**			**1688**

2017 PM PEAK HOUR:	**SB EVERS**				**EB OAKHURST**				**NB EVERS**				**WB Oakhurst**				**Period Total**
4:30-5:30	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	
3:00-3:15	0	5	5	0	0	5	0	5	0	5	5	5	5	5	0	0	35
3:15-3:30	0	10	0	5	0	5	5	5	5	5	0	0	0	5	0	0	35
3:30-3:45	5	10	0	0	0	5	5	0	0	5	5	0	0	5	0	0	40
3:45-4:00	0	5	5	5	0	5	0	5	5	5	0	5	5	5	0	5	35
4:00-4:15	0	5	0	0	0	5	5	0	5	5	0	0	5	5	0	0	35
4:15-4:30	0	5	5	0	0	5	0	5	5	5	5	5	5	10	0	0	45
4:30-4:45	**0**	**0**	**5**	**0**	**0**	**5**	**0**	**5**	**5**	**5**	**0**	**0**	**0**	**5**	**5**	**0**	**30**
4:45-5:00	**5**	**5**	**0**	**0**	**0**	**5**	**5**	**5**	**5**	**5**	**0**	**0**	**5**	**5**	**5**	**0**	**45**
5:00-5:15	**5**	**5**	**0**	**0**	**0**	**5**	**5**	**0**	**5**	**5**	**0**	**0**	**5**	**5**	**0**	**0**	**40**
5:15-5:30	**0**	**5**	**0**	**0**	**0**	**5**	**5**	**0**	**5**	**5**	**5**	**0**	**5**	**10**	**0**	**5**	**45**
5:30-5:45	0	0	0	0	0	0	0	0	0	5	5	0	0	10	0	0	20
5:45-6:00	0	10	0	0	0	5	0	0	5	5	0	0	0	5	0	0	30
Future Peak Hour Turns	**10**	**15**	**5**	**0**	**0**	**20**	**15**	**10**	**20**	**20**	**5**	**0**	**15**	**25**	**10**	**5**	**150**
Future Entry Volume		**30**				**35**				**45**				**50**			**160**
Future Exit Volume		**30**				**50**				**45**				**35**			**160**
Future 2 Way Day Est		**750**				**1063**				**1125**				**1063**			**2000**

Location: **Evers Boulevard at Oakhurst Drive**

*Assume 1.25% growth rate and future forecasts in 2037

2037 AM PEAK HOUR:	**SB EVERS**				**EB OAKHURST**				**NB EVERS**				**WB Oakhurst**				**Period Total**
7:45-8:45	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	
6:30-6:45	5	5	0	0	0	0	0	5	0	0	5	0	0	0	0	0	15
6:45-7:00	5	5	0	0	0	10	5	0	0	0	0	0	5	0	0	0	30
7:00-7:15	5	5	0	5	0	5	0	5	5	0	5	0	5	0	0	5	30
7:15-7:30	5	5	0	0	0	10	10	5	0	5	5	0	5	10	5	0	60
7:30-7:45	5	5	5	0	0	10	0	0	0	5	0	0	0	5	0	0	35
7:45-8:00	**0**	**5**	**0**	**0**	**0**	**10**	**5**	**0**	**5**	**0**	**5**	**0**	**0**	**5**	**0**	**0**	**35**
8:00-8:15	**0**	**5**	**0**	**0**	**0**	**5**	**5**	**0**	**0**	**0**	**0**	**0**	**5**	**5**	**0**	**0**	**25**
8:15-8:30	**5**	**15**	**0**	**0**	**0**	**5**	**5**	**5**	**0**	**15**	**0**	**0**	**5**	**5**	**5**	**0**	**60**
8:30-8:45	**0**	**10**	**0**	**0**	**0**	**10**	**0**	**0**	**5**	**10**	**5**	**5**	**0**	**0**	**5**	**0**	**45**
Future Peak Hour Turns	**5**	**35**	**0**	**0**	**0**	**30**	**15**	**5**	**10**	**25**	**10**	**5**	**10**	**15**	**10**	**0**	**175**
Future Entry Volume		**40**				**45**				**45**				**35**			**165**
Future Exit Volume		**35**				**25**				**60**				**45**			**165**
Future 2 Way Day Est		**938**				**875**				**1313**				**1000**			**2063**

2037 PM PEAK HOUR:	**SB EVERS**				**EB OAKHURST**				**NB EVERS**				**WB Oakhurst**				**Period Total**
4:30-5:30	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	**Left**	**Thru**	**Right**	**Peds**	
3:00-3:15	0	5	5	0	0	5	0	5	0	5	5	5	5	5	0	0	35
3:15-3:30	0	15	0	10	0	10	5	5	5	5	0	0	0	5	0	0	45
3:30-3:45	5	10	0	0	0	5	5	0	0	10	5	0	0	5	0	0	45
3:45-4:00	0	5	5	5	0	5	0	5	5	5	0	5	5	5	0	5	35
4:00-4:15	0	5	0	0	0	5	5	0	5	10	0	0	5	5	0	0	40
4:15-4:30	0	5	5	0	0	5	0	5	5	5	5	5	5	10	0	0	45
4:30-4:45	**0**	**0**	**5**	**0**	**0**	**5**	**0**	**5**	**5**	**10**	**0**	**0**	**0**	**5**	**5**	**0**	**35**
4:45-5:00	**5**	**5**	**0**	**0**	**0**	**5**	**5**	**5**	**5**	**5**	**0**	**0**	**5**	**5**	**5**	**0**	**45**
5:00-5:15	**5**	**5**	**0**	**0**	**0**	**5**	**5**	**0**	**5**	**5**	**0**	**0**	**5**	**5**	**0**	**0**	**40**
5:15-5:30	**0**	**10**	**0**	**0**	**0**	**10**	**5**	**0**	**5**	**10**	**5**	**0**	**5**	**10**	**0**	**5**	**60**
5:30-5:45	0	0	0	0	0	0	0	0	0	5	5	0	0	10	0	0	20
5:45-6:00	0	10	0	0	0	5	0	0	5	5	0	0	0	10	0	0	35
Future Peak Hour Turns	**10**	**20**	**5**	**0**	**0**	**25**	**15**	**10**	**20**	**30**	**5**	**0**	**15**	**25**	**10**	**5**	**165**
Future Entry Volume		**35**				**40**				**55**				**50**			**180**
Future Exit Volume		**40**				**50**				**50**				**40**			**180**
Future 2 Way Day Est		**938**				**1125**				**1313**				**1125**			**2250**

Appendix B: Evers Boulevard Traffic Data

- Technical Memo
  - Appendix D: Synchro Analysis

SYNCHRO ANALYSIS
EXISTING AM PEAK

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	10	6	2	6	2	4	12	5	1	17	0
Sign Control		Yield			Yield			Free			Free	
Grade		-3%			-3%			1%			-3%	
Peak Hour Factor	0.25	0.63	0.50	0.50	0.75	0.50	0.33	0.38	0.42	0.25	0.47	0.25
Hourly flow rate (vph)	0	16	12	4	8	4	12	32	12	4	36	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	114	112	36	126	106	38	36			43		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	114	112	36	126	106	38	36			43		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	98	99	100	99	100	99			100		
cM capacity (veh/h)	847	770	1036	819	776	1035	1575			1565		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	28	16	56	40
Volume Left	0	4	12	4
Volume Right	12	4	12	0
cSH	866	840	1575	1565
Volume to Capacity	0.03	0.02	0.01	0.00
Queue Length 95th (ft)	2	1	1	0
Control Delay (s)	9.3	9.4	1.6	0.7
Lane LOS	A	A	A	A
Approach Delay (s)	9.3	9.4	1.6	0.7
Approach LOS	A	A		

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	40	9	15	13	4	5	8	59	35	29	0
Sign Control		Stop			Stop			Free			Free	
Grade		-7%			-3%			0%			-2%	
Peak Hour Factor	0.25	0.67	0.45	0.47	0.46	0.50	0.31	0.40	0.64	0.73	0.56	0.25
Hourly flow rate (vph)	0	60	20	32	28	8	16	20	92	48	52	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	268	292	52	296	246	66	52			112		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	268	292	52	296	246	66	52			112		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	90	98	94	96	99	99			97		
cM capacity (veh/h)	635	593	1016	575	629	998	1554			1477		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	80	68	128	100
Volume Left	0	32	16	48
Volume Right	20	8	92	0
cSH	662	629	1554	1477
Volume to Capacity	0.12	0.11	0.01	0.03
Queue Length 95th (ft)	10	9	1	3
Control Delay (s)	11.2	11.4	1.0	3.7
Lane LOS	B	B	A	A
Approach Delay (s)	11.2	11.4	1.0	3.7
Approach LOS	B	B		

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	26.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	7	40	16	34	65	31
Sign Control	Stop			Free	Free	
Grade	-2%			-2%	1%	
Peak Hour Factor	0.35	0.71	0.80	0.77	0.71	0.30
Hourly flow rate (vph)	20	56	20	44	92	103
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	227	143	195			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	227	143	195			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	94	99			
cM capacity (veh/h)	750	904	1378			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	76	64	195
Volume Left	20	20	0
Volume Right	56	0	103
cSH	858	1378	1700
Volume to Capacity	0.09	0.01	0.11
Queue Length 95th (ft)	7	1	0
Control Delay (s)	9.6	2.5	0.0
Lane LOS	A	A	
Approach Delay (s)	9.6	2.5	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	19.9%	ICU Level of Service	A
Analysis Period (min)	15		

SYNCHRO ANALYSIS
EXISTING PM PEAK

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	10	6	4	13	2	4	12	1	3	6	1
Sign Control		Yield			Yield			Free			Free	
Grade		-3%			-3%			0%			-3%	
Peak Hour Factor	0.25	0.63	0.50	0.50	0.65	0.50	1.00	0.75	0.25	0.38	0.38	0.25
Hourly flow rate (vph)	0	16	12	8	20	4	4	16	4	8	16	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	74	62	18	80	62	18	20			20		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	74	62	18	80	62	18	20			20		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	98	99	99	98	100	100			100		
cM capacity (veh/h)	892	823	1061	880	823	1061	1596			1596		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	28	32	24	28
Volume Left	0	8	4	8
Volume Right	12	4	4	4
cSH	911	861	1596	1596
Volume to Capacity	0.03	0.04	0.00	0.00
Queue Length 95th (ft)	2	3	0	0
Control Delay (s)	9.1	9.3	1.2	2.1
Lane LOS	A	A	A	A
Approach Delay (s)	9.1	9.3	1.2	2.1
Approach LOS	A	A		

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	15.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	28	7	44	44	20	10	39	35	23	13	1
Sign Control		Stop			Stop			Free			Free	
Grade		-7%			-3%			0%			-2%	
Peak Hour Factor	0.25	0.70	0.44	0.61	0.61	0.56	0.50	0.61	0.51	0.58	0.81	0.25
Hourly flow rate (vph)	0	40	16	72	72	36	20	64	69	40	16	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	307	270	18	272	238	98	20			133		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	307	270	18	272	238	98	20			133		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	93	98	88	89	96	99			97		
cM capacity (veh/h)	551	612	1060	619	637	958	1596			1452		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	56	180	153	60
Volume Left	0	72	20	40
Volume Right	16	36	69	4
cSH	696	674	1596	1452
Volume to Capacity	0.08	0.27	0.01	0.03
Queue Length 95th (ft)	7	27	1	2
Control Delay (s)	10.6	12.3	1.0	5.1
Lane LOS	B	B	A	A
Approach Delay (s)	10.6	12.3	1.0	5.1
Approach LOS	B	B		

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	28.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	18	33	53	55	42	38
Sign Control	Stop			Free	Free	
Grade	-2%			-2%	1%	
Peak Hour Factor	0.32	0.55	0.74	0.69	0.62	0.68
Hourly flow rate (vph)	56	60	72	80	68	56
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	319	96	124			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	319	96	124			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	94	95			
cM capacity (veh/h)	642	961	1463			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	116	151	124
Volume Left	56	72	0
Volume Right	60	0	56
cSH	775	1463	1700
Volume to Capacity	0.15	0.05	0.07
Queue Length 95th (ft)	13	4	0
Control Delay (s)	10.5	3.8	0.0
Lane LOS	B	A	
Approach Delay (s)	10.5	3.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

SYNCHRO ANALYSIS
2017 FUTURE AM PEAK

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	20	15	10	15	10	10	15	10	5	25	0
Sign Control		Yield			Yield			Free			Free	
Grade		-3%			-3%			1%			-3%	
Peak Hour Factor	0.25	0.63	0.50	0.50	0.75	0.50	0.33	0.38	0.42	0.25	0.47	0.25
Hourly flow rate (vph)	0	32	30	20	20	20	30	39	24	20	53	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	235	217	53	251	205	51	53			63		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	235	217	53	251	205	51	53			63		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	95	97	97	97	98	98			99		
cM capacity (veh/h)	673	659	1014	641	669	1017	1552			1539		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	62	60	94	73
Volume Left	0	20	30	20
Volume Right	30	20	24	0
cSH	794	743	1552	1539
Volume to Capacity	0.08	0.08	0.02	0.01
Queue Length 95th (ft)	6	7	1	1
Control Delay (s)	9.9	10.3	2.5	2.1
Lane LOS	A	B	A	A
Approach Delay (s)	9.9	10.3	2.5	2.1
Approach LOS	A	B		

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	19.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	55	20	25	20	10	10	20	70	45	40	0
Sign Control		Stop			Stop			Free			Free	
Grade		-7%			-3%			0%			-2%	
Peak Hour Factor	0.25	0.67	0.45	0.47	0.46	0.50	0.31	0.40	0.64	0.73	0.56	0.25
Hourly flow rate (vph)	0	82	44	53	43	20	32	50	109	62	71	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	406	419	71	449	364	105	71			159		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	406	419	71	449	364	105	71			159		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	83	96	87	92	98	98			96		
cM capacity (veh/h)	486	493	991	413	528	950	1529			1420		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	127	117	192	133
Volume Left	0	53	32	62
Volume Right	44	20	109	0
cSH	599	503	1529	1420
Volume to Capacity	0.21	0.23	0.02	0.04
Queue Length 95th (ft)	20	22	2	3
Control Delay (s)	12.6	14.3	1.4	3.7
Lane LOS	B	B	A	A
Approach Delay (s)	12.6	14.3	1.4	3.7
Approach LOS	B	B		

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	29.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	50	30	45	75	45
Sign Control	Stop			Free	Free	
Grade	-2%			-2%	1%	
Peak Hour Factor	0.38	0.71	0.80	0.77	0.71	0.30
Hourly flow rate (vph)	39	70	38	58	106	150
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	314	181	256			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	314	181	256			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	92	97			
cM capacity (veh/h)	660	862	1309			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	110	96	256
Volume Left	39	38	0
Volume Right	70	0	150
cSH	776	1309	1700
Volume to Capacity	0.14	0.03	0.15
Queue Length 95th (ft)	12	2	0
Control Delay (s)	10.4	3.2	0.0
Lane LOS	B	A	
Approach Delay (s)	10.4	3.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	22.8%	ICU Level of Service	A
Analysis Period (min)	15		

SYNCHRO ANALYSIS
2017 FUTURE PM PEAK

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	20	15	15	25	10	20	20	5	10	15	5
Sign Control		Yield			Yield			Free			Free	
Grade		-3%			-3%			1%			-3%	
Peak Hour Factor	0.25	0.63	0.50	0.50	0.65	0.50	1.00	0.75	0.25	0.38	0.38	0.25
Hourly flow rate (vph)	0	32	30	30	38	20	20	27	20	26	39	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	218	189	49	225	189	37	59			47		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	218	189	49	225	189	37	59			47		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	95	97	96	94	98	99			98		
cM capacity (veh/h)	678	685	1019	669	685	1036	1544			1561		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	62	88	67	86
Volume Left	0	30	20	26
Volume Right	30	20	20	20
cSH	815	736	1544	1561
Volume to Capacity	0.08	0.12	0.01	0.02
Queue Length 95th (ft)	6	10	1	1
Control Delay (s)	9.8	10.6	2.3	2.3
Lane LOS	A	B	A	A
Approach Delay (s)	9.8	10.6	2.3	2.3
Approach LOS	A	B		

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	40	15	55	55	30	25	55	45	35	20	5
Sign Control		Stop			Stop			Free			Free	
Grade		-7%			-3%			0%			-2%	
Peak Hour Factor	0.25	0.70	0.44	0.61	0.61	0.56	0.50	0.61	0.51	0.58	0.81	0.25
Hourly flow rate (vph)	0	57	34	90	90	54	50	90	88	60	25	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	488	434	35	452	400	134	45			178		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	488	434	35	452	400	134	45			178		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	88	97	79	82	94	97			96		
cM capacity (veh/h)	376	478	1038	430	499	915	1563			1397		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	91	234	228	105
Volume Left	0	90	50	60
Volume Right	34	54	88	20
cSH	599	521	1563	1397
Volume to Capacity	0.15	0.45	0.03	0.04
Queue Length 95th (ft)	13	57	2	3
Control Delay (s)	12.1	17.4	1.8	4.6
Lane LOS	B	C	A	A
Approach Delay (s)	12.1	17.4	1.8	4.6
Approach LOS	B	C		

Intersection Summary			
Average Delay	9.2		
Intersection Capacity Utilization	32.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	30	45	65	70	55	45
Sign Control	Stop			Free	Free	
Grade	-2%			-2%	1%	
Peak Hour Factor	0.32	0.55	0.74	0.69	0.62	0.68
Hourly flow rate (vph)	94	82	88	101	89	66
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	399	122	155			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	399	122	155			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	84	91	94			
cM capacity (veh/h)	570	929	1425			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	176	189	155
Volume Left	94	88	0
Volume Right	82	0	66
cSH	695	1425	1700
Volume to Capacity	0.25	0.06	0.09
Queue Length 95th (ft)	25	5	0
Control Delay (s)	11.9	3.8	0.0
Lane LOS	B	A	
Approach Delay (s)	11.9	3.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	27.2%	ICU Level of Service	A
Analysis Period (min)	15		

SYNCHRO ANALYSIS
2037 FUTURE AM PEAK

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	30	15	10	15	10	10	25	10	5	35	0
Sign Control		Yield			Yield			Free			Free	
Grade		-3%			-3%			1%			-3%	
Peak Hour Factor	0.25	0.63	0.50	0.50	0.75	0.50	0.33	0.38	0.42	0.25	0.47	0.25
Hourly flow rate (vph)	0	48	30	20	20	20	30	66	24	20	74	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	283	265	74	307	253	78	74			90		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	283	265	74	307	253	78	74			90		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	92	97	97	97	98	98			99		
cM capacity (veh/h)	624	620	987	575	629	983	1525			1506		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	78	60	120	94
Volume Left	0	20	30	20
Volume Right	30	20	24	0
cSH	724	690	1525	1506
Volume to Capacity	0.11	0.09	0.02	0.01
Queue Length 95th (ft)	9	7	2	1
Control Delay (s)	10.6	10.7	2.0	1.7
Lane LOS	B	B	A	A
Approach Delay (s)	10.6	10.7	2.0	1.7
Approach LOS	B	B		

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	60	20	30	20	10	15	20	90	55	50	0
Sign Control		Stop			Stop			Free			Free	
Grade		-7%			-3%			0%			-2%	
Peak Hour Factor	0.25	0.67	0.45	0.47	0.46	0.50	0.31	0.40	0.64	0.73	0.56	0.25
Hourly flow rate (vph)	0	90	44	64	43	20	48	50	141	75	89	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	499	527	89	546	457	120	89			191		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	499	527	89	546	457	120	89			191		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	79	95	81	91	98	97			95		
cM capacity (veh/h)	410	418	969	335	458	931	1506			1383		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	134	127	239	165
Volume Left	0	64	48	75
Volume Right	44	20	141	0
cSH	515	415	1506	1383
Volume to Capacity	0.26	0.31	0.03	0.05
Queue Length 95th (ft)	26	32	2	4
Control Delay (s)	14.4	17.5	1.7	3.8
Lane LOS	B	C	A	A
Approach Delay (s)	14.4	17.5	1.7	3.8
Approach LOS	B	C		

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	30.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	25	70	50	65	110	70
Sign Control	Stop			Free	Free	
Grade	-2%			-2%	1%	
Peak Hour Factor	0.35	0.71	0.80	0.77	0.71	0.30
Hourly flow rate (vph)	71	99	62	84	155	233
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	481	272	388			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	481	272	388			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	87	95			
cM capacity (veh/h)	515	767	1170			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	170	147	388
Volume Left	71	62	0
Volume Right	99	0	233
cSH	636	1170	1700
Volume to Capacity	0.27	0.05	0.23
Queue Length 95th (ft)	27	4	0
Control Delay (s)	12.7	3.8	0.0
Lane LOS	B	A	
Approach Delay (s)	12.7	3.8	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

SYNCHRO ANALYSIS
2037 FUTURE PM PEAK

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	25	15	15	25	10	20	30	5	10	20	5
Sign Control		Yield			Yield			Free			Free	
Grade		-3%			-3%			1%			-3%	
Peak Hour Factor	0.25	0.63	0.50	0.50	0.65	0.50	1.00	0.75	0.25	0.38	0.38	0.25
Hourly flow rate (vph)	0	40	30	30	38	20	20	40	20	26	53	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	244	215	63	255	215	50	73			60		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	244	215	63	255	215	50	73			60		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	94	97	95	94	98	99			98		
cM capacity (veh/h)	650	662	1002	632	662	1018	1527			1544		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	70	88	80	99
Volume Left	0	30	20	26
Volume Right	30	20	20	20
cSH	776	707	1527	1544
Volume to Capacity	0.09	0.13	0.01	0.02
Queue Length 95th (ft)	7	11	1	1
Control Delay (s)	10.1	10.8	1.9	2.1
Lane LOS	B	B	A	A
Approach Delay (s)	10.1	10.8	1.9	2.1
Approach LOS	B	B		

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	50	20	70	65	40	25	60	60	40	25	5
Sign Control		Stop			Stop			Free			Free	
Grade		-7%			-3%			0%			-2%	
Peak Hour Factor	0.25	0.70	0.44	0.61	0.61	0.56	0.50	0.61	0.51	0.58	0.81	0.25
Hourly flow rate (vph)	0	71	45	115	107	71	50	98	118	69	31	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	561	495	41	517	446	157	51			216		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	561	495	41	517	446	157	51			216		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	84	96	69	77	92	97			95		
cM capacity (veh/h)	313	438	1030	369	466	888	1555			1354		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	117	293	266	120
Volume Left	0	115	50	69
Volume Right	45	71	118	20
cSH	564	472	1555	1354
Volume to Capacity	0.21	0.62	0.03	0.05
Queue Length 95th (ft)	19	103	2	4
Control Delay (s)	13.0	24.3	1.6	4.7
Lane LOS	B	C	A	A
Approach Delay (s)	13.0	24.3	1.6	4.7
Approach LOS	B	C		

Intersection Summary			
Average Delay	12.1		
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	50	70	95	100	80	65
Sign Control	Stop			Free	Free	
Grade	-2%			-2%	1%	
Peak Hour Factor	0.32	0.55	0.74	0.69	0.62	0.68
Hourly flow rate (vph)	156	127	128	145	129	96
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	579	177	225			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	579	177	225			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	64	85	90			
cM capacity (veh/h)	432	866	1344			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	284	273	225
Volume Left	156	128	0
Volume Right	127	0	96
cSH	558	1344	1700
Volume to Capacity	0.51	0.10	0.13
Queue Length 95th (ft)	72	8	0
Control Delay (s)	17.9	4.2	0.0
Lane LOS	C	A	
Approach Delay (s)	17.9	4.2	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	8.0		
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix C: Drainage Analysis

DRAFT

EVERS BOULEVARD ROAD REHABILITATION
35% Design
Drainage Report

Prepared for

City of Cheyenne and
Cheyenne Metropolitan Planning Organization

2101 O'Neil Avenue
Cheyenne, Wyoming 82001

AYRES
ASSOCIATES

DRAFT

EVERS BOULEVARD ROAD REHABILITATION
35% Design
Drainage Report

Prepared for

City of Cheyenne and
Cheyenne Metropolitan Planning Organization

2101 O'Neil Avenue
Cheyenne, Wyoming 82001

AYRES ASSOCIATES

September 2015

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. BACKGROUND

1.1 Project Area Description

For many years Evers Boulevard has experienced flooding even during a minor storm event. The surrounding neighborhood is almost 100% single family residential with Jessup Elementary School being located at the intersection of Evers and Bishop Boulevards. 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 under Interstate 25 (I-25). Storm-water collected in the existing system 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. The significant portion of the structures in this corridor are within the FEMA-regulated floodplain.

Standing water, caused by the existing inadequate storm sewer system, at the elementary school is of particular concern as are the velocity's on Evers Boulevard. There is little that can be done to limit the velocities given the steepness of Evers Boulevard due to the existing topography. However, by reducing the amount of water on the street, the depth of the flow can be reduced, greatly reducing the dangers and flooding to the surrounding community.

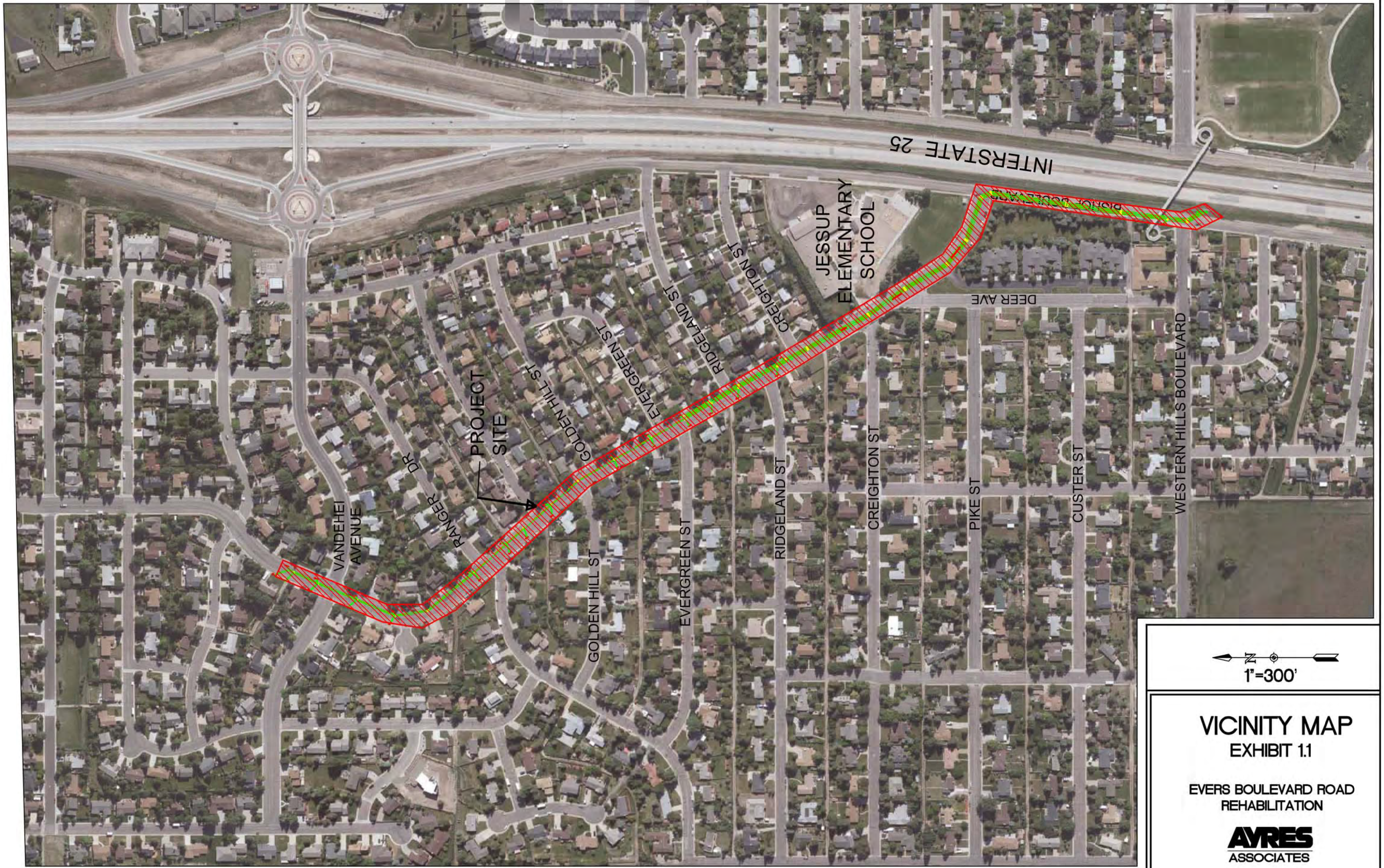
Refer to **Figure 1.1** for a Vicinity Map of the area.

1.2 Purpose and Scope of Project

The City of Cheyenne tasked Ayres Associates with a 35% design project to improve the surface drainage of Evers Boulevard south of Vandehei Avenue down to I-25. One of the initial goals of this project was to provide as much flood protection as possible to the surrounding community with $2 million worth of storm sewer improvements. This goal was later refined to provide a storm sewer system which would remove all of the structures along Evers Boulevard, between Vandehei Avenue and Bishop Boulevard, from the 100-year event floodplain.

2. FEMA FLOODPLAIN

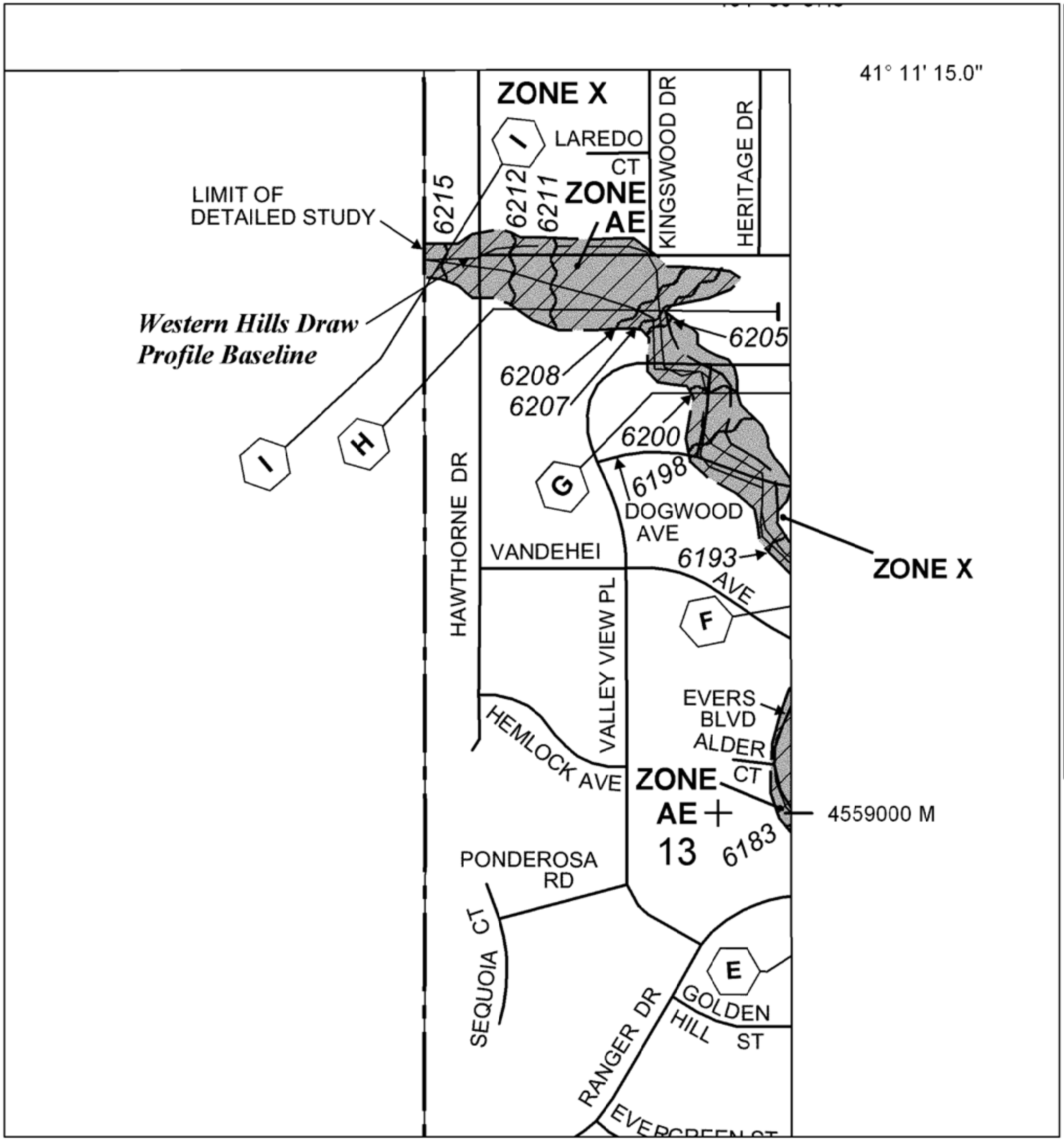
A significant portion of Evers Boulevard south of Vandehei Avenue is in a designated FEMA Flood Zone Type AE. This indicates that the area is subject to inundation by the 1-percent-annual-chance flood event. Figure 2.1 shows the FEMA designated flood plain for Evers Boulevard.



VICINITY MAP
EXHIBIT 1.1

EVERS BOULEVARD ROAD REHABILITATION

AYRES ASSOCIATES



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1086F

FIRM

FLOOD INSURANCE RATE MAP

LARAMIE COUNTY, WYOMING
AND INCORPORATED AREAS

PANEL 1086 OF 1650

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
CHEYENNE, CITY OF	560030	1086	F
LARAMIE COUNTY	560029	1086	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
56021C1086F

EFFECTIVE DATE
JANUARY 17, 2007

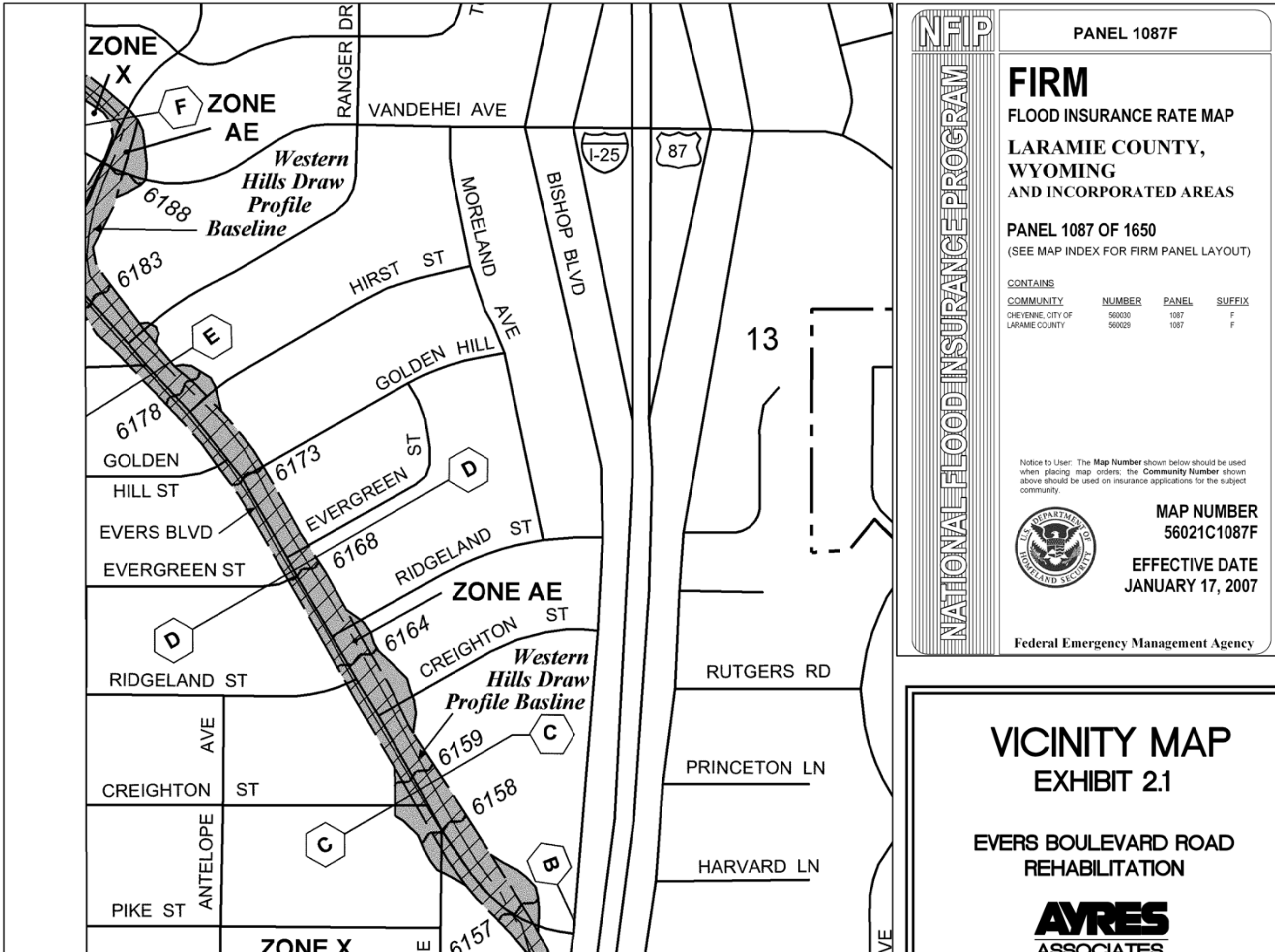
Federal Emergency Management Agency

VICINITY MAP

EXHIBIT 2.1

EVERS BOULEVARD ROAD REHABILITATION

AYRES ASSOCIATES



VICINITY MAP
EXHIBIT 2.1

EVERS BOULEVARD ROAD REHABILITATION

AYRES ASSOCIATES

3. DRAINAGE ANALYSIS

Ayres Associates explored three concepts that would provide a storm sewer system for greater flood protection to the Evers Boulevard corridor. Each concept was evaluated using EPA SWMM to analysis the storm sewer and HEC RAS to analyze the floodplain remaining on the street. For the HEC-RAS modeling, a combination of City of Cheyenne 1-foot aerial contours and a conceptual level proposed plan and profile of Evers Boulevard, created by Ayres Associates for the project, was used.

There were three alternatives/concepts that were analyzed. Each of the alternatives were taken to a conceptual level, however, the chosen alternative was fine-tuned and was analyzed in greater detail. The chosen alternative will need to be re-evaluated with the final design of the storm sewer system and the proposed street grading and design.

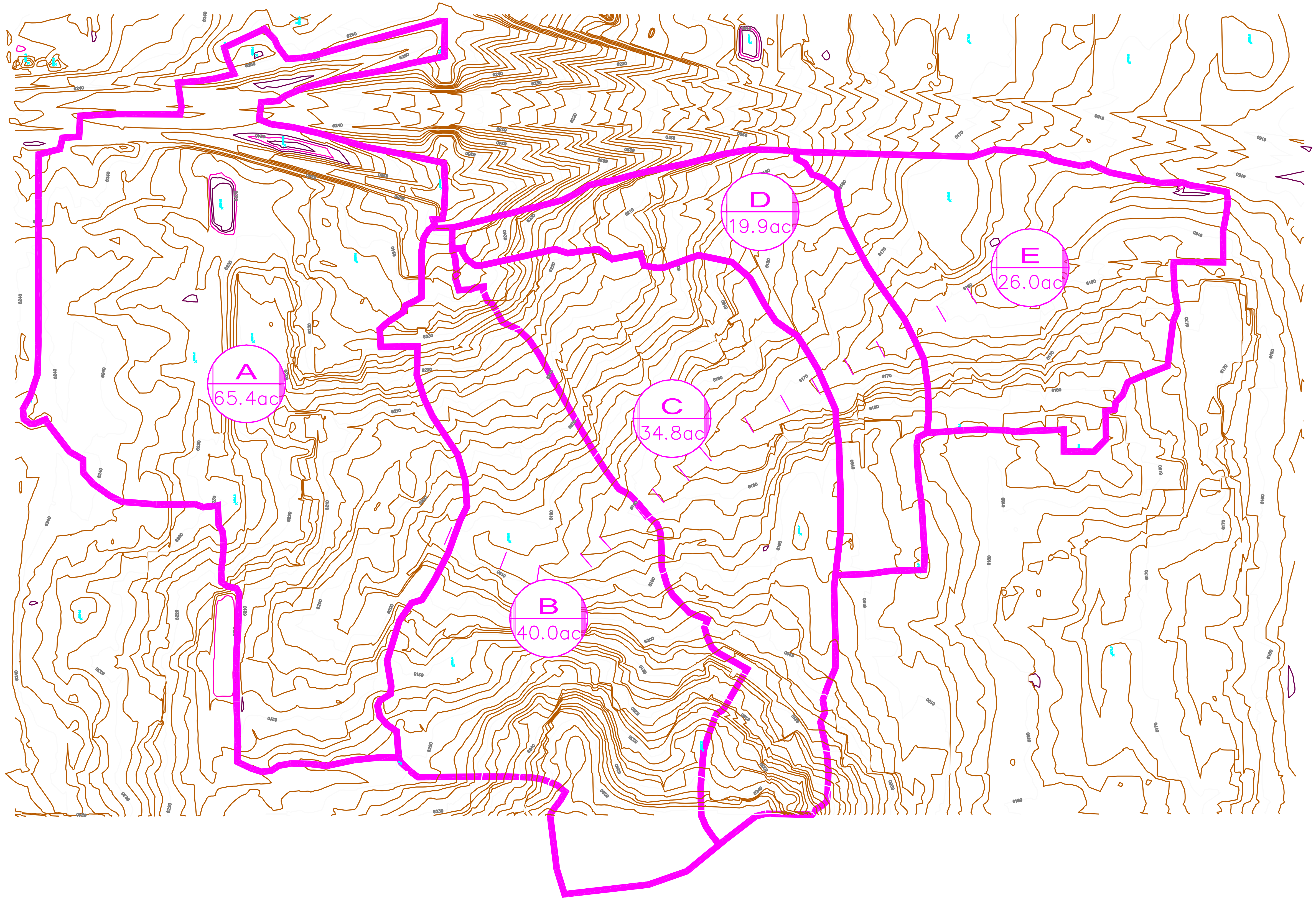
4. HYDROLOGIC ANALYSIS

The hydrology used for the project was obtained from the Effective FEMA model for the Western Hills Draw reach. The Western Hill Draw reach starts at the upstream end at Evers Boulevard. The total flows at the upstream end of Evers Boulevard, between Dogwood Avenue and Vandehei Avenue, is 140cfs during a 100-year event. Local flows enter throughout the corridor, totaling 680cfs at the downstream end of the project. Basin delineation was provided to Ayres from the City Engineering office. Per the direction of the City, flow values were interpolated at major design points along the reach. The following table summarizes the 100-year flows used for the project.

Table 4.1. 100-year FEMA Flows

Location	Flow (cfs)	Total Contributing Drainage Basin (acres)
Between Dogwood and Vandehei (Sub-basin 140)	140 cfs	---
Above Vandehei (Sub-basin A)	320 cfs	65.43 acres
Below Ranger (Sub-basin B)	430 cfs	105.43 acres
Below Evergreen (Sub-basin C)	524 cfs	140.23 acres
Above Creighton (Sub-basin D)	580 cfs	160.16 acres
At Bishop Sump (Sub-basin E)	650 cfs	186.13 acres

Refer to **Figure 4.1** for the Basin Map provided to Ayres by the City.



FLOW SUMMARY

DESIGN PT	AREA (ac)	FIS Q (cfs)
Subbasin 20 Outflow	---	140
Above Vandehei	65.43	320
Below Ranger	105.43	430
Below Evergreen	140.23	524
Above Creighton	160.16	580
Bishop Sump	186.13	650

N

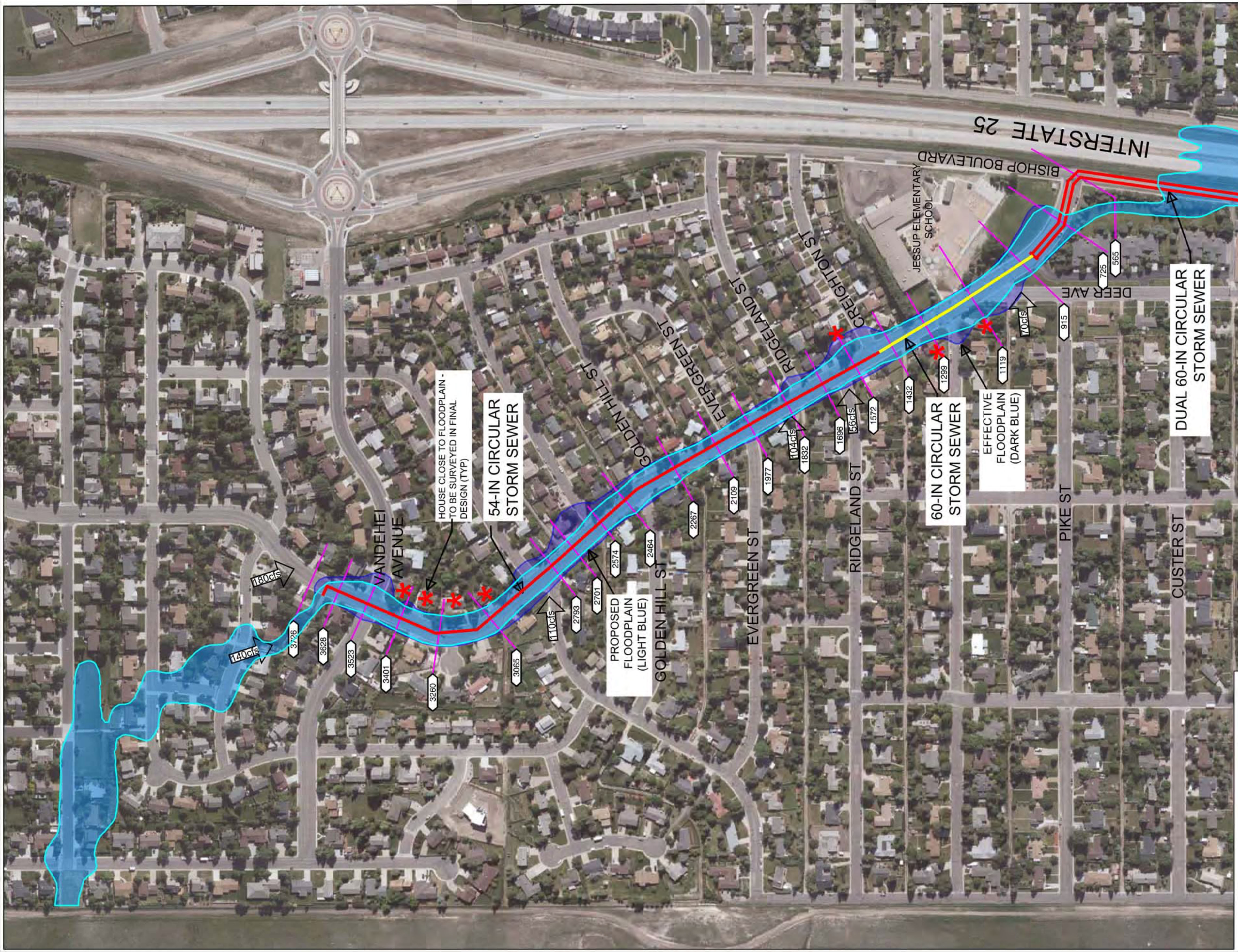
1"=400'

BASIN MAP

EXHIBIT 4.1

EVERS BOULEVARD ROAD REHABILITATION

AYRES ASSOCIATES



FLOODPLAIN

EXHIBIT 5.1

CONCEPT 1 - NO SWALE

AYRES ASSOCIATES

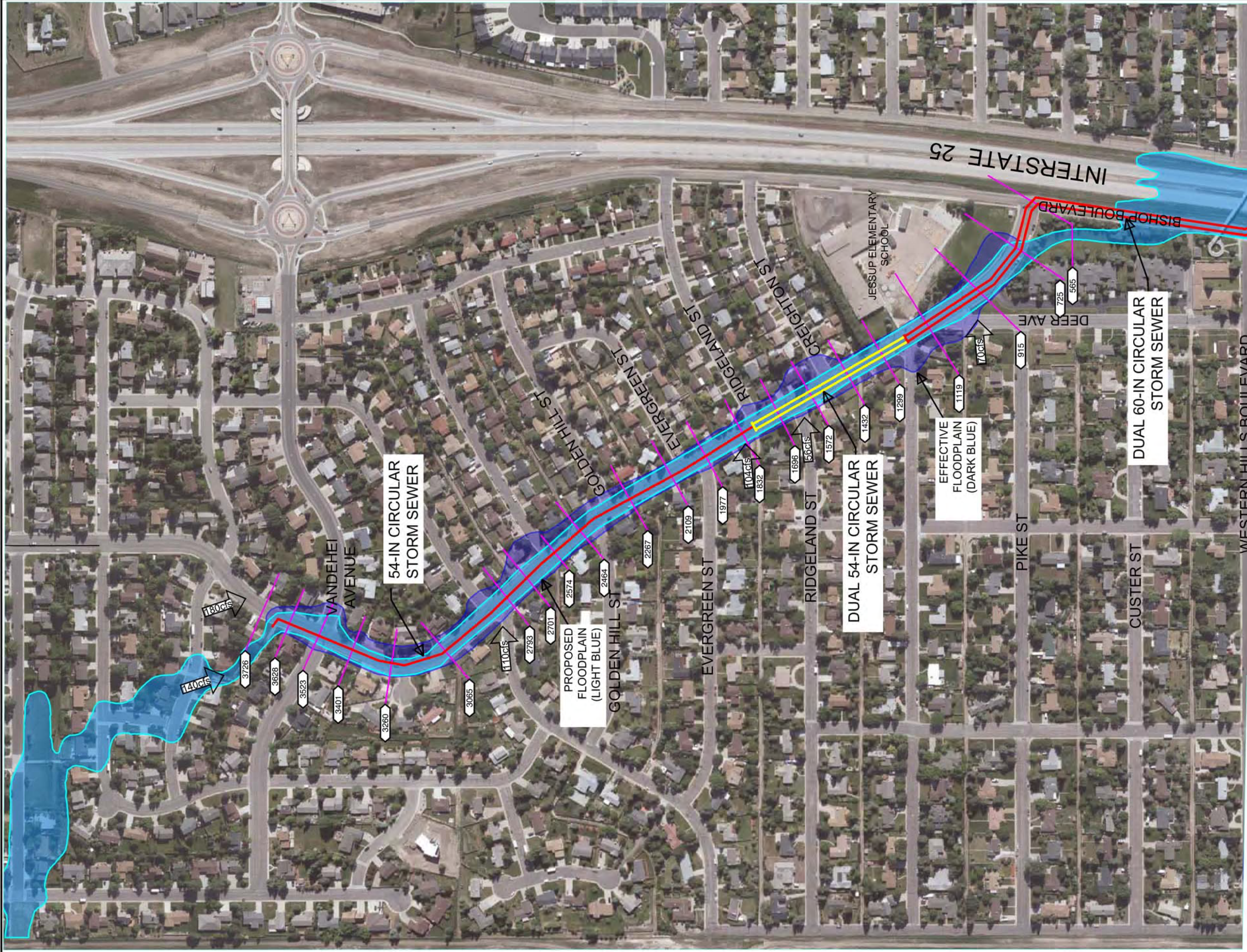
5.1.2 Alternative/Concept 2: Inverted Crown Roadway with Median Bio-Swale.

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.

With this concept the amount of storm sewer could be increased for the $2 million budget. Since the water would be collected in the swales running down the center of the street, the length of laterals could be greatly decreased. The swale will naturally pond up the water higher than what a normal curb and gutter would allow, creating greater head to push the water through. By creating greater head at each of the inlets, the number of inlets can be greatly reduced. With the cost savings in the reduction of laterals and inlets, more storm sewer trunk line pipe could be added while still meeting the $2 million budget.

The resulting system consisted of a storm sewer system that starts just below Dogwood Avenue as a 54-inch circular storm sewer which ultimately transitions into dual 54 inch culverts downstream of Ridgeland. The culverts ultimately transfer to dual 60-inch culverts slightly farther upstream than alternative 1. The system would remain dual 60-inch pipes until they intersect with the culverts running under I-25.

With this option, the 100 year flows range from 100 cfs to 230 cfs. More flow is diverted off of the street with this option, resulting in a safer option with fewer homes remaining in the floodplain. However, the swale running down the middle of the street results in a wider street section. The wider street section will cost approximately $600,000 more to construct. While this storm sewer system remains under $2 million, the project would result in an overall increase in construction costs of approximately $600,000. Refer to **Figure 5.2** for the storm sewer sizes and the resulting floodplain. The floodplain is conceptual and was analyzed and mapped based on a conceptual level surface created by Ayres for this concept. The final floodplain will be based on the final storm sewer design and road surface.



FLOODPLAIN

EXHIBIT 5.2

CONCEPT 2 - SWALE

AYRES ASSOCIATES

5.1.3 Alternative 3/Concept 3: Combination of Concepts 1 and 2

Both of the previous 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. Concept 3 is therefore a combination of both alternatives.

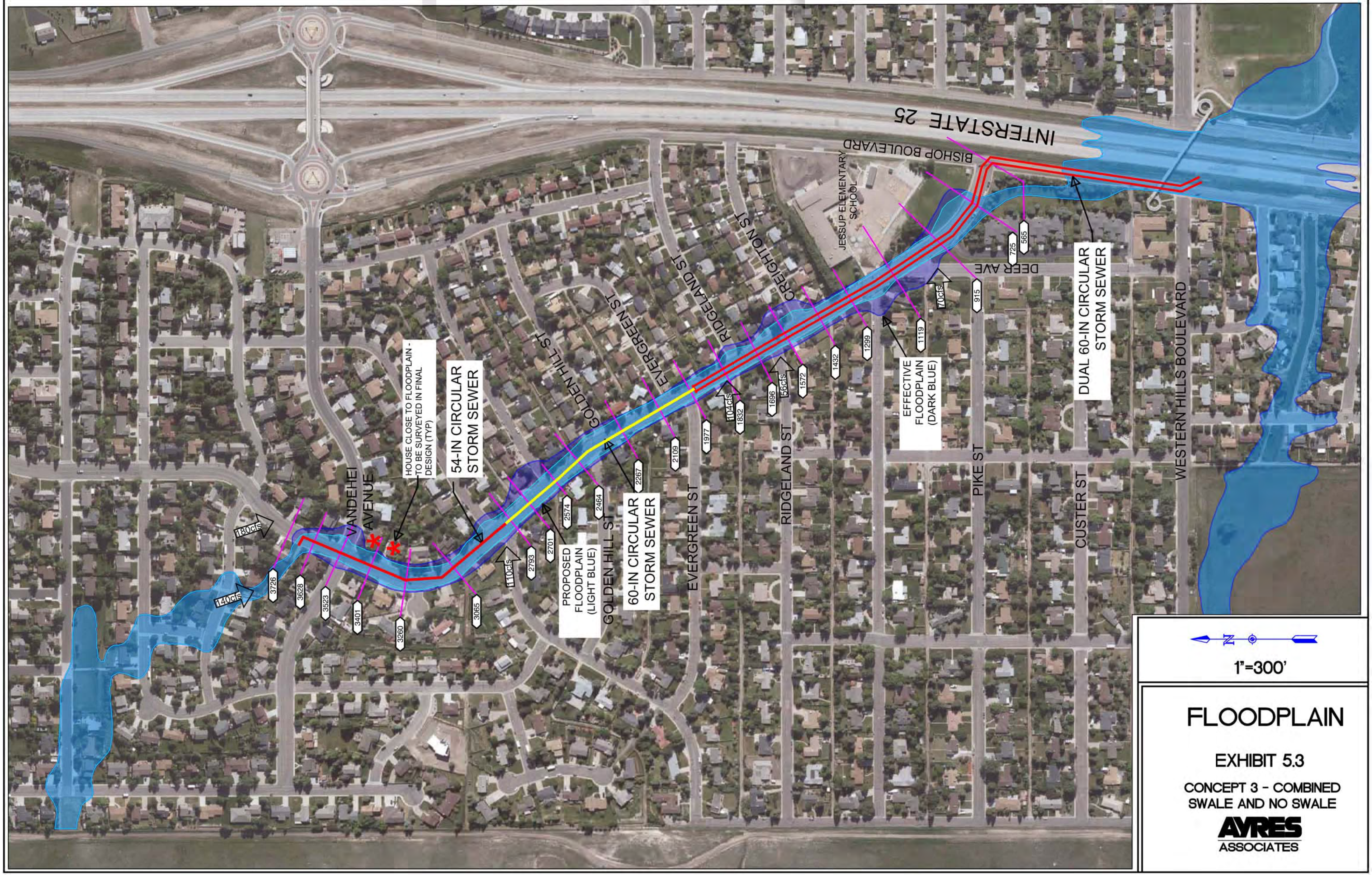
Ayres Associates was directed to provide a solution that would remove all structures along Evers Boulevard, from Vandehie Avenue to Bishop Boulevard, from the 100-year floodplain. In this step the storm sewer improvements would not be held to an estimated construction cost of $2 million.

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.

The resulting system consisted of a storm sewer system that starts just below Dogwood Avenue as an 54-inch circular storm sewer, which transfers to a 60-inch circular storm sewer near Hurst and ultimately into dual 60-inch culverts at Evergreen. The system would remain dual 60 inch pipes till they intersect with the culverts running under I-25.

With this option, the 100 year flows range from 75 cfs to 140 cfs. More flow is diverted off of the street with this option, resulting in a safer option with no homes remaining in the floodplain. Refer to **Figure 5.3** for the storm sewer sizes and the resulting floodplain. The floodplain is conceptual and was analyzed and mapped based on a conceptual level surface created by Ayres for this concept. The final floodplain will be based on the final storm sewer design and road surface.

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



FLOODPLAIN

EXHIBIT 5.3

CONCEPT 3 - COMBINED SWALE AND NO SWALE

AYRES ASSOCIATES

5.1.4 Preferred Alternative/Concept

The design option that removes the most structures from the 100-year floodplain and with the highest reduction in surface flows is the preferred concept. This concept is the combination of a normal crown road section as well as a bio-swale (Concept 3). This option will have a normal crown roadway with curb inlets from just north of Vandehei Avenue to Creighton Street. Just south of Creighton Street the roadway cross section changes to an inverted crown with a center bio-swale to Bishop Boulevard.

The largest single source of surface flow comes through the existing concrete drainage channel just north of Vandehei Avenue on the west side of Evers Boulevard. In total 140 cfs comes through this concrete channel onto Evers Boulevard. Here a trench drain is proposed to capture the stormwater flowing out of the existing detention pond. Curb inlets north of Vandehei Avenue are also proposed to capture the 140 cfs coming from the north. South of Vandehei Avenue a total of 96 storm inlets are proposed. The proposed storm sewer trunk line will start north of Vandehei Avenue. Starting at the southern edge of Vandehei Avenue the main trunk line will be a 54-inch diameter circular pipe, which transfers to a 60-inch circular storm sewer near Hurst, and ultimately into dual 60-inch culverts at Evergreen. This double line will run under Evers Boulevard until the point of connection with the elliptical 60-inch equivalent pipes under I-25.

The preferred alternative was taken further in the design process. The models created for Concepts 1 and 2 were created to determine if the concepts were feasible. Once Concept 3 was chosen to be the preferred alternative the modeling was fine-tuned and taken to greater detail. Also, a plan view was created of the chosen storm sewer alignment/concept.

5.1.5 Existing System under I-25

All three options make use of the existing outlet pipes under I-25 which convey flows to Dry Creek. At the southwest corner of the intersection of Bishop Boulevard and Evers Boulevard is an existing detention. The existing storm sewer discharges into the pond and surface flow from Evers Boulevard overtops the curb and flows into it. The pond contains an outlet pipe that is assumed, for modelling purposes, to be a 48-inch equivalent elliptical pipe that conveys water under I-25. This pipe is an elliptical pipe with a height of 48 inches, which makes the actual pipe larger than a 48-inch equivalent; a 48-inch tall elliptical pipe is equivalent to a 60-inch round pipe. The City of Cheyenne GIS records report this pipe to be a 48-inch pipe. The ultimate outfall of this system into Dry Creek is a 54-inch round concrete pipe. To be conservative and based on the outfall size of 54-inch, it was assumed that the culvert out of the pond and under I-25 was a 48-inch equivalent. This pipe size should be verified prior to final design. The storm sewer for Concept 3 ties into this storm sewer and is conveyed under I-25. By connecting into the system, the flow out of Evers Boulevard can be maximized. The 48-inch culvert connects into an existing system on the east side of I-25. It is recommended that with final design, the existing storm sewer system on the east side of I-25 be analyzed to ensure that the connection of the proposed system in Evers Boulevard with the existing 48-inch culvert does not cause backwater up the system on the east side of I-25 and flood structures that were not previously flooded, or increase any localized flooding.

The proposed storm sewer system ultimately connects into a large concrete trench drain inlet structure along the east side of Bishop Boulevard within the right-of-way of I-25. No modifications to this structure are expected beyond what is necessary to attach the proposed culverts into the inlet. The inlet box is connected to dual 60-inch equivalent elliptical culverts (48-inch x 76-inch HERCP) which convey the storm flows under I-25. The downstream outlet ends are flared end sections that flow adjacent to the greenway path that is located west and south of the football field at McCormick Jr. High school. The conceptual Evers Bloulevard storm sewer model terminates at the end of the culverts passing under I-25.

5.1.6 Existing Utilities

The following utility conflicts were acknowledged during the design and layout of the proposed storm sewer system down Evers Boulevard:

1) Sanitary Sewer: There are dual sanitary sewer lines that travel the length of the corridor. It was directed to Ayres by the Board of Public Utilities to assume that the sewer lines will be combined into one system and a new system will be constructed. Therefore, the main sanitary sewer conflict is at the intersection of Bishop and Evers Boulevards. This is where the future sanitary sewer system will connect into the existing system; the storm sewer cannot block this connection. The conceptual plans show the storm sewer going over the existing 15-inch sanitary sewer in Bishop Boulevard. The Board will require that the existing 15-inch sanitary sewer line under the proposed storm sewer be placed in a casing pipe.

2) Water Main at Western Hills Boulevard: There is a 24-inch water main that crosses the proposed storm sewer system just north of the downstream inlet connection. The water main is in a casing pipe that extends under I-25 from the west side of Bishop Boulevard to the east side of Hynds Boulevard. This pipe will need to be potholed during final design to verify its depth. As-constructed drawings show this casing pipe to be 7 feet deep. The conceptual plans show that this water main will need to be lowered due to the proposed storm sewer. When the water main and casing pipe were installed under I-25 the Wyoming Department of Transportation owned the right-of-way of both Bishop Boulevard and Hynds Boulevard; they required the casing pipe under the WYDOT right-of-way. Since that installation there has been a land swap with the City of Cheyenne. The City now controls the right-of-way of Bishop Boulevard in the vicinity of the 24 inch water main. The casing pipe is to remain within WYDOT right-of-way but the water main can be lowered and the casing pipe removed under Bishop Boulevard.

3) Water lines on Evers Boulevard: Conversations with the Board of Public Utilities during this conceptual design plan indicate that the Board plans on removing and replacing the aging water mains in Evers Boulevard with the total reconstruction of the roadway.

6. OPINION OF PROBABLE COST

Cost estimates were prepared for each of the concepts. The detailed cost estimate can be found in the Appendix. These cost estimates assumed the use of DURAMAXX pipe instead of Reinforce Concrete Pipe (RCP) for cost saving purposes. Below is a summary of the cost estimate for the storm sewer system:

Concept 1: $ 2,033,771.00
Concept 2: $ 2,074,067.50
Concept 3: $ 2,343,839.50

7. MAINTENANCE

A storm-water drainage system requires regular maintenance to ensure that the system will function at the intended capacity. The existing drainage system in the immediate vicinity of Evers Boulevard appears to be well maintained and functioning properly. There are several locations immediately downstream, however, which will require maintenance prior to implementing the Evers Boulevard Reconstruction Project. Figure 7.1 provides an overview of the existing systems.

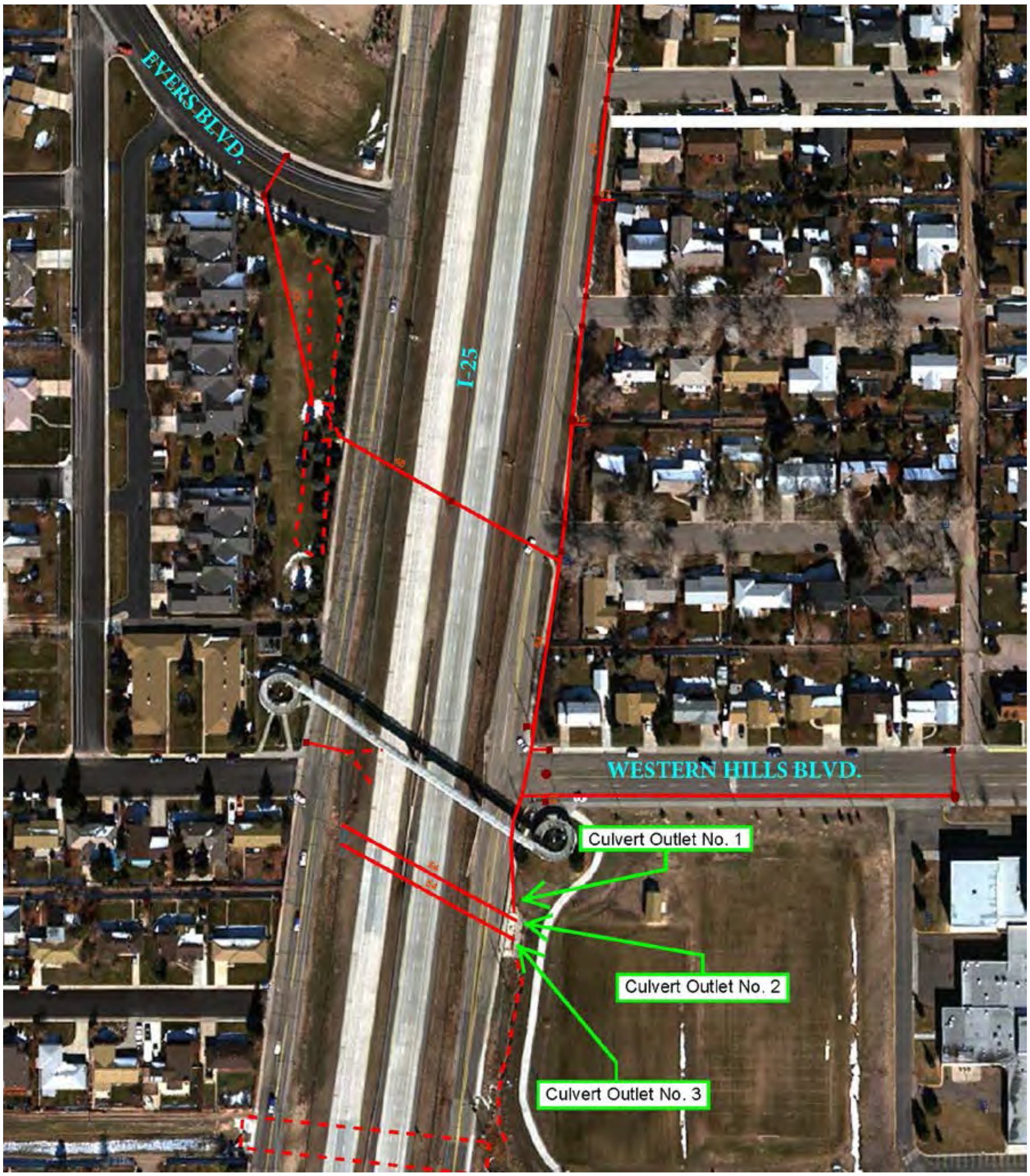


Figure 7.1. Aerial View of Existing Storm Sewer Network.

Culvert Outlet No. 1

Existing Culvert No. 1 is a 54 inch round concrete pipe with a flared end section. The trash guard is functional to keep large debris from falling into the flared end section of the pipe, but there is graffiti on the inside of the pipe as evidence that people are getting into the pipe. At the time of this photo, July 2015, the outlet of the pipe is unobstructed and flowing freely (Photo 7.2).

Photo 7.2. Culvert No.1
1

There is a potential head cutting concern at the end of the existing concrete pan at the end of this culvert. As shown in Photo 7.3 the natural ground is no longer level with the end of the concrete pan. There was an 8-inch difference in elevation at the time of this photo, July 2015. Additionally, material under the concrete pan had been eroded away leaving a void under the concrete.

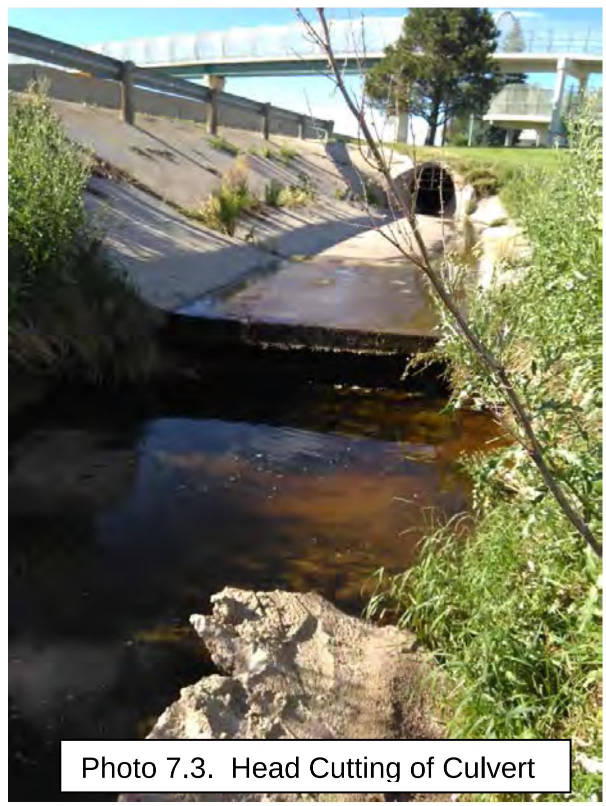


Photo 7.3. Head Cutting of Culvert

The channel has lots of sediment and rock debris as well as some vegetation. Photo 7.4 is looking north along this channel with Culvert No. 1 in the background, Culvert No. 2 in the middle of the photo, and the edge of Culvert No. 3 in the foreground.

Photo 7.4. Channel Downstream of Culvert No 1

Culvert Outlet No. 2

Existing Culvert No. 2 is a 76 inch x 48 inch concrete arch pipe: 60 inch equivalent. The upstream end of this culvert is a large concrete inlet vault on the west side of the right-of-way for the southbound lane of Interstate 25. The downstream end is a flared end section with no trash guard. This culvert is more than half full with silt and vegetation growing on top of the pan at the flared end section. In addition to debris there were large diameter stones and pieces of asphalt inside the culvert. Photos 7.5 and 7.6 were taken in April 2015 of Culvert No. 2.

Photo 7.6. Downstream end of Culvert No. 2

Photo 7.5. Looking Upstream through Culvert No. 2

Culvert Outlet No. 3

Existing Culvert No. 3 is also a 76 inch x 48 inch concrete arch pipe: 60 inch equivalent with the upstream end at the same concrete inlet vault as Culvert No. 2. Photo 7.7, taken April 2015, shows that this culvert is also more than half full of sediment, rocks, and vegetation at the flared end section. A hole was dug at the flared end section to determine the depth of the sediment. Photo 7.8 is showing that the sediment is 24 inches deep with an additional 12 inches of vegetation and roots on top of the sediment and only 12 inches of clear space for water to flow out of the culvert. The wall thickness on this existing culvert is 6 inches.

Photo 7.7. Downstream end of Culvert No. 3

It is recommended that the sediment be removed from the ends of Culverts No. 1 and No. 2 to restore the capacity of these pipes. Additionally, sediment removal/dredging will be necessary for the Dry Creek channel as the sediment depths in this portion of Dry Creek will restrict downstream flow in a large storm event.

Photo 7.8. Sediment in Culvert No. 3

Culverts under Education Drive

There are four existing CMP culverts at the Dry Creek crossing under Education Drive. Figure 7.9 is an aerial view of this portion of Dry Creek.

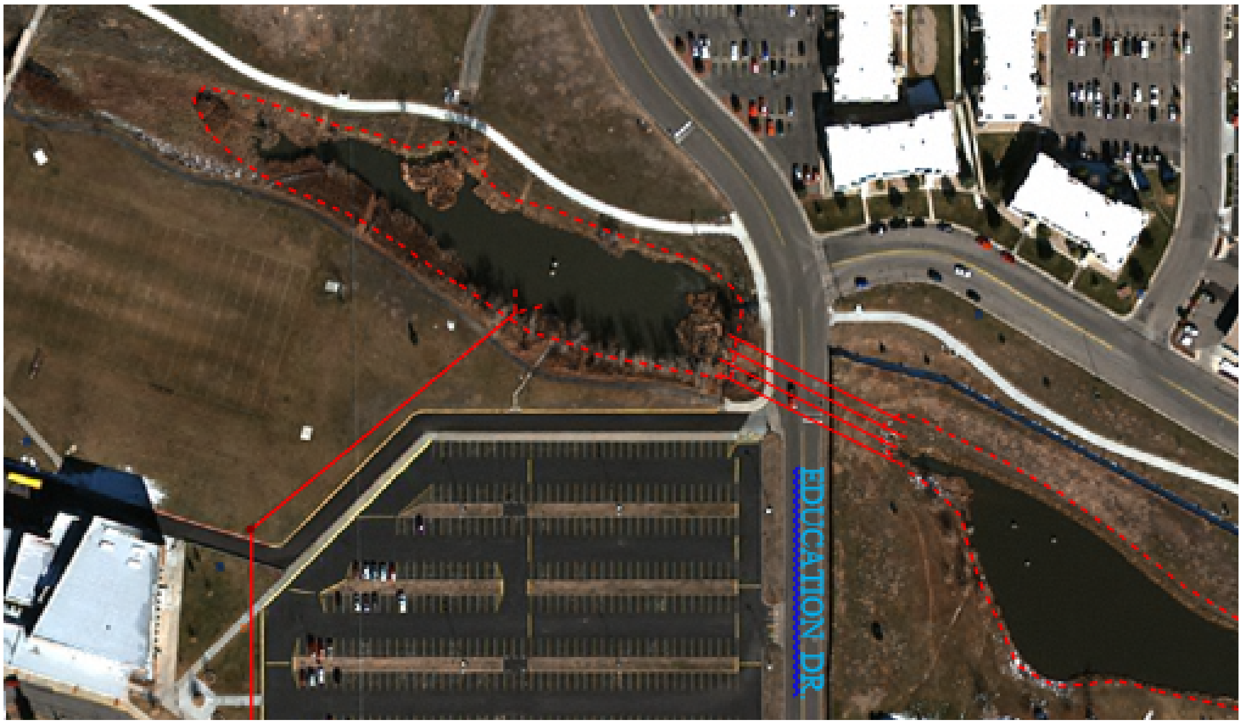


Figure 7.9. Aerial View of Existing Culverts under Education Dr.

The upstream end of these culverts have debris in the form of trash and tree branches restricting the flow through the culverts. The downstream end of the culverts was not assessed.

Photos 7.10 – 7.12 were taken in August 2015.

Photo 7.10. Culverts under Education Dr. 1 of 3

Photo 7.11. Culverts under Education Dr. 2 of 3

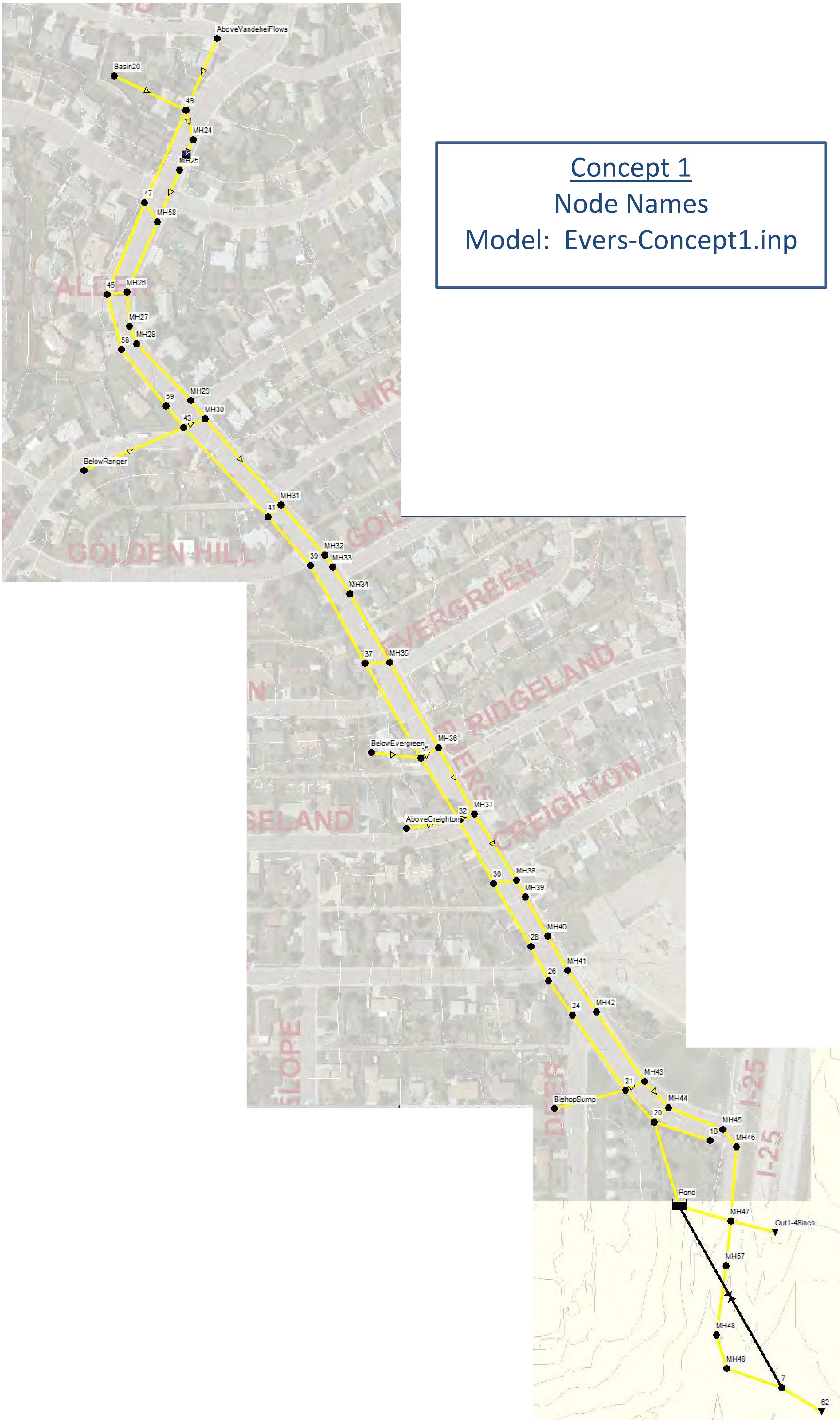
Photo 7.12. Culverts under Education Dr. 3 of 3

APPENIDX A

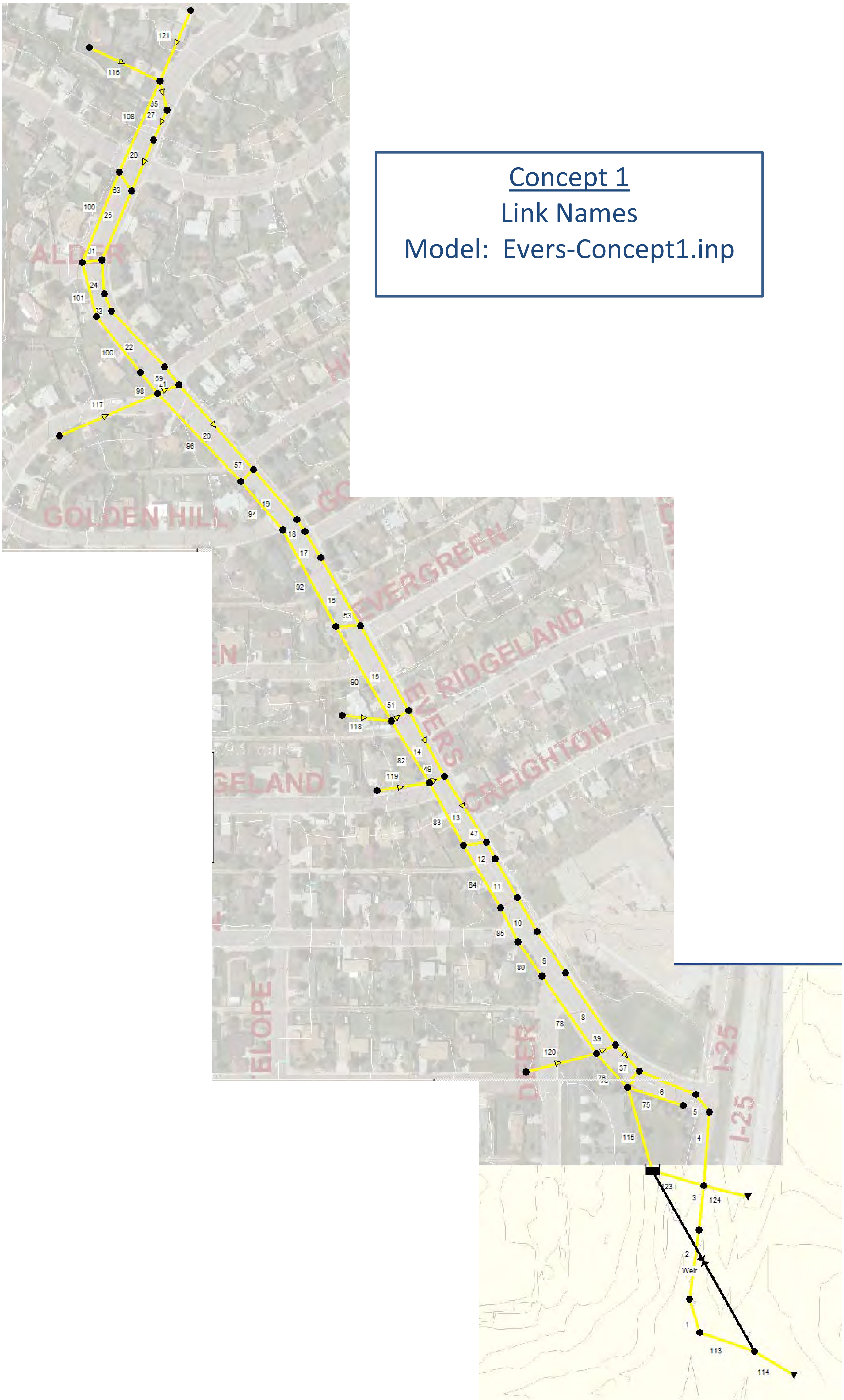
HYDRAULICS
EPA SWMM MODELS

APPENIDX A

HYDRAULICS
CONCEPT 1



Concept 1
Node Names
Model: Evers-Concept1.inp



<u>Concept 1</u>

Link Names

Model: Evers-Concept1.inp

Node Depth Summary

Concept 1

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Feet
MH49	JUNCTION	2.92	9.43	6147.59	0	00:41	8.41
MH48	JUNCTION	2.88	10.17	6148.76	0	00:41	9.11
MH57	JUNCTION	2.87	11.63	6151.36	0	00:41	10.15
MH47	JUNCTION	2.86	12.80	6153.66	0	00:41	10.78
MH46	JUNCTION	2.17	10.01	6153.81	0	00:41	8.74
MH45	JUNCTION	2.27	9.99	6154.19	0	00:41	8.69
MH44	JUNCTION	2.29	9.54	6154.84	0	00:41	8.36
MH43	JUNCTION	2.20	9.15	6155.25	0	00:41	7.97
MH42	JUNCTION	2.86	10.00	6157.50	0	00:41	8.90
MH41	JUNCTION	2.68	10.05	6158.75	0	00:41	8.79
MH40	JUNCTION	2.98	10.65	6159.90	0	00:41	9.35
MH39	JUNCTION	2.81	10.67	6161.25	0	00:41	9.34
MH38	JUNCTION	2.89	10.83	6161.71	0	00:41	9.52
MH37	JUNCTION	2.91	11.12	6164.85	0	00:41	10.10
MH36	JUNCTION	2.77	10.54	6167.40	0	00:41	9.82
MH35	JUNCTION	2.43	9.12	6169.98	0	00:41	8.77
MH34	JUNCTION	2.34	8.31	6172.09	0	00:44	8.16
MH32	JUNCTION	2.18	7.76	6173.38	0	00:44	7.65
MH33	JUNCTION	2.27	8.01	6172.92	0	00:44	7.88
MH31	JUNCTION	2.37	7.85	6175.17	0	00:44	7.84

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Feet
MH30	JUNCTION	1.95	6.28	6178.07	0	00:44	6.26
MH29	JUNCTION	1.53	5.32	6178.35	0	00:44	5.31
MH28	JUNCTION	1.41	2.98	6179.61	0	00:49	2.98
MH27	JUNCTION	1.57	3.11	6180.24	0	00:49	3.11
MH26	JUNCTION	1.69	3.21	6180.99	0	00:49	3.21
MH58	JUNCTION	1.73	3.24	6182.32	0	00:49	3.24
MH25	JUNCTION	1.50	2.72	6183.85	0	00:49	2.72
MH24	JUNCTION	1.34	2.39	6185.42	0	00:12	2.38
18	JUNCTION	0.00	0.00	6145.91	0	00:00	0.00
20	JUNCTION	2.26	8.55	6154.75	0	00:41	8.55
21	JUNCTION	2.38	8.81	6156.43	0	00:40	8.81
24	JUNCTION	7.62	9.54	6157.54	0	00:39	9.54
26	JUNCTION	8.41	9.67	6160.08	0	00:39	9.67
28	JUNCTION	8.57	10.24	6161.13	0	00:39	10.24
30	JUNCTION	2.43	9.98	6163.15	0	00:38	9.98
32	JUNCTION	2.82	10.18	6167.71	0	00:38	10.17
35	JUNCTION	3.15	10.27	6170.57	0	00:37	10.26
37	JUNCTION	2.37	11.46	6174.62	0	00:36	11.46
39	JUNCTION	7.86	9.28	6177.62	0	00:35	9.27
41	JUNCTION	2.40	10.04	6178.61	0	00:35	10.04
43	JUNCTION	2.65	9.65	6184.79	0	00:34	9.65
45	JUNCTION	2.28	10.56	6191.45	0	00:33	10.55

Concept 1

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Feet
47	JUNCTION	2.02	9.68	6192.68	0	00:31	9.68
49	JUNCTION	3.33	10.50	6196.30	0	00:30	10.50
58	JUNCTION	9.27	10.70	6190.97	0	00:33	10.70
59	JUNCTION	7.98	9.30	6185.78	0	00:34	9.30
7	JUNCTION	2.09	5.13	6143.01	0	00:41	5.12
Basin20	JUNCTION	0.20	0.40	6200.40	0	00:30	0.40
BelowRanger	JUNCTION	0.26	0.50	6185.50	0	00:30	0.50
BelowEvergreen	JUNCTION	0.24	0.53	6170.53	0	00:31	0.52
AboveCreighton	JUNCTION	0.14	0.32	6170.32	0	00:30	0.32
BishopSump	JUNCTION	0.19	0.44	6156.44	0	00:30	0.44
AboveVandeheiFlows	JUNCTION	0.19	0.35	6210.35	0	00:30	0.35
Out1-48inch	OUTFALL	0.59	4.00	6149.87	0	00:38	4.00
62	OUTFALL	2.09	5.12	6142.00	0	00:42	5.12
Pond	STORAGE	1.07	7.12	6153.18	0	00:41	7.09

Node Inflow Summary

Concept 1

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
MH49	JUNCTION	0.00	441.20	0	00:45	0	22.1	0.015
MH48	JUNCTION	0.00	441.20	0	00:45	0	22.1	0.006
MH57	JUNCTION	0.00	441.20	0	00:45	0	22.1	0.006
MH47	JUNCTION	0.00	541.73	0	00:45	0	23.6	0.001
MH46	JUNCTION	0.00	318.76	0	01:40	0	19.2	0.001
MH45	JUNCTION	0.00	317.87	0	01:40	0	19.2	0.002
MH44	JUNCTION	0.00	316.82	0	01:39	0	19.2	0.002
MH43	JUNCTION	0.00	291.21	0	01:39	0	18.2	0.003
MH42	JUNCTION	0.00	265.38	0	01:10	0	16.8	0.004
MH41	JUNCTION	0.00	265.36	0	01:10	0	16.8	-0.000
MH40	JUNCTION	0.00	265.34	0	01:10	0	16.8	0.004
MH39	JUNCTION	0.00	265.31	0	01:11	0	16.8	0.001
MH38	JUNCTION	0.00	265.29	0	01:11	0	16.8	0.002
MH37	JUNCTION	0.00	255.29	0	01:11	0	16.3	0.002
MH36	JUNCTION	0.00	235.29	0	01:11	0	15.1	0.001
MH35	JUNCTION	0.00	215.29	0	01:11	0	13.5	0.006
MH34	JUNCTION	0.00	205.88	0	01:38	0	13.2	0.002
MH32	JUNCTION	0.00	205.27	0	01:11	0	13.2	0.000
MH33	JUNCTION	0.00	205.27	0	01:11	0	13.2	-0.000
MH31	JUNCTION	0.00	205.25	0	01:11	0	13.2	0.001

Concept 1

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
MH30	JUNCTION	0.00	195.07	0	01:11	0	12.8	0.000
MH29	JUNCTION	0.00	147.32	0	01:10	0	9.56	0.001
MH28	JUNCTION	0.00	146.28	0	01:10	0	9.56	0.001
MH27	JUNCTION	0.00	146.12	0	01:02	0	9.56	0.001
MH26	JUNCTION	0.00	146.09	0	00:22	0	9.56	0.004
MH58	JUNCTION	0.00	138.29	0	00:20	0	9.27	0.003
MH25	JUNCTION	0.00	130.71	0	00:12	0	8.98	0.001
MH24	JUNCTION	0.00	130.00	0	00:12	0	8.98	0.001
18	JUNCTION	0.00	0.00	0	00:00	0	0	0.000
20	JUNCTION	0.00	328.20	0	00:40	0	5.9	-0.186
21	JUNCTION	0.00	354.17	0	00:40	0	7.37	0.002
24	JUNCTION	0.00	292.68	0	00:39	0	5.11	-0.160
26	JUNCTION	0.00	292.71	0	00:39	0	5.11	0.039
28	JUNCTION	0.00	293.31	0	00:38	0	5.11	-0.043
30	JUNCTION	0.00	304.02	0	00:38	0	5.51	-0.102
32	JUNCTION	0.00	324.87	0	00:37	0	6.76	0.129
35	JUNCTION	0.00	295.17	0	00:36	0	6.44	-0.310
37	JUNCTION	0.00	220.69	0	00:36	0	3.52	-0.068
39	JUNCTION	0.00	219.53	0	00:35	0	3.51	-0.080
41	JUNCTION	0.00	228.25	0	00:34	0	3.93	1.030
43	JUNCTION	0.00	274.41	0	00:34	0	7.17	0.009
45	JUNCTION	0.00	180.00	0	00:31	0	3.03	0.296

Concept 1

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
47	JUNCTION	0.00	188.52	0	00:31	0	3.32	0.319
49	JUNCTION	0.00	319.72	0	00:30	0	12.3	0.110
58	JUNCTION	0.00	168.96	0	00:33	0	2.73	-0.057
59	JUNCTION	0.00	168.70	0	00:33	0	2.73	-0.151
7	JUNCTION	0.00	567.60	0	00:41	0	22.7	0.028
Basin20	JUNCTION	140.00	140.00	0	00:30	5.25	5.25	0.012
BelowRanger	JUNCTION	110.00	110.00	0	00:30	4.44	4.44	0.021
BelowEvergreen	JUNCTION	94.00	94.00	0	00:30	3.27	3.27	0.013
AboveCreighton	JUNCTION	56.00	56.00	0	00:30	1.88	1.88	0.008
BishopSump	JUNCTION	70.00	70.00	0	00:30	2.26	2.26	0.025
AboveVandeheiFlows	JUNCTION	180.00	180.00	0	00:30	7.07	7.07	0.014
Out1-48inch	OUTFALL	0.00	101.31	0	00:42	0	1.46	0.000
62	OUTFALL	0.00	567.45	0	00:42	0	22.7	0.000
Pond	STORAGE	0.00	299.33	0	00:42	0	4.94	0.014

Node Surcharge Summary

Concept 1

Node	Type	Hours Surcharged	Max Height Above Crown Feet	Min Depth Below Rim Feet
MH49	JUNCTION	1.31	4.430	0.000
MH48	JUNCTION	1.33	5.172	1.378
MH57	JUNCTION	1.31	6.629	0.000
MH47	JUNCTION	0.47	3.625	0.295
MH46	JUNCTION	0.95	5.015	0.235
MH45	JUNCTION	0.94	4.993	3.907
MH44	JUNCTION	0.87	4.544	0.000
MH43	JUNCTION	0.79	4.147	0.053
MH42	JUNCTION	1.08	5.000	0.000
MH41	JUNCTION	1.06	5.049	0.000
MH40	JUNCTION	1.25	5.654	0.000
MH39	JUNCTION	1.23	5.672	0.000
MH38	JUNCTION	1.25	5.831	0.000
MH37	JUNCTION	1.32	6.624	0.000
MH36	JUNCTION	1.28	6.038	0.000
MH35	JUNCTION	1.07	4.618	1.282
MH34	JUNCTION	1.02	3.806	0.394
MH32	JUNCTION	0.87	3.257	0.363
MH33	JUNCTION	0.97	3.513	0.000
MH31	JUNCTION	0.90	3.345	0.615

Node	Type	**Concept 1** Hours Surcharged	Max Height Above Crown Feet	Min Depth Below Rim Feet
MH30	JUNCTION	0.54	1.779	2.321
MH29	JUNCTION	0.38	0.817	3.083

Storage Volume Summary

Concept 1

Storage Unit	Average Volume 1000 ft3	Average Percent Full	Evap Percent Loss	Exfil Percent Loss	Maximum Volume 1000 ft3	Maximum Percent Full	Day of Maximum Volume	Hour of Maximum Volume
Pond	0.577	7	0	0	6.442	77	0	00:41

Storage Volume Summary

Concept 1

Storage Unit	Maximum Outflow CFS
Pond	336.86

Outfall Loading Summary

Concept 1

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
Out1-48inch	21.65	41.92	101.31	1.461
62	98.27	144.10	567.45	22.657

Link Flow Summary

Concept 1

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
1	CONDUIT	441.20	0	00:45	11.23	1.17	1.00
2	CONDUIT	441.20	0	00:45	11.24	1.18	1.00
3	CONDUIT	441.20	0	00:45	11.24	1.19	1.00
4	CONDUIT	320.97	0	01:40	10.82	0.57	1.00
6	CONDUIT	317.87	0	01:40	10.89	0.73	1.00
5	CONDUIT	318.76	0	01:40	12.27	0.50	1.00
7	CONDUIT	291.82	0	01:39	10.46	0.67	1.00
8	CONDUIT	266.21	0	01:39	15.50	1.34	1.00
9	CONDUIT	265.38	0	01:10	14.01	0.94	1.00
10	CONDUIT	265.36	0	01:10	13.60	1.35	1.00
11	CONDUIT	265.34	0	01:10	13.51	0.96	1.00
12	CONDUIT	265.31	0	01:11	13.59	1.09	1.00
13	CONDUIT	255.29	0	01:11	16.05	1.09	1.00
14	CONDUIT	235.29	0	01:11	15.09	0.95	1.00
15	CONDUIT	215.29	0	01:11	15.57	0.86	1.00
16	CONDUIT	210.03	0	01:38	16.27	0.90	1.00
17	CONDUIT	205.88	0	01:38	16.00	0.82	1.00
18	CONDUIT	205.27	0	01:11	16.27	0.72	1.00
19	CONDUIT	205.27	0	01:11	15.29	1.00	1.00
20	CONDUIT	195.25	0	01:11	15.27	0.81	1.00

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
21	CONDUIT	150.07	0	01:11	14.45	0.44	1.00
22	CONDUIT	147.32	0	01:10	16.09	0.58	0.83
23	CONDUIT	146.28	0	01:10	14.82	0.67	0.68
24	CONDUIT	146.12	0	01:02	12.98	0.83	0.70
25	CONDUIT	138.21	0	00:20	11.95	0.80	0.72
26	CONDUIT	131.20	0	00:12	12.59	0.60	0.66
27	CONDUIT	130.71	0	00:12	14.64	0.50	0.57
37	CONDUIT	25.00	0	00:19	3.67	0.20	1.00
39	CONDUIT	25.00	0	00:10	10.08	0.15	1.00
47	CONDUIT	10.00	0	00:13	1.70	0.05	1.00
49	CONDUIT	20.00	0	00:10	9.86	0.08	1.00
51	CONDUIT	20.00	0	00:06	12.00	0.08	1.00
53	CONDUIT	10.00	0	00:23	1.99	0.05	1.00
57	CONDUIT	10.00	0	00:17	1.54	0.07	1.00
59	CONDUIT	45.00	0	00:12	11.60	0.18	1.00
61	CONDUIT	8.00	0	00:21	1.95	0.03	1.00
63	CONDUIT	8.00	0	00:19	1.96	0.03	1.00
65	CONDUIT	130.00	0	00:12	20.86	0.58	0.90
75	CHANNEL	0.00	0	00:00	0.00	0.00	0.05
76	CHANNEL	328.20	0	00:40	4.44	0.02	0.12
78	CHANNEL	291.40	0	00:40	2.80	0.05	0.16
80	CHANNEL	292.68	0	00:39	3.74	0.01	0.14

Concept 1

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
82	CHANNEL	273.22	0	00:37	4.03	0.02	0.11
83	CHANNEL	304.02	0	00:38	4.73	0.02	0.11
84	CHANNEL	293.31	0	00:38	3.60	0.02	0.13
85	CHANNEL	292.71	0	00:39	3.70	0.03	0.13
90	CHANNEL	207.57	0	00:36	3.31	0.01	0.11
92	CHANNEL	220.69	0	00:36	3.76	0.02	0.10
94	CHANNEL	219.53	0	00:35	2.75	0.03	0.13
96	CHANNEL	228.25	0	00:34	3.37	0.01	0.12
98	CHANNEL	168.47	0	00:34	3.51	0.01	0.09
100	CHANNEL	168.70	0	00:33	4.21	0.01	0.09
101	CHANNEL	168.96	0	00:33	2.06	0.02	0.13
106	CHANNEL	180.00	0	00:31	3.35	0.01	0.14
108	CHANNEL	188.52	0	00:31	3.16	0.01	0.11
113	CONDUIT	441.20	0	00:45	10.86	3.06	1.00
114	CONDUIT	567.45	0	00:42	10.97	0.10	0.34
115	CONDUIT	299.33	0	00:42	2.57	0.01	0.07
116	CHANNEL	139.88	0	00:30	12.84	0.00	0.30
117	CHANNEL	109.93	0	00:30	7.52	0.01	0.15
118	CHANNEL	93.99	0	00:30	5.19	0.01	0.18
119	CHANNEL	55.94	0	00:30	7.98	0.00	0.15
120	CHANNEL	69.94	0	00:30	5.75	0.00	0.18
121	CHANNEL	179.84	0	00:30	20.07	0.00	0.30

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
123	CONDUIT	236.75	0	00:43	18.84	7.52	1.00
124	CONDUIT	101.31	0	00:42	8.06	2.80	1.00
Weir	WEIR	165.39	0	00:41	0.14		

Flow Classification Summary

Concept 1

Conduit	Adjusted/ Actual Length	Fully Dry	Upstrm Dry	Dnstrm Dry	Sub Critical	Super Critical	Upstrm Critical	Dnstrm Critical
1	1.00	0.01	0.00	0.00	0.99	0.01	0.00	0.00
2	1.00	0.00	0.00	0.00	0.66	0.33	0.00	0.00
3	1.00	0.00	0.00	0.00	0.29	0.71	0.00	0.00
4	1.00	0.00	0.00	0.00	0.23	0.77	0.00	0.00
6	1.00	0.00	0.00	0.00	0.21	0.79	0.00	0.00
5	1.06	0.00	0.00	0.00	0.20	0.80	0.00	0.00
7	1.00	0.00	0.00	0.00	0.23	0.77	0.00	0.00
8	1.00	0.00	0.01	0.00	0.17	0.83	0.00	0.00
9	1.00	0.00	0.00	0.00	0.21	0.79	0.00	0.00
10	1.00	0.00	0.00	0.00	0.23	0.77	0.00	0.00
11	1.00	0.00	0.00	0.00	0.23	0.77	0.00	0.00
12	1.00	0.00	0.00	0.00	0.23	0.77	0.00	0.00
13	1.00	0.00	0.00	0.00	0.23	0.77	0.00	0.00
14	1.00	0.00	0.00	0.00	0.22	0.78	0.00	0.00
15	1.00	0.00	0.00	0.00	0.22	0.78	0.00	0.00
16	1.00	0.00	0.00	0.00	0.18	0.81	0.00	0.00
17	1.00	0.00	0.00	0.00	0.18	0.82	0.00	0.00
18	1.00	0.00	0.00	0.00	0.17	0.83	0.00	0.00
19	1.00	0.00	0.00	0.00	0.17	0.83	0.00	0.00
20	1.00	0.00	0.00	0.00	0.13	0.86	0.00	0.00

Concept 1

Conduit	Adjusted/ Actual Length	Fully Dry	Upstrm Dry	Dnstrm Dry	Sub Critical	Super Critical	Upstrm Critical	Dnstrm Critical
21	1.00	0.00	0.00	0.00	0.10	0.89	0.00	0.00
22	1.00	0.00	0.00	0.00	0.07	0.93	0.00	0.00
23	1.00	0.00	0.00	0.00	0.00	0.99	0.00	0.00
24	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
25	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
26	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
27	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
37	1.11	0.00	0.20	0.00	0.80	0.00	0.00	0.00
39	1.32	0.00	0.00	0.00	0.98	0.02	0.00	0.00
47	1.54	0.00	0.66	0.00	0.34	0.00	0.00	0.00
49	1.87	0.00	0.00	0.00	0.99	0.01	0.00	0.00
51	1.80	0.00	0.00	0.00	0.98	0.02	0.00	0.00
53	1.54	0.01	0.02	0.00	0.97	0.00	0.00	0.00
57	1.24	0.00	0.30	0.00	0.70	0.00	0.00	0.00
59	1.78	0.00	0.00	0.00	0.27	0.73	0.00	0.00
61	1.73	0.00	0.05	0.00	0.94	0.00	0.00	0.00
63	1.90	0.00	0.75	0.00	0.25	0.00	0.00	0.00
65	1.65	0.00	0.00	0.00	0.00	1.00	0.00	0.00
75	1.00	0.76	0.24	0.00	0.00	0.00	0.00	0.00
76	1.00	0.74	0.00	0.00	0.06	0.00	0.00	0.20
78	1.00	0.04	0.01	0.00	0.24	0.00	0.00	0.71
80	1.00	0.04	0.00	0.00	0.95	0.00	0.00	0.01

Concept 1

Conduit	Adjusted/ Actual Length	Fully Dry	Upstrm Dry	Dnstrm Dry	Sub Critical	Super Critical	Upstrm Critical	Dnstrm Critical
82	1.00	0.70	0.00	0.00	0.15	0.03	0.00	0.12
83	1.00	0.73	0.00	0.00	0.13	0.00	0.00	0.15
84	1.00	0.04	0.72	0.00	0.24	0.00	0.00	0.00
85	1.00	0.04	0.00	0.00	0.03	0.68	0.00	0.25
90	1.00	0.70	0.09	0.00	0.21	0.00	0.00	0.00
92	1.00	0.06	0.00	0.00	0.10	0.00	0.00	0.85
94	1.00	0.05	0.73	0.00	0.18	0.00	0.00	0.04
96	1.00	0.75	0.00	0.00	0.19	0.02	0.00	0.03
98	1.04	0.04	0.03	0.00	0.11	0.11	0.00	0.72
100	1.00	0.07	0.00	0.00	0.04	0.76	0.00	0.14
101	1.00	0.06	0.00	0.00	0.08	0.00	0.14	0.71
106	1.00	0.77	0.02	0.00	0.21	0.00	0.00	0.01
108	1.00	0.77	0.00	0.00	0.13	0.00	0.00	0.10
113	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00
114	1.00	0.01	0.00	0.00	0.72	0.27	0.00	0.00
115	1.00	0.76	0.00	0.00	0.00	0.00	0.00	0.24
116	5.34	0.00	0.00	0.00	0.25	0.01	0.00	0.73
117	2.62	0.00	0.00	0.00	0.08	0.12	0.00	0.81
118	2.08	0.00	0.00	0.00	0.16	0.08	0.00	0.76
119	4.03	0.00	0.00	0.00	0.16	0.10	0.00	0.74
120	2.37	0.00	0.00	0.00	0.19	0.04	0.00	0.76
121	9.29	0.00	0.00	0.00	0.25	0.02	0.00	0.73

Concept 1

Conduit	Adjusted/ Actual Length	Fully Dry	Upstrm Dry	Dnstrm Dry	Sub Critical	Super Critical	Upstrm Critical	Dnstrm Critical
123	1.00	0.06	0.00	0.00	0.09	0.00	0.00	0.86
124	1.00	0.78	0.00	0.00	0.22	0.00	0.00	0.00

Flow Classification Summary

Concept 1

Conduit	Normal Flow Limited	Inlet Control
1	0.04	0.00
2	0.00	0.00
3	0.09	0.00
4	0.68	0.00
6	0.00	0.00
5	0.00	0.00
7	0.02	0.00
8	0.46	0.00
9	0.08	0.00
10	0.71	0.00
11	0.10	0.00
12	0.02	0.00
13	0.29	0.00
14	0.24	0.00
15	0.56	0.00
16	0.02	0.00
17	0.04	0.00
18	0.02	0.00
19	0.00	0.00
20	0.70	0.00

Conduit	Normal Flow Limited	Inlet Control
21	0.17	0.00
22	0.00	0.00
23	0.00	0.00
24	0.25	0.00
25	0.04	0.00
26	0.32	0.00
27	0.22	0.00
37	0.21	0.00
39	0.69	0.00
47	0.67	0.00
49	0.72	0.00
51	0.68	0.00
53	0.70	0.00
57	0.31	0.00
59	0.29	0.00
61	0.72	0.00
63	0.73	0.00
65	0.02	0.00
75	0.00	0.00
76	0.01	0.00
78	0.00	0.00
80	0.95	0.00

Concept 1

Conduit	Normal Flow Limited	Inlet Control
82	0.01	0.00
83	0.07	0.00
84	0.95	0.00
85	0.00	0.00
90	0.93	0.00
92	0.00	0.00
94	0.73	0.00
96	0.21	0.00
98	0.21	0.00
100	0.76	0.00
101	0.01	0.00
106	0.94	0.00
108	0.00	0.00
113	0.00	0.00
114	0.89	0.00
115	0.00	0.00
116	0.26	0.00
117	0.19	0.00
118	0.22	0.00
119	0.25	0.00
120	0.23	0.00
121	0.26	0.00

Concept 1

Conduit	Normal Flow Limited	Inlet Control
123	0.00	0.16
124	0.00	0.01

Conduit Surcharge Summary

Concept 1

Conduit	Hours Both Ends Full	Hours Upstream Full	Hours Dnstream Full	Hours Above Normal Flow	Hours Capacity Limited
1	1.31	1.33	1.31	1.65	1.31
2	1.31	1.31	1.33	1.65	1.27
3	1.29	1.29	1.31	1.65	1.02
4	0.95	0.95	1.29	1.40	0.01
6	0.87	0.87	0.94	1.59	0.01
5	0.94	0.94	0.95	0.18	0.01
7	0.79	0.79	0.87	1.61	0.01
8	0.79	1.08	0.79	1.60	0.79
9	1.06	1.06	1.08	0.01	0.02
10	1.06	1.25	1.06	1.61	1.06
11	1.23	1.23	1.25	0.01	0.85
12	1.23	1.25	1.23	1.34	1.23
13	1.31	1.32	1.31	1.34	1.31
14	1.28	1.28	1.32	0.01	0.01
15	1.07	1.07	1.28	0.01	0.01
16	1.02	1.02	1.07	0.01	0.01
17	0.97	0.97	1.02	0.01	0.01
18	0.87	0.87	0.97	0.01	0.01
19	0.86	0.90	0.87	0.02	0.86
20	0.54	0.54	0.90	0.01	0.01

Concept 1

Conduit	Hours Both Ends Full	Hours Upstream Full	Hours Dnstream Full	Hours Above Normal Flow	Hours Capacity Limited
21	0.38	0.38	0.54	0.01	0.01
22	0.01	0.01	0.38	0.01	0.01
37	1.41	1.41	1.51	0.01	1.40
39	1.49	1.54	1.49	0.01	1.49
47	1.47	1.47	1.67	0.01	1.46
49	1.62	1.62	1.64	0.01	1.59
51	1.60	1.80	1.60	0.01	1.60
53	1.24	1.24	1.35	0.01	1.24
57	1.34	1.34	1.61	0.01	1.34
59	1.32	1.48	1.32	0.01	1.32
61	1.34	1.34	1.37	0.01	1.34
63	1.29	1.29	5.69	0.01	1.29
65	0.01	1.59	0.01	0.01	0.01
113	1.11	1.53	1.11	2.73	1.11
123	0.47	0.95	0.47	1.17	0.47
124	0.47	0.47	0.51	0.51	0.47

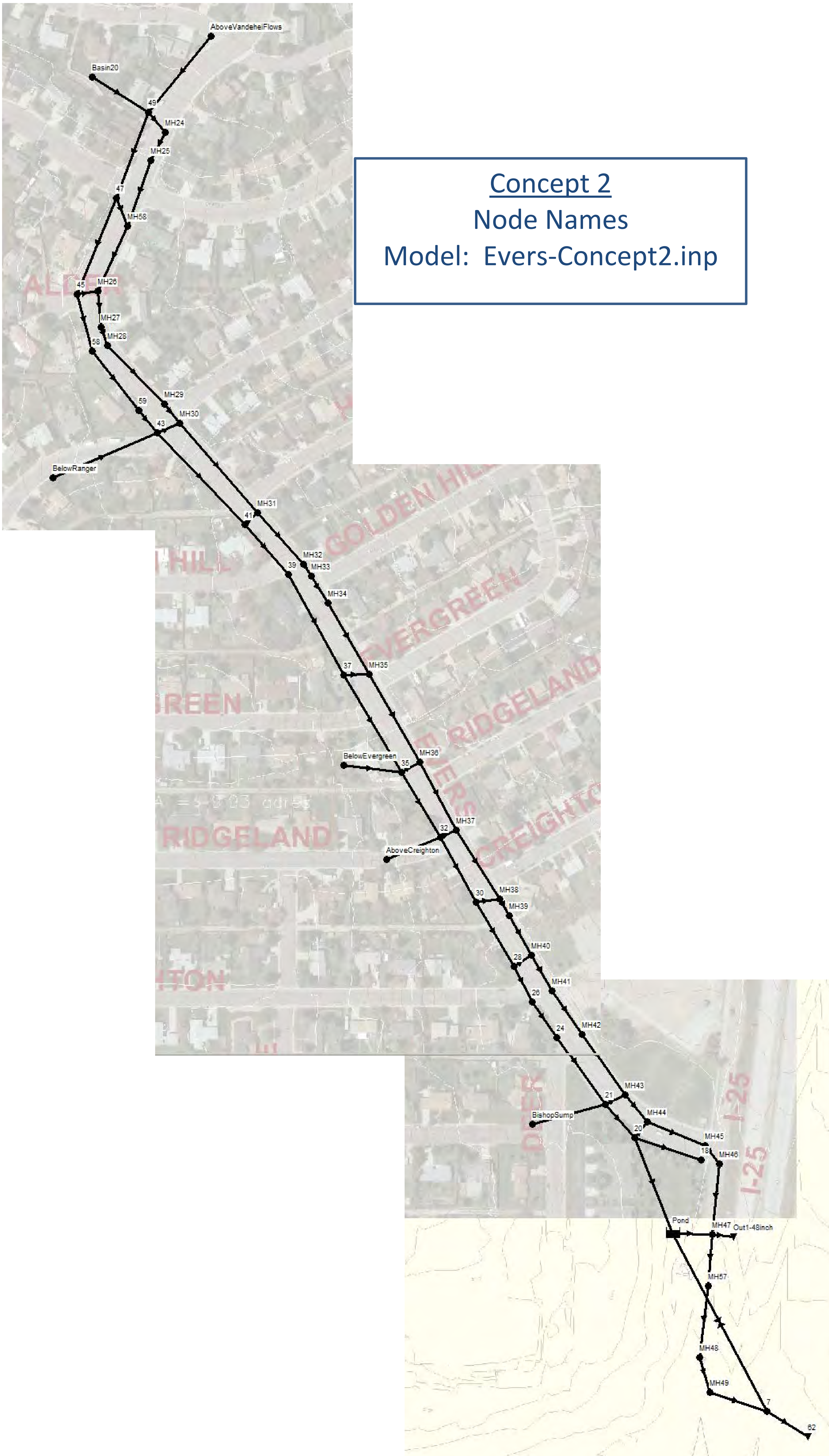
APPENIDX A

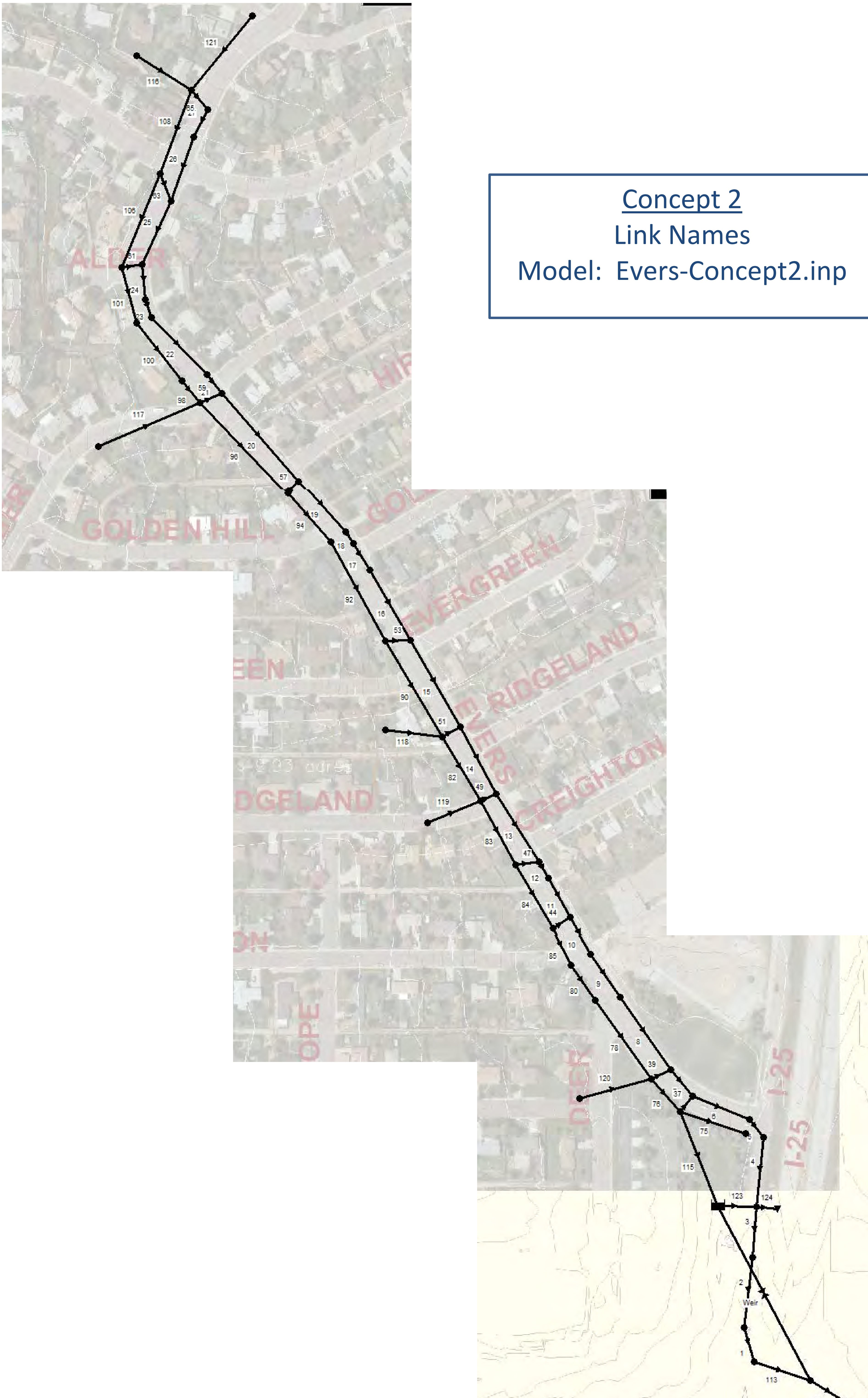
HYDRAULICS
CONCEPT 2

Concept 2

Node Names

Model: Evers-Concept2.inp





Concept 2
Link Names
Model: Evers-Concept2.inp

Node Depth Summary

Concept 2

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Feet
MH49	JUNCTION	2.90	8.28	6146.44	0	00:42	8.23
MH48	JUNCTION	2.86	9.07	6147.66	0	00:41	9.03
MH57	JUNCTION	2.87	10.24	6149.97	0	00:41	10.15
MH47	JUNCTION	2.87	10.92	6151.78	0	00:41	10.82
MH46	JUNCTION	1.89	8.05	6153.55	0	00:41	7.74
MH45	JUNCTION	2.13	8.28	6154.18	0	00:41	7.95
MH44	JUNCTION	2.67	9.46	6155.65	0	00:41	9.05
MH43	JUNCTION	2.70	9.86	6156.48	0	00:41	9.39
MH42	JUNCTION	2.31	9.41	6157.74	0	00:41	8.84
MH41	JUNCTION	2.49	9.61	6158.31	0	00:41	8.99
MH40	JUNCTION	2.41	9.60	6158.85	0	00:41	8.95
MH39	JUNCTION	2.17	9.24	6159.82	0	00:41	8.54
MH38	JUNCTION	2.22	9.28	6160.16	0	00:41	8.57
MH37	JUNCTION	1.81	7.79	6161.52	0	00:41	7.06
MH36	JUNCTION	1.45	5.79	6162.65	0	00:41	5.04
MH35	JUNCTION	1.90	6.37	6167.23	0	00:41	5.58
MH34	JUNCTION	2.02	7.09	6170.87	0	00:41	6.28
MH32	JUNCTION	2.00	7.36	6172.98	0	00:41	6.51
MH33	JUNCTION	2.03	7.30	6172.21	0	00:41	6.48
MH31	JUNCTION	2.37	8.61	6175.93	0	00:41	7.76

Concept 2

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Feet
MH30	JUNCTION	2.23	8.78	6180.57	0	00:41	7.90
MH29	JUNCTION	1.85	8.14	6181.17	0	00:41	7.28
MH28	JUNCTION	1.74	7.10	6183.73	0	00:41	6.56
MH27	JUNCTION	1.90	7.34	6184.47	0	00:41	6.84
MH26	JUNCTION	2.05	7.74	6185.52	0	00:41	7.19
MH58	JUNCTION	2.20	8.44	6187.52	0	00:41	7.72
MH25	JUNCTION	1.97	8.07	6189.20	0	00:41	7.20
MH24	JUNCTION	1.73	7.29	6190.32	0	00:41	6.33
18	JUNCTION	0.00	0.00	6146.91	0	00:00	0.00
20	JUNCTION	1.55	8.16	6156.44	0	00:41	8.16
21	JUNCTION	1.98	8.11	6156.91	0	00:40	8.11
24	JUNCTION	5.63	8.18	6158.17	0	00:40	8.18
26	JUNCTION	5.64	8.25	6158.66	0	00:39	8.25
28	JUNCTION	1.52	8.36	6159.24	0	00:39	8.36
30	JUNCTION	1.62	8.67	6161.84	0	00:39	8.67
32	JUNCTION	2.07	8.38	6165.92	0	00:39	8.38
35	JUNCTION	2.29	8.44	6168.74	0	00:39	8.44
37	JUNCTION	1.60	8.64	6171.80	0	00:39	8.64
39	JUNCTION	5.21	7.34	6175.69	0	00:38	7.34
41	JUNCTION	1.89	7.84	6176.41	0	00:37	7.84
43	JUNCTION	2.10	7.33	6182.47	0	00:37	7.33
45	JUNCTION	1.14	8.20	6189.10	0	00:35	8.20

Concept 2

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Feet
47	JUNCTION	1.18	7.44	6190.44	0	00:35	7.44
49	JUNCTION	2.10	9.21	6195.01	0	00:33	9.21
58	JUNCTION	5.65	7.68	6187.95	0	00:36	7.68
59	JUNCTION	4.85	6.75	6183.23	0	00:35	6.75
7	JUNCTION	2.07	4.80	6142.69	0	00:41	4.80
Basin20	JUNCTION	0.20	0.40	6200.40	0	00:30	0.40
BelowRanger	JUNCTION	0.17	0.33	6190.33	0	00:30	0.33
BelowEvergreen	JUNCTION	0.18	0.39	6170.39	0	00:30	0.39
AboveCreighton	JUNCTION	0.13	0.28	6170.28	0	00:30	0.28
BishopSump	JUNCTION	0.14	0.31	6160.31	0	00:30	0.31
AboveVandeheiFlows	JUNCTION	0.18	0.34	6211.34	0	00:30	0.34
Out1-48inch	OUTFALL	0.44	3.17	6149.05	0	00:41	3.15
62	OUTFALL	2.06	4.79	6141.67	0	00:42	4.79
Pond	STORAGE	0.78	6.30	6152.36	0	00:41	6.27

Node Inflow Summary

Concept 2

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
MH49	JUNCTION	0.00	455.71	0	00:41	0	22	0.014
MH48	JUNCTION	0.00	455.69	0	00:41	0	22	0.006
MH57	JUNCTION	0.00	455.69	0	00:41	0	22	0.005
MH47	JUNCTION	0.00	565.19	0	00:41	0	24	0.001
MH46	JUNCTION	0.00	407.30	0	01:03	0	21.5	0.001
MH45	JUNCTION	0.00	407.23	0	01:03	0	21.5	0.001
MH44	JUNCTION	0.00	407.20	0	01:03	0	21.5	0.006
MH43	JUNCTION	0.00	382.18	0	01:03	0	20.7	0.004
MH42	JUNCTION	0.00	357.17	0	01:03	0	19.2	0.003
MH41	JUNCTION	0.00	357.14	0	01:03	0	19.2	0.004
MH40	JUNCTION	0.00	357.11	0	01:03	0	19.2	0.001
MH39	JUNCTION	0.00	337.09	0	01:03	0	18.7	-0.000
MH38	JUNCTION	0.00	337.02	0	01:03	0	18.7	0.000
MH37	JUNCTION	0.00	316.99	0	01:03	0	18	0.000
MH36	JUNCTION	0.00	294.83	0	01:02	0	16.5	0.002
MH35	JUNCTION	0.00	262.57	0	00:41	0	14.7	0.003
MH34	JUNCTION	0.00	252.52	0	00:41	0	14.4	0.001
MH32	JUNCTION	0.00	252.30	0	00:41	0	14.4	0.001
MH33	JUNCTION	0.00	252.40	0	00:41	0	14.4	0.000
MH31	JUNCTION	0.00	252.22	0	00:41	0	14.4	0.004

Concept 2

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
MH30	JUNCTION	0.00	242.06	0	00:41	0	14	0.002
MH29	JUNCTION	0.00	206.92	0	00:41	0	11.2	0.002
MH28	JUNCTION	0.00	206.77	0	00:41	0	11.2	-0.000
MH27	JUNCTION	0.00	206.85	0	00:24	0	11.2	-0.001
MH26	JUNCTION	0.00	206.58	0	00:40	0	11.2	0.003
MH58	JUNCTION	0.00	200.30	0	01:19	0	11	0.003
MH25	JUNCTION	0.00	192.18	0	01:19	0	10.7	0.001
MH24	JUNCTION	0.00	190.00	0	00:18	0	10.7	-0.001
18	JUNCTION	0.00	0.00	0	00:00	0	0	0.000
20	JUNCTION	0.00	230.00	0	00:40	0	3.49	-0.101
21	JUNCTION	0.00	254.84	0	00:40	0	4.93	-0.004
24	JUNCTION	0.00	192.45	0	00:40	0	2.67	-0.042
26	JUNCTION	0.00	192.32	0	00:40	0	2.67	0.072
28	JUNCTION	0.00	212.22	0	00:39	0	3.26	0.025
30	JUNCTION	0.00	232.27	0	00:39	0	3.97	0.001
32	JUNCTION	0.00	257.28	0	00:39	0	5.4	0.031
35	JUNCTION	0.00	231.59	0	00:39	0	5.3	-0.073
37	JUNCTION	0.00	156.90	0	00:38	0	2.38	0.046
39	JUNCTION	0.00	156.98	0	00:38	0	2.38	0.062
41	JUNCTION	0.00	167.34	0	00:37	0	2.77	-0.378
43	JUNCTION	0.00	204.92	0	00:36	0	5.61	-0.012
45	JUNCTION	0.00	107.49	0	00:35	0	1.37	0.089

Concept 2

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
47	JUNCTION	0.00	120.64	0	00:33	0	1.6	-0.032
49	JUNCTION	0.00	319.71	0	00:30	0	12.3	-0.030
58	JUNCTION	0.00	99.95	0	00:36	0	1.17	-0.175
59	JUNCTION	0.00	100.27	0	00:36	0	1.17	0.174
7	JUNCTION	0.00	499.33	0	00:41	0	22.2	0.031
Basin20	JUNCTION	139.99	139.99	0	00:30	5.25	5.25	0.011
BelowRanger	JUNCTION	109.99	109.99	0	00:30	4.44	4.44	0.011
BelowEvergreen	JUNCTION	93.99	93.99	0	00:30	3.27	3.27	0.010
AboveCreighton	JUNCTION	56.00	56.00	0	00:30	1.88	1.88	0.014
BishopSump	JUNCTION	69.99	69.99	0	00:30	2.26	2.26	0.011
AboveVandeheiFlows	JUNCTION	179.99	179.99	0	00:30	7.07	7.07	0.014
Out1-48inch	OUTFALL	0.00	110.24	0	00:41	0	1.99	0.000
62	OUTFALL	0.00	497.57	0	00:42	0	22.2	0.000
Pond	STORAGE	0.00	204.23	0	00:41	0	2.72	0.002

Node Surcharge Summary

Concept 2

Node	Type	Hours Surcharged	Max Height Above Crown Feet	Min Depth Below Rim Feet
MH49	JUNCTION	1.21	3.279	0.000
MH48	JUNCTION	1.24	4.073	1.827
MH57	JUNCTION	1.20	5.239	1.311
MH47	JUNCTION	0.52	1.745	2.175
MH46	JUNCTION	0.75	3.045	4.155
MH45	JUNCTION	0.78	3.277	3.923
MH44	JUNCTION	1.05	4.462	0.000
MH43	JUNCTION	1.08	4.859	0.000
MH42	JUNCTION	0.92	4.414	0.000
MH41	JUNCTION	0.94	4.610	0.000
MH40	JUNCTION	0.92	4.603	0.000
MH39	JUNCTION	0.92	4.739	0.761
MH38	JUNCTION	0.92	4.778	0.072
MH37	JUNCTION	0.69	3.292	1.168
MH36	JUNCTION	0.26	1.290	3.210
MH35	JUNCTION	0.37	1.871	2.929
MH34	JUNCTION	0.71	2.595	1.505
MH32	JUNCTION	0.72	2.856	0.744
MH33	JUNCTION	0.72	2.802	2.788
MH31	JUNCTION	1.05	4.112	0.000

Node	Type	**Concept 2** Hours Surcharged	Max Height Above Crown Feet	Min Depth Below Rim Feet
MH30	JUNCTION	0.96	4.283	0.000
MH29	JUNCTION	0.92	3.638	0.000
MH28	JUNCTION	0.63	2.599	1.801
MH27	JUNCTION	0.65	2.838	1.862
MH26	JUNCTION	0.68	3.240	1.110
MH58	JUNCTION	1.03	3.936	0.000
MH25	JUNCTION	0.68	3.567	3.523
MH24	JUNCTION	0.63	2.786	1.134

Storage Volume Summary

Concept 2

Storage Unit	Average Volume 1000 ft3	Average Percent Full	Evap Percent Loss	Exfil Percent Loss	Maximum Volume 1000 ft3	Maximum Percent Full	Day of Maximum Volume	Hour of Maximum Volume
Pond	0.274	35	0	0	0.771	100	0	00:30

Storage Volume Summary

Concept 2

Storage Unit	Maximum Outflow CFS
Pond	204.43

Outfall Loading Summary

Concept 2

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
Out1-48inch	19.59	63.38	110.24	1.993
62	98.09	140.60	497.57	22.169

Link Flow Summary

Concept 2

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
1	CONDUIT	455.71	0	00:41	11.60	1.21	1.00
2	CONDUIT	455.69	0	00:41	11.60	1.22	1.00
3	CONDUIT	455.69	0	00:41	11.60	1.23	1.00
4	CONDUIT	409.11	0	01:16	11.89	0.58	1.00
6	CONDUIT	407.23	0	01:03	10.59	1.84	1.00
5	CONDUIT	407.30	0	01:03	14.19	0.64	1.00
7	CONDUIT	382.20	0	01:03	9.73	1.20	1.00
8	CONDUIT	357.18	0	01:03	9.18	0.81	1.00
9	CONDUIT	357.17	0	01:03	10.20	1.13	1.00
10	CONDUIT	357.14	0	01:03	10.03	0.91	1.00
11	CONDUIT	337.11	0	01:03	11.57	0.81	1.00
12	CONDUIT	337.09	0	01:03	12.10	0.92	1.00
13	CONDUIT	317.02	0	01:03	12.56	0.68	1.00
14	CONDUIT	291.99	0	01:03	14.09	0.59	1.00
15	CONDUIT	269.83	0	01:02	21.63	1.08	1.00
16	CONDUIT	252.57	0	00:41	16.85	1.09	1.00
17	CONDUIT	252.52	0	00:41	16.45	1.01	1.00
18	CONDUIT	252.40	0	00:41	16.59	0.88	1.00
19	CONDUIT	252.30	0	00:41	15.92	1.23	1.00
20	CONDUIT	242.22	0	00:41	15.23	1.00	1.00

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
21	CONDUIT	207.06	0	00:41	14.79	0.61	1.00
22	CONDUIT	206.92	0	00:41	16.52	0.82	1.00
23	CONDUIT	206.77	0	00:41	15.89	0.94	1.00
24	CONDUIT	206.85	0	00:24	14.23	1.18	1.00
25	CONDUIT	200.40	0	01:19	12.73	1.16	1.00
26	CONDUIT	192.30	0	01:19	12.67	0.88	1.00
27	CONDUIT	192.18	0	01:19	14.58	0.73	1.00
37	CONDUIT	25.00	0	00:23	3.54	0.13	1.00
39	CONDUIT	25.00	0	00:10	11.08	0.13	1.00
44	CONDUIT	20.00	0	00:20	1.52	0.06	1.00
47	CONDUIT	20.00	0	00:17	2.19	0.05	1.00
49	CONDUIT	25.00	0	00:11	11.45	0.10	1.00
51	CONDUIT	25.00	0	00:08	14.71	0.10	1.00
53	CONDUIT	10.00	0	00:19	2.28	0.05	1.00
57	CONDUIT	10.00	0	00:15	1.65	0.07	1.00
59	CONDUIT	35.00	0	00:09	11.61	0.14	1.00
61	CONDUIT	8.00	0	00:25	1.60	0.03	1.00
63	CONDUIT	8.00	0	00:21	1.94	0.03	1.00
65	CONDUIT	190.00	0	00:18	13.83	0.43	1.00
75	CHANNEL	0.00	0	00:00	0.00	0.00	0.10
76	CHANNEL	230.00	0	00:40	5.63	0.01	0.21
78	CHANNEL	192.31	0	00:40	5.31	0.01	0.20

Concept 2

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
80	CHANNEL	192.45	0	00:40	5.98	0.01	0.20
82	CHANNEL	206.54	0	00:39	10.77	0.00	0.18
83	CHANNEL	232.27	0	00:39	13.08	0.00	0.18
84	CHANNEL	212.22	0	00:39	11.31	0.00	0.19
85	CHANNEL	192.32	0	00:40	6.38	0.01	0.20
90	CHANNEL	146.10	0	00:39	7.90	0.00	0.18
92	CHANNEL	156.90	0	00:38	12.32	0.00	0.17
94	CHANNEL	156.98	0	00:38	4.48	0.01	0.20
96	CHANNEL	167.34	0	00:37	9.44	0.00	0.19
98	CHANNEL	100.97	0	00:36	9.98	0.00	0.15
100	CHANNEL	100.27	0	00:36	13.14	0.00	0.14
101	CHANNEL	99.95	0	00:36	6.16	0.00	0.18
106	CHANNEL	107.49	0	00:35	7.70	0.00	0.18
108	CHANNEL	120.64	0	00:33	2.83	0.01	0.15
113	CONDUIT	455.68	0	00:41	11.22	3.16	1.00
114	CONDUIT	497.57	0	00:42	10.61	0.08	0.32
115	CONDUIT	204.23	0	00:41	3.31	0.01	0.05
116	CHANNEL	139.88	0	00:30	14.09	0.00	0.18
117	CHANNEL	109.90	0	00:30	13.68	0.00	0.26
118	CHANNEL	93.91	0	00:30	8.61	0.00	0.25
119	CHANNEL	55.92	0	00:30	10.19	0.00	0.27
120	CHANNEL	69.93	0	00:30	10.28	0.00	0.30

Concept 2

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
121	CHANNEL	179.84	0	00:30	22.97	0.00	0.17
123	CONDUIT	166.73	0	00:40	13.27	5.30	1.00
124	CONDUIT	110.24	0	00:41	9.28	3.04	0.90
Weir	WEIR	43.65	0	00:41	0.06		

Flow Classification Summary

Concept 2

Conduit	Adjusted/ Actual Length	Fully Dry	Upstrm Dry	Dnstrm Dry	Sub Critical	Super Critical	Upstrm Critical	Dnstrm Critical
1	1.00	0.01	0.00	0.00	0.99	0.01	0.00	0.00
2	1.00	0.00	0.00	0.00	0.66	0.33	0.00	0.00
3	1.00	0.00	0.00	0.00	0.28	0.71	0.00	0.00
4	1.00	0.00	0.00	0.00	0.20	0.79	0.00	0.00
6	1.00	0.00	0.00	0.00	0.20	0.80	0.00	0.00
5	1.06	0.00	0.00	0.00	0.16	0.84	0.00	0.00
7	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00
8	1.00	0.00	0.01	0.00	0.30	0.69	0.00	0.00
9	1.00	0.00	0.00	0.00	0.20	0.80	0.00	0.00
10	1.00	0.00	0.00	0.00	0.24	0.76	0.00	0.00
11	1.00	0.00	0.00	0.00	0.19	0.81	0.00	0.00
12	1.00	0.00	0.00	0.00	0.17	0.83	0.00	0.00
13	1.00	0.00	0.00	0.00	0.16	0.84	0.00	0.00
14	1.00	0.00	0.00	0.00	0.12	0.88	0.00	0.00
15	1.00	0.00	0.00	0.00	0.06	0.93	0.00	0.00
16	1.00	0.00	0.00	0.00	0.07	0.93	0.00	0.00
17	1.00	0.00	0.00	0.00	0.15	0.85	0.00	0.00
18	1.00	0.00	0.00	0.00	0.15	0.85	0.00	0.00
19	1.00	0.00	0.00	0.00	0.16	0.84	0.00	0.00
20	1.00	0.00	0.00	0.00	0.17	0.82	0.00	0.00

Concept 2

Conduit	Adjusted/ Actual Length	Fully Dry	Upstrm Dry	Dnstrm Dry	Sub Critical	Super Critical	Upstrm Critical	Dnstrm Critical
21	1.00	0.00	0.00	0.00	0.17	0.83	0.00	0.00
22	1.00	0.00	0.00	0.00	0.15	0.85	0.00	0.00
23	1.00	0.00	0.00	0.00	0.12	0.88	0.00	0.00
24	1.00	0.00	0.00	0.00	0.15	0.85	0.00	0.00
25	1.00	0.00	0.00	0.00	0.18	0.82	0.00	0.00
26	1.00	0.00	0.00	0.00	0.18	0.82	0.00	0.00
27	1.00	0.00	0.00	0.00	0.12	0.88	0.00	0.00
37	1.49	0.00	0.66	0.00	0.34	0.00	0.00	0.00
39	1.51	0.00	0.00	0.00	0.98	0.02	0.00	0.00
44	1.36	0.00	0.63	0.00	0.37	0.00	0.00	0.00
47	1.54	0.00	0.72	0.00	0.28	0.00	0.00	0.00
49	1.87	0.00	0.00	0.00	0.97	0.03	0.00	0.00
51	1.80	0.00	0.00	0.00	0.30	0.70	0.00	0.00
53	1.54	0.01	0.02	0.00	0.97	0.00	0.00	0.00
57	1.24	0.00	0.30	0.00	0.69	0.00	0.00	0.00
59	1.78	0.00	0.00	0.00	0.29	0.71	0.00	0.00
61	1.73	0.00	0.77	0.00	0.23	0.00	0.00	0.00
63	1.90	0.00	0.79	0.00	0.21	0.00	0.00	0.00
65	1.65	0.00	0.00	0.00	0.17	0.83	0.00	0.00
75	1.00	0.83	0.17	0.00	0.00	0.00	0.00	0.00
76	1.00	0.76	0.00	0.00	0.07	0.10	0.00	0.07
78	1.00	0.03	0.03	0.00	0.08	0.13	0.00	0.72

Concept 2

Conduit	Adjusted/ Actual Length	Fully Dry	Upstrm Dry	Dnstrm Dry	Sub Critical	Super Critical	Upstrm Critical	Dnstrm Critical
80	1.00	0.06	0.00	0.00	0.78	0.00	0.00	0.16
82	1.00	0.73	0.00	0.00	0.00	0.03	0.00	0.24
83	1.00	0.75	0.00	0.00	0.00	0.00	0.00	0.25
84	1.00	0.80	0.00	0.00	0.00	0.15	0.00	0.05
85	1.00	0.06	0.77	0.00	0.00	0.16	0.00	0.00
90	1.00	0.73	0.07	0.00	0.03	0.16	0.00	0.00
92	1.00	0.05	0.00	0.00	0.00	0.11	0.00	0.85
94	1.00	0.04	0.72	0.00	0.00	0.00	0.00	0.23
96	1.00	0.73	0.00	0.00	0.00	0.22	0.00	0.05
98	2.48	0.03	0.03	0.00	0.10	0.12	0.02	0.70
100	1.00	0.07	0.00	0.00	0.00	0.70	0.00	0.22
101	1.00	0.07	0.78	0.00	0.00	0.00	0.00	0.14
106	1.00	0.83	0.00	0.00	0.00	0.11	0.00	0.06
108	1.00	0.82	0.02	0.00	0.15	0.00	0.00	0.01
113	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00
114	1.00	0.01	0.00	0.00	0.74	0.25	0.00	0.00
115	1.00	0.84	0.00	0.00	0.00	0.00	0.00	0.16
116	5.34	0.00	0.00	0.00	0.06	0.11	0.00	0.83
117	6.66	0.00	0.00	0.00	0.22	0.05	0.00	0.73
118	3.98	0.00	0.00	0.00	0.20	0.05	0.00	0.75
119	5.41	0.00	0.00	0.00	0.23	0.01	0.00	0.75
120	5.12	0.00	0.00	0.00	0.22	0.02	0.00	0.76

Conduit	Adjusted/ Actual Length	Fully Dry	Upstrm Dry	Dnstrm Dry	Sub Critical	Super Critical	Upstrm Critical	Dnstrm Critical
121	9.78	0.00	0.00	0.00	0.00	0.17	0.00	0.83
123	1.00	0.06	0.00	0.00	0.20	0.00	0.00	0.75
124	1.00	0.80	0.00	0.00	0.20	0.00	0.00	0.00

Flow Classification Summary

Concept 2

Conduit	Normal Flow Limited	Inlet Control
1	0.04	0.00
2	0.00	0.00
3	0.09	0.00
4	0.73	0.00
6	0.00	0.00
5	0.00	0.00
7	0.04	0.00
8	0.29	0.00
9	0.66	0.00
10	0.03	0.00
11	0.18	0.00
12	0.00	0.00
13	0.68	0.00
14	0.47	0.00
15	0.08	0.00
16	0.09	0.00
17	0.04	0.00
18	0.02	0.00
19	0.01	0.00
20	0.69	0.00

Concept 2

Conduit	Normal Flow Limited	Inlet Control
21	0.17	0.00
22	0.00	0.00
23	0.00	0.00
24	0.13	0.00
25	0.03	0.00
26	0.32	0.00
27	0.22	0.00
37	0.67	0.00
39	0.70	0.00
44	0.63	0.00
47	0.71	0.00
49	0.71	0.00
51	0.62	0.00
53	0.70	0.00
57	0.31	0.00
59	0.29	0.00
61	0.75	0.00
63	0.76	0.00
65	0.13	0.00
75	0.00	0.00
76	0.00	0.00
78	0.18	0.00

Concept 2

Conduit	Normal Flow Limited	Inlet Control
80	0.78	0.00
82	0.01	0.00
83	0.00	0.00
84	0.14	0.00
85	0.79	0.00
90	0.94	0.00
92	0.09	0.00
94	0.00	0.00
96	0.21	0.00
98	0.13	0.00
100	0.70	0.00
101	0.79	0.00
106	0.09	0.00
108	0.94	0.00
113	0.00	0.00
114	0.89	0.00
115	0.00	0.00
116	0.17	0.00
117	0.27	0.00
118	0.25	0.00
119	0.24	0.00
120	0.24	0.00

Concept 2

Conduit	Normal Flow Limited	Inlet Control
121	0.16	0.00
123	0.00	0.05
124	0.00	0.17

Conduit Surcharge Summary

Concept 2

Conduit	Hours Both Ends Full	Hours Upstream Full	Hours Dnstream Full	Hours Above Normal Flow	Hours Capacity Limited
1	1.21	1.24	1.21	1.60	1.21
2	1.20	1.20	1.24	1.61	1.16
3	1.17	1.17	1.20	1.61	1.03
4	0.75	0.75	1.17	1.10	0.01
6	0.78	1.05	0.78	1.86	0.78
5	0.75	0.78	0.75	1.17	0.75
7	1.05	1.08	1.05	1.70	1.05
8	0.92	0.92	1.08	1.41	0.01
9	0.92	0.94	0.92	1.65	0.92
10	0.92	0.92	0.94	1.49	0.01
11	0.92	0.92	1.00	1.47	0.01
12	0.92	0.92	0.92	1.55	0.90
13	0.69	0.69	0.92	1.31	0.01
14	0.26	0.26	0.69	1.12	0.01
15	0.25	0.37	0.26	0.97	0.25
16	0.37	0.71	0.37	1.04	0.37
17	0.71	0.72	0.71	0.76	0.71
18	0.72	0.72	0.72	0.01	0.71
19	0.72	1.05	0.72	1.17	0.72
20	0.96	0.96	1.05	0.01	0.88

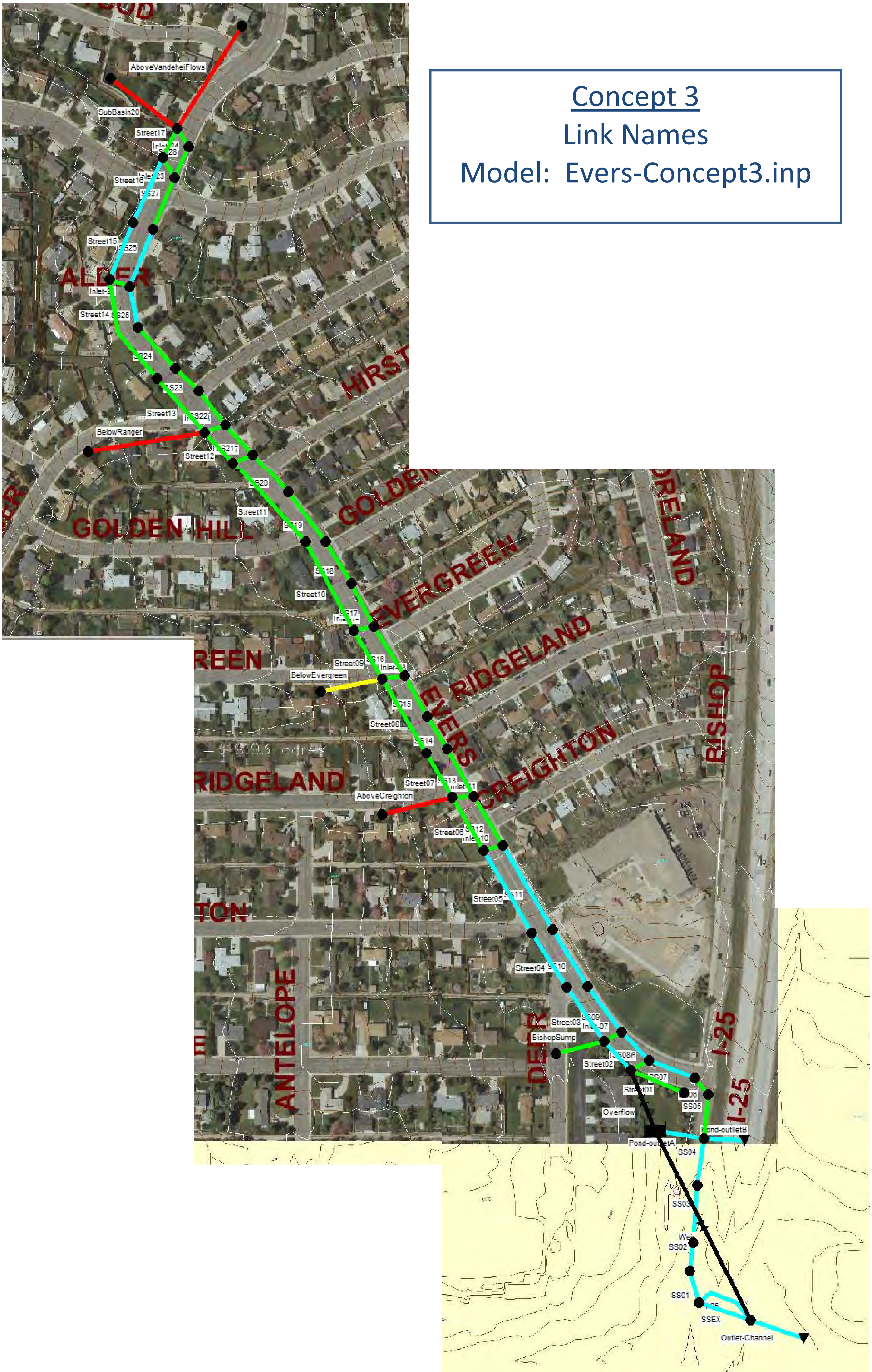
Concept 2

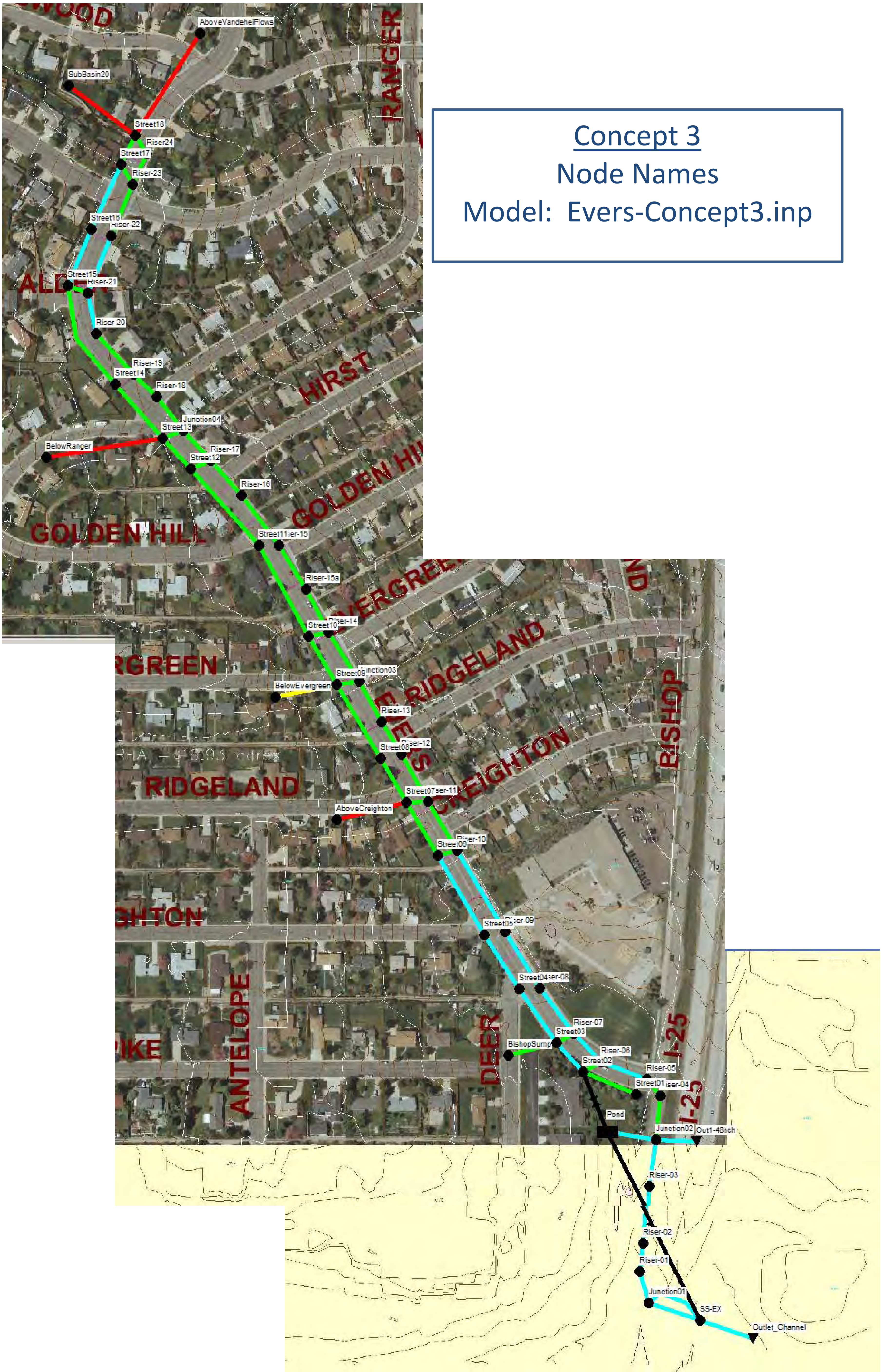
Conduit	Hours Both Ends Full	Hours Upstream Full	Hours Dnstream Full	Hours Above Normal Flow	Hours Capacity Limited
21	0.92	0.92	0.96	0.01	0.01
22	0.63	0.63	0.92	0.01	0.01
23	0.63	0.65	0.63	0.01	0.63
24	0.65	0.68	0.65	1.08	0.65
25	0.68	1.03	0.68	1.09	0.68
26	0.68	0.68	1.03	0.01	0.01
27	0.63	0.63	0.68	0.01	0.01
37	1.05	1.05	1.57	0.01	0.57
39	1.44	1.44	1.59	0.01	0.92
44	1.05	1.05	1.38	0.01	0.61
47	1.20	1.20	1.24	0.01	1.19
49	0.94	1.49	0.94	0.01	0.94
51	0.58	1.63	0.58	0.01	0.58
53	1.18	1.18	1.28	0.01	1.18
57	1.40	1.40	1.47	0.01	1.39
59	1.23	1.64	1.23	0.01	0.82
61	0.86	0.86	1.29	0.01	0.85
63	1.04	1.04	5.72	0.01	0.79
65	1.02	1.02	1.06	0.01	1.02
113	1.11	1.44	1.11	2.73	1.11
123	0.52	0.64	0.52	0.79	0.52
124	0.01	0.52	0.01	0.84	0.01

APPENIDX A

HYDRAULICS
CONCEPT 3

Concept 3
Link Names
Model: Evers-Concept3.inp





Concept 3

Node Names

Model: Evers-Concept3.inp

Concept 3

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Feet
AboveCreighton	JUNCTION	0.12	0.26	6170.26	0	00:30	0.26
AboveVandeheiFlows	JUNCTION	0.19	0.37	6210.37	0	00:30	0.37
BelowEvergreen	JUNCTION	0.20	0.44	6170.44	0	00:30	0.43
BelowRanger	JUNCTION	0.20	0.38	6185.38	0	00:30	0.38
BishopSump	JUNCTION	0.19	0.44	6156.44	0	00:30	0.44
Junction01	JUNCTION	2.80	7.70	6145.86	0	00:50	7.70
Junction02	JUNCTION	2.80	10.45	6151.31	0	00:51	10.45
Junction03	JUNCTION	1.57	4.95	6163.13	0	00:51	4.95
Junction04	JUNCTION	2.23	7.85	6178.19	0	00:28	7.21
Riser-01	JUNCTION	2.76	8.45	6147.04	0	00:50	8.45
Riser-02	JUNCTION	2.96	9.37	6148.21	0	00:50	9.37
Riser-03	JUNCTION	2.83	9.93	6149.66	0	00:50	9.93
Riser-04	JUNCTION	2.43	9.47	6153.27	0	00:51	9.47
Riser-05	JUNCTION	2.60	9.73	6153.93	0	00:51	9.73
Riser-06	JUNCTION	2.87	10.34	6155.34	0	00:50	10.34
Riser-07	JUNCTION	2.82	10.54	6156.34	0	00:50	10.54

Concept 3

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Feet
Riser-08	JUNCTION	2.72	10.57	6157.57	0	00:50	10.57
Riser-09	JUNCTION	2.87	11.00	6158.70	0	00:51	11.00
Riser-10	JUNCTION	2.58	10.54	6160.42	0	00:51	10.54
Riser-11	JUNCTION	2.12	8.98	6161.22	0	00:51	8.98
Riser-12	JUNCTION	1.90	7.45	6162.01	0	00:51	7.45
Riser-13	JUNCTION	1.55	5.71	6162.57	0	00:51	5.71
Riser-14	JUNCTION	2.52	7.38	6168.24	0	00:28	7.29
Riser-15	JUNCTION	2.17	7.50	6173.12	0	00:28	6.88
Riser-15a	JUNCTION	2.24	7.45	6170.68	0	00:28	7.09
Riser-16	JUNCTION	2.27	7.90	6175.22	0	00:28	7.18
Riser-17	JUNCTION	2.23	7.88	6177.02	0	00:28	7.23
Riser-18	JUNCTION	2.11	8.22	6180.01	0	00:28	7.35
Riser-19	JUNCTION	1.93	8.29	6181.29	0	00:28	7.00
Riser-20	JUNCTION	1.88	10.27	6186.90	0	00:28	6.53
Riser-21	JUNCTION	2.18	8.16	6185.94	0	00:28	7.43
Riser-22	JUNCTION	2.55	8.62	6187.20	0	00:28	8.47
Riser-23	JUNCTION	2.09	7.63	6188.76	0	00:30	7.63

Concept 3

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Feet
Riser24	JUNCTION	2.06	7.31	6189.47	0	00:30	7.27
SS-EX	JUNCTION	2.07	4.65	6142.54	0	00:50	4.65
Street01	JUNCTION	0.00	0.00	6145.10	0	00:00	0.00
Street02	JUNCTION	1.93	9.10	6155.10	0	00:50	9.10
Street03	JUNCTION	2.03	9.59	6156.39	0	00:50	9.59
Street04	JUNCTION	0.12	0.96	6157.16	0	00:48	0.96
Street05	JUNCTION	0.11	0.96	6158.36	0	00:47	0.96
Street06	JUNCTION	1.75	9.92	6160.80	0	00:46	9.92
Street07	JUNCTION	1.92	9.64	6162.88	0	00:45	9.64
Street08	JUNCTION	0.13	0.94	6165.04	0	00:44	0.94
Street09	JUNCTION	2.36	9.59	6168.77	0	00:44	9.59
Street10	JUNCTION	1.95	9.21	6171.07	0	00:44	9.21
Street11	JUNCTION	0.12	0.92	6174.62	0	00:43	0.92
Street12	JUNCTION	1.51	7.52	6177.66	0	00:38	7.52
Street13	JUNCTION	2.16	7.57	6178.91	0	00:36	7.56
Street14	JUNCTION	0.07	0.61	6181.71	0	00:37	0.61
Street15	JUNCTION	1.66	10.38	6189.16	0	00:34	10.38

Concept 3

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Feet
Street16	JUNCTION	1.34	2.26	6189.46	0	00:35	2.26
Street17	JUNCTION	1.36	7.39	6189.52	0	00:34	7.39
Street18	JUNCTION	2.14	8.26	6191.42	0	00:30	8.26
SubBasin20	JUNCTION	0.18	0.37	6200.37	0	00:30	0.37
Out1-48inch	OUTFALL	0.42	3.05	6148.92	0	00:51	3.05
Outlet_Channel	OUTFALL	2.06	4.65	6141.53	0	00:51	4.65
Pond	STORAGE	0.71	5.88	6151.95	0	00:51	5.88

Concept 3

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
AboveCreighton	JUNCTION	56.00	56.00	0	00:30	1.88	1.88	0.020
AboveVandeheiFlows	JUNCTION	179.99	179.99	0	00:30	7.07	7.07	0.009
BelowEvergreen	JUNCTION	94.00	94.00	0	00:30	3.27	3.27	0.019
BelowRanger	JUNCTION	110.00	110.00	0	00:30	4.44	4.44	0.007
BishopSump	JUNCTION	70.00	70.00	0	00:30	2.26	2.26	0.032
Junction01	JUNCTION	0.00	461.27	0	00:51	0	22.2	0.017
Junction02	JUNCTION	0.00	562.62	0	00:51	0	24.1	0.008
Junction03	JUNCTION	0.00	354.55	0	00:32	0	18.3	0.002
Junction04	JUNCTION	0.00	284.54	0	00:32	0	15.2	-0.000
Riser-01	JUNCTION	0.00	461.27	0	00:51	0	22.2	0.002
Riser-02	JUNCTION	0.00	461.26	0	00:51	0	22.2	0.006
Riser-03	JUNCTION	0.00	461.26	0	00:51	0	22.2	0.004
Riser-04	JUNCTION	0.00	462.23	0	00:30	0	22	0.002
Riser-05	JUNCTION	0.00	462.29	0	00:31	0	22	0.001
Riser-06	JUNCTION	0.00	462.33	0	00:31	0	22.4	0.003
Riser-07	JUNCTION	0.00	443.57	0	00:27	0	22.2	0.001

Concept 3

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
Riser-08	JUNCTION	0.00	418.39	0	00:39	0	20.7	0.004
Riser-09	JUNCTION	0.00	418.39	0	00:39	0	20.7	0.004
Riser-10	JUNCTION	0.00	418.39	0	00:38	0	20.7	0.000
Riser-11	JUNCTION	0.00	402.13	0	01:10	0	20.3	0.002
Riser-12	JUNCTION	0.00	357.20	0	01:10	0	18.3	0.000
Riser-13	JUNCTION	0.00	353.45	0	00:37	0	18.3	0.003
Riser-14	JUNCTION	0.00	309.55	0	00:32	0	15.8	0.002
Riser-15	JUNCTION	0.00	299.54	0	00:32	0	15.6	0.002
Riser-15a	JUNCTION	0.00	299.54	0	00:32	0	15.6	0.002
Riser-16	JUNCTION	0.00	299.54	0	00:32	0	15.6	0.002
Riser-17	JUNCTION	0.00	299.54	0	00:32	0	15.6	0.001
Riser-18	JUNCTION	0.00	229.54	0	00:32	0	11.6	0.002
Riser-19	JUNCTION	0.00	229.54	0	00:32	0	11.6	0.001
Riser-20	JUNCTION	0.00	241.90	0	00:28	0	11.6	0.001
Riser-21	JUNCTION	0.00	241.84	0	00:28	0	11.6	-0.000
Riser-22	JUNCTION	0.00	235.42	0	00:28	0	11.2	0.003
Riser-23	JUNCTION	0.00	235.60	0	00:28	0	11.2	-0.000

Concept 3

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
Riser24	JUNCTION	0.00	229.53	0	00:22	0	10.8	-0.000
SS-EX	JUNCTION	0.00	467.96	0	00:51	0	22.2	0.030
Street01	JUNCTION	0.00	0.00	0	00:00	0	0	0.000
Street02	JUNCTION	0.00	168.69	0	00:50	0	2.18	-0.000
Street03	JUNCTION	0.00	156.00	0	00:48	0	3.4	0.010
Street04	JUNCTION	0.00	101.86	0	00:48	0	1.14	0.153
Street05	JUNCTION	0.00	100.79	0	00:46	0	1.15	0.126
Street06	JUNCTION	0.00	123.56	0	00:45	0	1.56	-0.806
Street07	JUNCTION	0.00	169.24	0	00:44	0	3.51	0.199
Street08	JUNCTION	0.00	119.28	0	00:44	0	1.63	0.089
Street09	JUNCTION	0.00	164.93	0	00:43	0	4.16	-0.071
Street10	JUNCTION	0.00	93.73	0	00:43	0	1.11	0.037
Street11	JUNCTION	0.00	109.73	0	00:39	0	1.11	0.429
Street12	JUNCTION	0.00	126.69	0	00:36	0	1.52	-0.517
Street13	JUNCTION	0.00	178.62	0	00:36	0	5.1	0.080
Street14	JUNCTION	0.00	77.23	0	00:35	0	0.666	0.789
Street15	JUNCTION	0.00	101.56	0	00:35	0	1.15	-0.769

Concept 3

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
Street16	JUNCTION	0.00	112.24	0	00:31	0	1.24	5.701
Street17	JUNCTION	0.00	129.49	0	00:30	0	1.6	-0.376
Street18	JUNCTION	0.00	319.80	0	00:30	0	12.3	0.021
SubBasin20	JUNCTION	139.99	139.99	0	00:30	5.25	5.25	0.015
Out1-48inch	OUTFALL	0.00	101.42	0	00:51	0	1.88	0.000
Outlet_Channel	OUTFALL	0.00	468.50	0	00:51	0	22.2	0.000
Pond	STORAGE	0.00	168.69	0	00:50	0	2.06	0.004

Concept 3

Node Surcharge Summary

Node	Type	Hours Surcharged	Max Height Above Crown Feet	Min Depth Below Rim Feet
Junction02	JUNCTION	0.54	1.271	2.689
Junction04	JUNCTION	0.86	2.847	0.000
Riser-01	JUNCTION	1.21	3.451	2.959
Riser-02	JUNCTION	1.24	4.369	1.791
Riser-03	JUNCTION	1.21	4.928	1.342
Riser-04	JUNCTION	1.01	4.467	5.233
Riser-05	JUNCTION	1.02	4.726	4.474
Riser-06	JUNCTION	1.05	5.340	0.000
Riser-07	JUNCTION	1.04	5.545	0.000
Riser-08	JUNCTION	1.00	5.566	0.000
Riser-09	JUNCTION	1.00	5.998	0.000
Riser-10	JUNCTION	0.95	5.544	0.000
Riser-11	JUNCTION	0.88	3.977	0.783
Riser-12	JUNCTION	0.80	2.449	2.091
Riser-13	JUNCTION	0.64	0.712	3.428
Riser-14	JUNCTION	1.03	2.382	2.158

Concept 3

Node	Type	Hours Surcharged	Max Height Above Crown Feet	Min Depth Below Rim Feet
Riser-15	JUNCTION	0.90	2.498	0.582
Riser-15a	JUNCTION	0.94	2.451	1.519
Riser-16	JUNCTION	0.90	2.903	0.000
Riser-17	JUNCTION	0.88	2.880	0.000
Riser-18	JUNCTION	0.87	3.722	0.000
Riser-19	JUNCTION	0.85	3.786	0.000
Riser-20	JUNCTION	0.80	5.766	0.000
Riser-21	JUNCTION	0.82	3.658	0.562
Riser-22	JUNCTION	0.97	4.117	0.003
Riser-23	JUNCTION	0.87	3.132	0.000
Riser24	JUNCTION	0.86	2.807	1.233

Concept 3

Storage Volume Summary

Storage Unit	Average Volume 1000 ft3	Average Percent Full	Evap Percent Loss	Exfil Percent Loss	Maximum Volume 1000 ft3	Maximum Percent Full	Day of Maximum Volume	Hour of Maximum Volume
Pond	0.266	3	0	0	3.912	47	0	00:51

Concept 3

Storage Volume Summary

Storage Unit	Maximum Outflow CFS
Pond	168.67

Concept 3

Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
Out1-48inch	19.68	59.21	101.42	1.879
Outlet_Channel	98.10	140.77	468.50	22.206

Concept 3

Link Flow Summary

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
AboveCreighton	CHANNEL	55.91	0	00:30	13.05	0.00	0.19
AboveVandeheiFlows	CHANNEL	180.00	0	00:30	25.98	0.00	0.07
BelowEvergreen	CHANNEL	94.04	0	00:30	8.94	0.00	0.10
BelowRanger	CHANNEL	110.01	0	00:30	13.68	0.00	0.08
BishopSump	CHANNEL	69.95	0	00:30	6.50	0.00	0.18
I-25	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
Inlet-06	CONDUIT	30.00	0	00:50	4.24	0.28	1.00
Inlet-07	CONDUIT	59.08	0	00:25	8.92	0.56	1.00
Inlet-10	CONDUIT	20.00	0	00:26	2.83	0.21	1.00
Inlet-11	CONDUIT	45.00	0	00:20	7.58	0.48	1.00
Inlet-13	CONDUIT	55.00	0	00:15	8.72	0.41	1.00
Inlet-14	CONDUIT	10.00	0	00:26	1.42	0.07	1.00
Inlet-17	CONDUIT	15.00	0	00:20	2.12	0.11	1.00
Inlet-21	CONDUIT	25.00	0	00:28	12.52	0.55	1.00
Inlet-23	CONDUIT	15.00	0	00:22	4.77	0.47	1.00
Inlet-24	CONDUIT	229.53	0	00:22	16.24	0.86	1.00

Concept 3

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
Inlet-J3	CONDUIT	45.00	0	00:14	9.09	0.48	1.00
Outlet-Channel	CONDUIT	468.50	0	00:51	10.45	0.08	0.31
Pond-outlletA	CONDUIT	162.09	0	00:51	12.90	5.15	1.00
Pond-outlletB	CONDUIT	101.42	0	00:51	8.65	2.80	0.88
SS01	CONDUIT	461.27	0	00:51	11.75	1.16	1.00
SS02	CONDUIT	461.27	0	00:51	11.75	1.51	1.00
SS03	CONDUIT	461.26	0	00:51	11.75	1.23	1.00
SS04	CONDUIT	461.26	0	00:51	11.75	1.17	1.00
SS05	CONDUIT	462.17	0	00:30	11.77	0.86	1.00
SS06	CONDUIT	462.23	0	00:30	11.77	0.83	1.00
SS07	CONDUIT	462.29	0	00:31	11.77	1.27	1.00
SS08	CONDUIT	443.47	0	00:27	11.29	1.02	1.00
SS09	CONDUIT	418.38	0	00:40	10.65	0.97	1.00
SS10	CONDUIT	418.39	0	00:39	10.65	1.22	1.00
SS11	CONDUIT	418.39	0	00:39	10.81	0.87	1.00
SS12	CONDUIT	402.04	0	01:10	13.64	0.56	1.00
SS13	CONDUIT	357.13	0	01:10	14.72	0.57	1.00

Concept 3

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
SS14	CONDUIT	357.20	0	01:10	16.37	0.47	1.00
SS15	CONDUIT	353.45	0	00:37	16.14	0.63	1.00
SS16	CONDUIT	309.55	0	00:32	17.78	0.87	1.00
SS17	CONDUIT	299.55	0	00:32	15.26	0.92	1.00
SS18	CONDUIT	299.54	0	00:32	15.69	0.92	1.00
SS19	CONDUIT	299.54	0	00:32	16.16	1.01	1.00
SS20	CONDUIT	299.54	0	00:32	16.07	0.96	1.00
SS21	CONDUIT	284.54	0	00:32	16.03	0.92	1.00
SS22	CONDUIT	229.54	0	00:32	14.43	0.99	1.00
SS23	CONDUIT	229.54	0	00:32	15.41	0.76	1.00
SS24	CONDUIT	229.54	0	00:32	16.64	0.90	1.00
SS25	CONDUIT	241.90	0	00:28	15.53	1.26	1.00
SS26	CONDUIT	235.45	0	00:28	14.80	1.64	1.00
SS27	CONDUIT	235.42	0	00:28	14.80	0.92	1.00
SS28	CONDUIT	229.49	0	00:22	14.95	0.93	1.00
SSEX	CONDUIT	461.38	0	00:51	11.36	3.19	1.00
Street01	CHANNEL	0.00	0	00:00	0.00	0.00	0.02

Concept 3

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
Street02	CHANNEL	138.69	0	00:50	2.36	0.02	0.10
Street03	CHANNEL	99.56	0	00:48	1.58	0.01	0.11
Street04	CHANNEL	101.86	0	00:48	3.35	0.01	0.09
Street05	CHANNEL	100.79	0	00:46	3.76	0.01	0.09
Street06	CHANNEL	123.56	0	00:45	3.58	0.01	0.08
Street07	CHANNEL	121.53	0	00:44	3.15	0.01	0.09
Street08	CHANNEL	119.28	0	00:44	4.23	0.01	0.08
Street09	CHANNEL	83.63	0	00:44	2.78	0.01	0.07
Street10	CHANNEL	93.73	0	00:43	2.90	0.01	0.08
Street11	CHANNEL	109.73	0	00:39	4.09	0.01	0.08
Street12	CHANNEL	126.69	0	00:36	3.39	0.01	0.09
Street13	CHANNEL	75.44	0	00:37	2.70	0.00	0.07
Street14	CHANNEL	77.23	0	00:35	5.76	0.00	0.06
Street15	CHANNEL	101.56	0	00:35	1.12	0.01	0.14
Street16	CHANNEL	112.24	0	00:31	4.06	0.01	0.15
Street17	CHANNEL	129.49	0	00:30	4.18	0.01	0.08
SubBasin20	CHANNEL	139.88	0	00:30	17.06	0.00	0.11

Concept 3

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
Weir	WEIR	6.64	0	00:51	0.02		
Overflow	WEIR	168.69	0	00:50	0.40		

Concept 3

Flow Classification Summary

Conduit	Adjusted/ Actual Length	Fully Dry	Upstrm Dry	Dnstrm Dry	Sub Critical	Super Critical	Upstrm Critical	Dnstrm Critical
AboveCreighton	6.28	0.00	0.00	0.00	0.15	0.01	0.00	0.84
AboveVandeheiFlows	10.08	0.00	0.00	0.00	0.00	0.00	0.00	1.00
BelowEvergreen	3.05	0.00	0.00	0.00	0.00	0.06	0.00	0.94
BelowRanger	4.80	0.00	0.00	0.00	0.00	0.00	0.00	1.00
BishopSump	2.39	0.00	0.00	0.00	0.12	0.02	0.00	0.87
I-25	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Inlet-06	1.00	0.00	0.20	0.00	0.80	0.00	0.00	0.00
Inlet-07	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00
Inlet-10	1.00	0.00	0.30	0.00	0.70	0.00	0.00	0.00
Inlet-11	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00
Inlet-13	1.15	0.00	0.00	0.00	0.35	0.65	0.00	0.00
Inlet-14	1.15	0.00	0.01	0.00	0.99	0.00	0.00	0.00
Inlet-17	1.15	0.00	0.24	0.00	0.76	0.00	0.00	0.00
Inlet-21	1.00	0.00	0.26	0.00	0.73	0.00	0.00	0.00
Inlet-23	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00
Inlet-24	1.15	0.00	0.00	0.00	0.22	0.78	0.00	0.00

Concept 3

Conduit	Adjusted/ Actual Length	Fully Dry	Upstrm Dry	Dnstrm Dry	Sub Critical	Super Critical	Upstrm Critical	Dnstrm Critical
Inlet-J3	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00
Outlet-Channel	1.00	0.01	0.00	0.00	0.74	0.25	0.00	0.00
Pond-outlletA	1.00	0.05	0.00	0.00	0.20	0.00	0.00	0.75
Pond-outlletB	1.00	0.80	0.00	0.00	0.20	0.00	0.00	0.00
SS01	1.00	0.01	0.00	0.00	0.98	0.01	0.00	0.00
SS02	1.00	0.01	0.00	0.00	0.89	0.10	0.00	0.00
SS03	1.00	0.00	0.00	0.00	0.71	0.28	0.00	0.00
SS04	1.00	0.00	0.00	0.00	0.27	0.72	0.00	0.00
SS05	1.00	0.00	0.00	0.00	0.21	0.79	0.00	0.00
SS06	1.00	0.00	0.00	0.00	0.19	0.80	0.00	0.00
SS07	1.00	0.00	0.00	0.00	0.21	0.79	0.00	0.00
SS08	1.00	0.00	0.00	0.00	0.23	0.77	0.00	0.00
SS09	1.00	0.00	0.00	0.00	0.23	0.76	0.00	0.00
SS10	1.00	0.00	0.00	0.00	0.21	0.79	0.00	0.00
SS11	1.00	0.00	0.00	0.00	0.18	0.81	0.00	0.00
SS12	1.00	0.00	0.00	0.00	0.16	0.84	0.00	0.00
SS13	1.00	0.00	0.00	0.00	0.16	0.84	0.00	0.00

Concept 3

Conduit	Adjusted/ Actual Length	Fully Dry	Upstrm Dry	Dnstrm Dry	Sub Critical	Super Critical	Upstrm Critical	Dnstrm Critical
SS14	1.00	0.00	0.00	0.00	0.14	0.86	0.00	0.00
SS15	1.00	0.00	0.00	0.00	0.12	0.88	0.00	0.00
SS16	1.00	0.00	0.00	0.00	0.09	0.90	0.00	0.00
SS17	1.00	0.00	0.00	0.00	0.18	0.82	0.00	0.00
SS18	1.00	0.00	0.00	0.00	0.16	0.84	0.00	0.00
SS19	1.00	0.00	0.00	0.00	0.15	0.84	0.00	0.00
SS20	1.00	0.00	0.00	0.00	0.15	0.85	0.00	0.00
SS21	1.00	0.00	0.00	0.00	0.15	0.85	0.00	0.00
SS22	1.00	0.00	0.00	0.00	0.15	0.84	0.00	0.00
SS23	1.00	0.00	0.00	0.00	0.15	0.85	0.00	0.00
SS24	1.00	0.00	0.00	0.00	0.14	0.86	0.00	0.00
SS25	1.00	0.00	0.00	0.00	0.14	0.86	0.00	0.00
SS26	1.00	0.00	0.00	0.00	0.17	0.83	0.00	0.00
SS27	1.00	0.00	0.00	0.00	0.17	0.83	0.00	0.00
SS28	1.00	0.00	0.00	0.00	0.15	0.85	0.00	0.00
SSEX	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00
Street01	1.00	0.88	0.12	0.00	0.00	0.00	0.00	0.00

Concept 3

Conduit	Adjusted/ Actual Length	Fully Dry	Upstrm Dry	Dnstrm Dry	Sub Critical	Super Critical	Upstrm Critical	Dnstrm Critical
Street02	1.00	0.86	0.00	0.00	0.00	0.00	0.00	0.14
Street03	1.00	0.07	0.01	0.00	0.13	0.00	0.00	0.79
Street04	1.00	0.07	0.00	0.00	0.91	0.01	0.00	0.00
Street05	1.00	0.07	0.80	0.00	0.11	0.01	0.00	0.00
Street06	1.00	0.85	0.00	0.00	0.05	0.01	0.00	0.08
Street07	1.00	0.05	0.00	0.00	0.05	0.00	0.00	0.90
Street08	1.00	0.05	0.76	0.00	0.14	0.06	0.00	0.00
Street09	1.00	0.80	0.08	0.00	0.12	0.00	0.00	0.00
Street10	1.00	0.06	0.00	0.00	0.00	0.00	0.00	0.94
Street11	1.00	0.06	0.79	0.00	0.12	0.03	0.00	0.00
Street12	1.00	0.80	0.00	0.00	0.04	0.00	0.00	0.16
Street13	1.00	0.05	0.04	0.00	0.16	0.00	0.00	0.75
Street14	1.00	0.08	0.81	0.00	0.01	0.09	0.00	0.00
Street15	1.00	0.06	0.27	0.00	0.00	0.00	0.67	0.00
Street16	1.00	0.06	0.00	0.00	0.13	0.01	0.80	0.00
Street17	1.00	0.86	0.00	0.00	0.10	0.03	0.00	0.01
SubBasin20	6.48	0.00	0.00	0.00	0.00	0.12	0.00	0.88

Concept 3

Flow Classification Summary

Conduit	Normal Flow Limited	Inlet Control
AboveCreighton	0.16	0.00
AboveVandeheiFlows	0.00	0.00
BelowEvergreen	0.06	0.00
BelowRanger	0.00	0.00
BishopSump	0.13	0.00
I-25	0.00	0.00
Inlet-06	0.21	0.00
Inlet-07	0.58	0.00
Inlet-10	0.33	0.00
Inlet-11	0.68	0.00
Inlet-13	0.05	0.00
Inlet-14	0.21	0.00
Inlet-17	0.25	0.00
Inlet-21	0.26	0.00
Inlet-23	0.48	0.00
Inlet-24	0.03	0.00

Concept 3

Conduit	Normal Flow Limited	Inlet Control
Inlet-J3	0.18	0.00
Outlet-Channel	0.85	0.00
Pond-outlletA	0.00	0.01
Pond-outlletB	0.00	0.17
SS01	0.04	0.00
SS02	0.00	0.00
SS03	0.07	0.00
SS04	0.09	0.00
SS05	0.34	0.00
SS06	0.00	0.00
SS07	0.00	0.00
SS08	0.03	0.00
SS09	0.11	0.00
SS10	0.69	0.00
SS11	0.49	0.00
SS12	0.58	0.00
SS13	0.03	0.00

Concept 3

Conduit	Normal Flow Limited	Inlet Control
SS14	0.46	0.00
SS15	0.06	0.00
SS16	0.00	0.00
SS17	0.38	0.00
SS18	0.07	0.00
SS19	0.01	0.00
SS20	0.09	0.00
SS21	0.03	0.00
SS22	0.17	0.00
SS23	0.11	0.00
SS24	0.00	0.00
SS25	0.04	0.00
SS26	0.17	0.00
SS27	0.58	0.00
SS28	0.03	0.00
SSEX	0.00	0.00
Street01	0.00	0.00

Concept 3

Conduit	Normal Flow Limited	Inlet Control
Street02	0.00	0.00
Street03	0.13	0.00
Street04	0.87	0.00
Street05	0.91	0.00
Street06	0.05	0.00
Street07	0.00	0.00
Street08	0.92	0.00
Street09	0.92	0.00
Street10	0.00	0.00
Street11	0.89	0.00
Street12	0.04	0.00
Street13	0.16	0.00
Street14	0.90	0.00
Street15	0.00	0.00
Street16	0.02	0.00
Street17	0.13	0.00
SubBasin20	0.12	0.00

Concept 3

Conduit Surcharge Summary

Conduit	Hours Both Ends Full	Hours Upstream Full	Hours Dnstream Full	Hours Above Normal Flow	Hours Capacity Limited
Inlet-06	1.19	1.19	1.48	0.01	0.01
Inlet-07	1.21	1.21	1.43	0.01	0.01
Inlet-10	0.98	0.98	1.17	0.01	0.06
Inlet-11	0.95	0.98	0.96	0.01	0.95
Inlet-13	1.23	1.23	1.27	0.01	1.22
Inlet-14	1.25	1.25	1.58	0.01	0.73
Inlet-17	0.94	0.94	1.26	0.01	0.62
Inlet-21	1.23	1.23	1.75	0.01	0.62
Inlet-23	1.09	1.09	1.60	0.01	0.08
Inlet-24	1.07	1.22	1.07	1.33	1.07
Inlet-J3	0.78	1.21	0.78	0.01	0.78
Pond-outlletA	0.54	0.55	0.54	0.63	0.54
Pond-outlletB	0.01	0.54	0.01	0.84	0.01
SS01	1.19	1.21	1.19	1.56	1.19
SS02	1.21	1.24	1.21	1.72	1.21
SS03	1.21	1.21	1.24	1.60	0.99

Concept 3

Conduit	Hours Both Ends Full	Hours Upstream Full	Hours Dnstream Full	Hours Above Normal Flow	Hours Capacity Limited
SS04	1.18	1.18	1.21	1.56	0.90
SS05	1.01	1.01	1.18	1.32	0.01
SS06	1.01	1.02	1.01	1.28	1.01
SS07	1.02	1.05	1.02	1.61	1.02
SS08	1.04	1.04	1.05	1.49	0.96
SS09	1.00	1.00	1.04	1.42	0.66
SS10	1.00	1.00	1.00	1.60	0.99
SS11	0.95	0.95	1.00	1.33	0.01
SS12	0.88	0.88	0.95	0.90	0.01
SS13	0.80	0.80	0.88	0.93	0.01
SS14	0.64	0.64	0.80	0.01	0.01
SS15	0.01	0.01	0.64	1.05	0.01
SS16	0.01	1.03	0.01	0.01	0.01
SS17	0.94	0.94	1.03	0.01	0.01
SS18	0.90	0.90	0.94	0.01	0.01
SS19	0.90	0.90	0.90	0.62	0.89
SS20	0.88	0.88	0.90	0.01	0.64

Concept 3

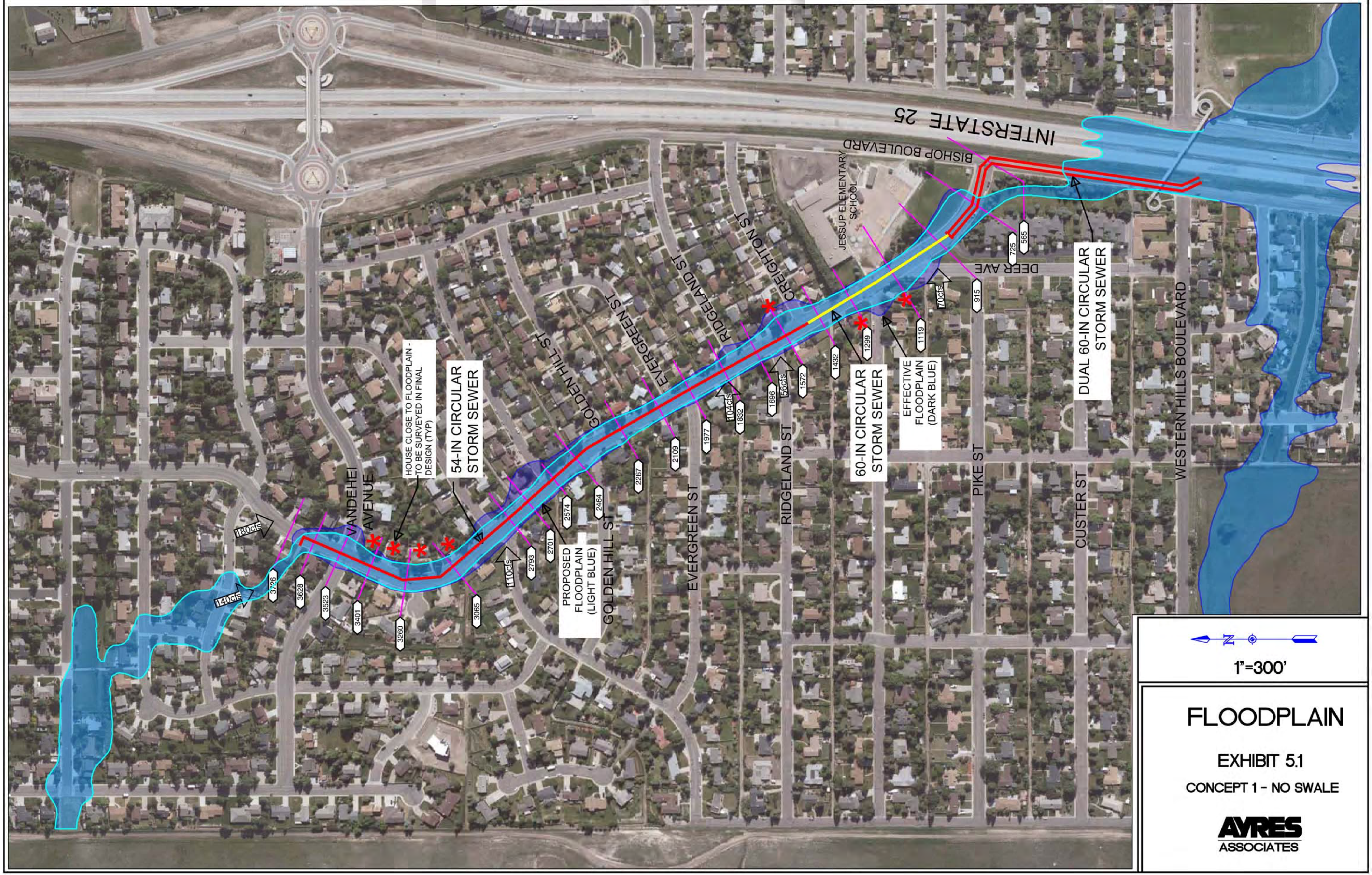
Conduit	Hours Both Ends Full	Hours Upstream Full	Hours Dnstream Full	Hours Above Normal Flow	Hours Capacity Limited
SS21	0.86	0.86	0.88	0.01	0.01
SS22	0.87	0.87	0.88	0.01	0.76
SS23	0.85	0.85	0.87	0.01	0.01
SS24	0.80	0.80	0.85	0.01	0.01
SS25	0.80	0.82	0.80	0.94	0.80
SS26	0.82	0.97	0.82	1.26	0.82
SS27	0.87	0.87	0.97	0.01	0.01
SS28	0.86	0.86	0.87	0.01	0.02
SSEX	1.08	1.40	1.08	2.74	1.08

APPENIDX B

HYDRAULICS
HEC RAS MODELS

APPENIDX B

HYDRAULICS
CONCEPT 1



FLOODPLAIN

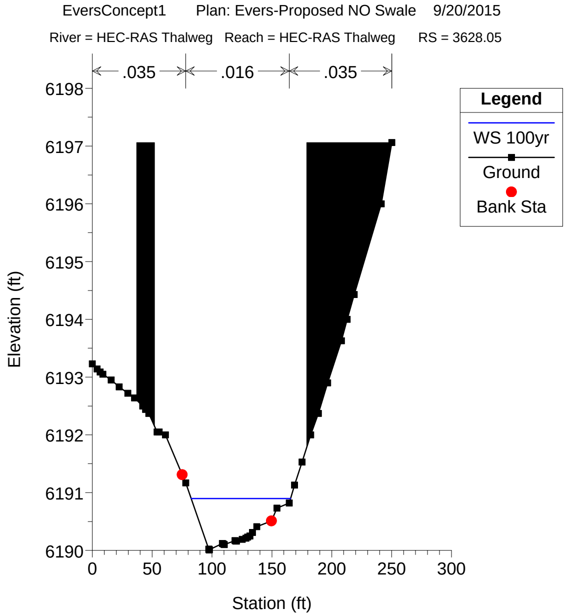
EXHIBIT 5.1

CONCEPT 1 - NO SWALE

AYRES ASSOCIATES

HEC-RAS Plan: no swale   River: HEC-RAS Thalweg   Reach: HEC-RAS Thalweg   Profile: 100yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
HEC-RAS Thalweg	564.79	100yr	314.00	6153.88	6155.09	6155.09	6155.53	0.003998	5.33	58.95	68.15	1.01
HEC-RAS Thalweg	724.56	100yr	314.00	6154.50	6155.79	6155.72	6156.06	0.002491	4.60	89.96	138.52	0.81
HEC-RAS Thalweg	914.79	100yr	314.00	6155.19	6156.42	6156.42	6156.78	0.003497	5.23	75.05	111.90	0.95
HEC-RAS Thalweg	1118.82	100yr	277.00	6156.55	6157.53	6157.53	6157.83	0.004823	5.13	75.52	121.38	1.06
HEC-RAS Thalweg	1299.23	100yr	280.00	6157.95	6159.10	6159.10	6159.47	0.003806	5.24	63.22	90.93	0.98
HEC-RAS Thalweg	1432.11	100yr	280.00	6159.73	6160.87	6160.87	6161.21	0.003985	4.87	62.80	101.11	1.00
HEC-RAS Thalweg	1571.97	100yr	290.00	6161.56	6162.57	6162.57	6162.89	0.018622	4.83	65.46	103.44	0.97
HEC-RAS Thalweg	1696.4	100yr	260.00	6163.03	6164.19	6164.19	6164.52	0.003669	4.72	56.70	85.16	0.99
HEC-RAS Thalweg	1832.48	100yr	260.00	6165.39	6166.53	6166.53	6166.89	0.003920	4.93	55.15	80.57	1.00
HEC-RAS Thalweg	1977	100yr	195.00	6167.91	6168.90	6168.90	6169.21	0.003932	4.67	46.08	79.15	0.96
HEC-RAS Thalweg	2108.55	100yr	195.00	6170.18	6171.17	6171.17	6171.45	0.003803	4.56	52.08	98.74	0.94
HEC-RAS Thalweg	2267	100yr	208.00	6172.02	6173.01	6173.01	6173.29	0.003879	4.64	55.47	104.29	0.96
HEC-RAS Thalweg	2463.8	100yr	208.00	6173.98	6174.99	6174.99	6175.30	0.003920	4.72	51.97	93.67	0.96
HEC-RAS Thalweg	2574.39	100yr	207.00	6175.23	6176.27	6176.27	6176.59	0.003795	4.74	48.30	82.32	0.95
HEC-RAS Thalweg	2700.88	100yr	216.00	6176.87	6177.86	6177.86	6178.21	0.004003	4.78	46.52	69.30	0.98
HEC-RAS Thalweg	2793.31	100yr	216.00	6178.55	6179.61	6179.61	6179.96	0.003949	4.89	47.07	70.47	0.97
HEC-RAS Thalweg	2967.08	100yr	158.00	6182.24	6183.04	6183.04	6183.30	0.004427	4.11	40.14	85.14	0.97
HEC-RAS Thalweg	3064.75	100yr	158.00	6184.83	6185.74	6185.74	6185.98	0.003800	4.21	46.17	106.20	0.93
HEC-RAS Thalweg	3260.43	100yr	159.00	6186.23	6187.20	6187.20	6187.45	0.004026	4.28	45.56	98.39	0.95
HEC-RAS Thalweg	3401.18	100yr	172.00	6186.93	6187.93	6187.93	6188.20	0.004532	4.20	41.40	79.94	0.99
HEC-RAS Thalweg	3523.33	100yr	172.00	6187.99	6188.62	6188.62	6188.86	0.004495	3.94	45.03	100.04	0.98
HEC-RAS Thalweg	3628.05	100yr	180.00	6190.01	6190.90	6190.90	6191.17	0.003973	4.24	43.95	83.01	0.95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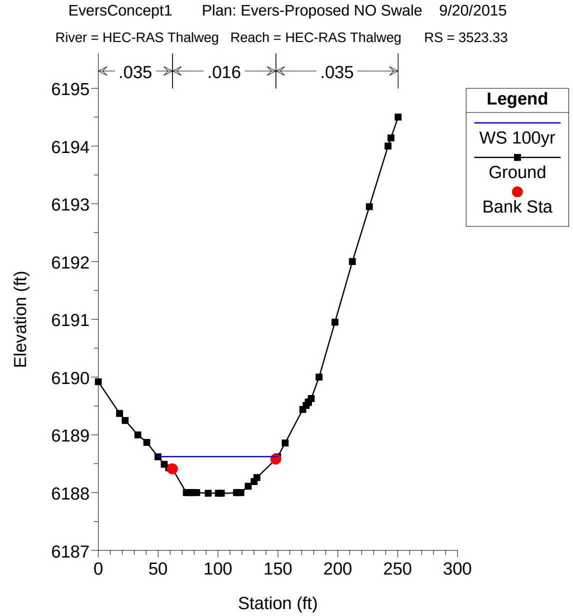
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
6198
6197
6196
6195
6194
6193
6192
6191
6190
Station (ft)
0 50 100 150 200 250 300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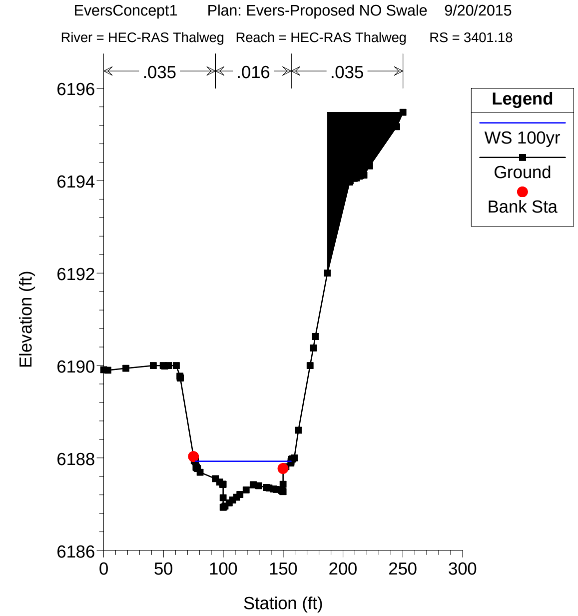
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
6195
6194
6193
6192
6191
6190
6189
6188
6187
Station (ft)
0 50 100 150 200 250 300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WS 100yr
Ground
Bank Sta
Elevation (ft)
6196
6194
6192
6190
6188
6186
Station (ft)
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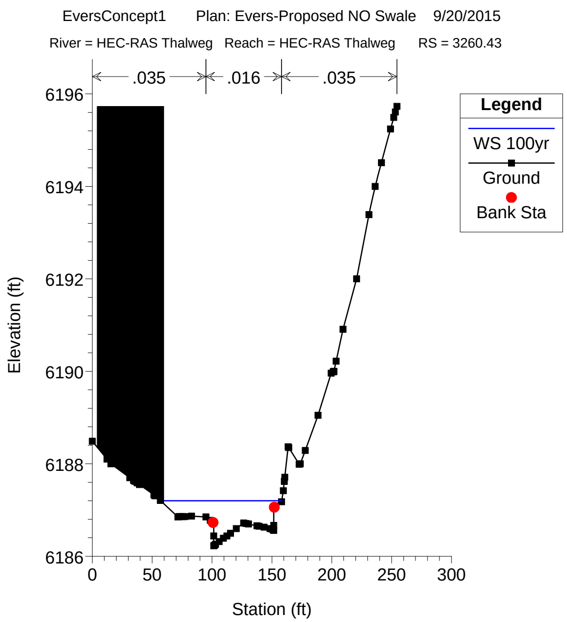
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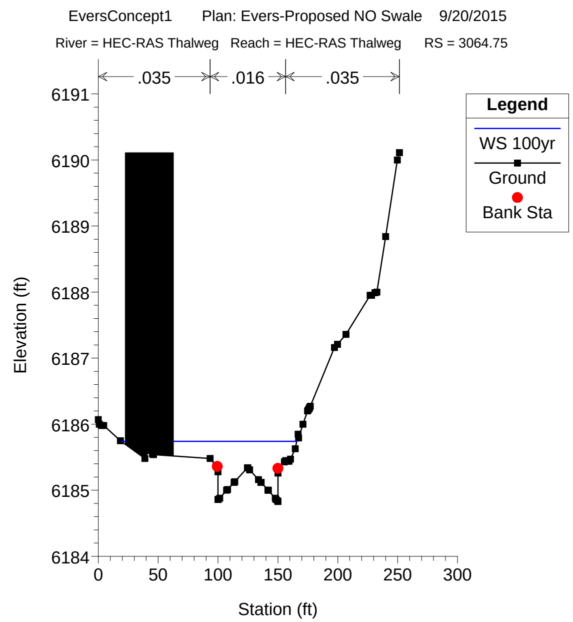
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
6196
6194
6192
6190
6188
6186
Station (ft)
0 50 100 150 200 250 300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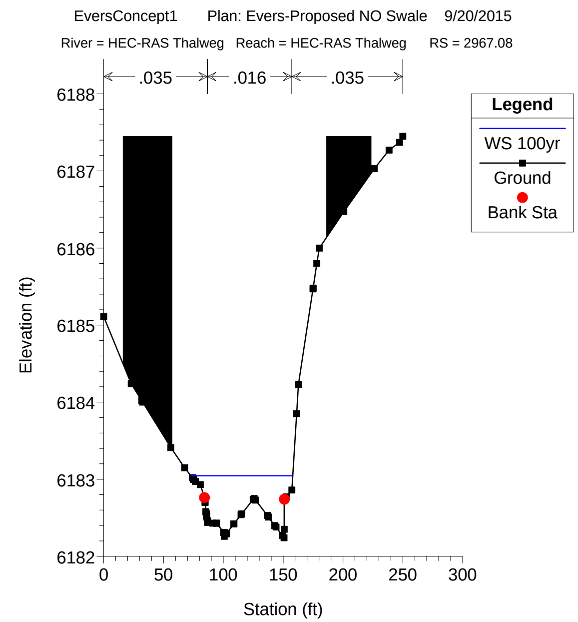
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
6191
6190
6189
6188
6187
6186
6185
6184
Station (ft)
0 50 100 150 200 250 300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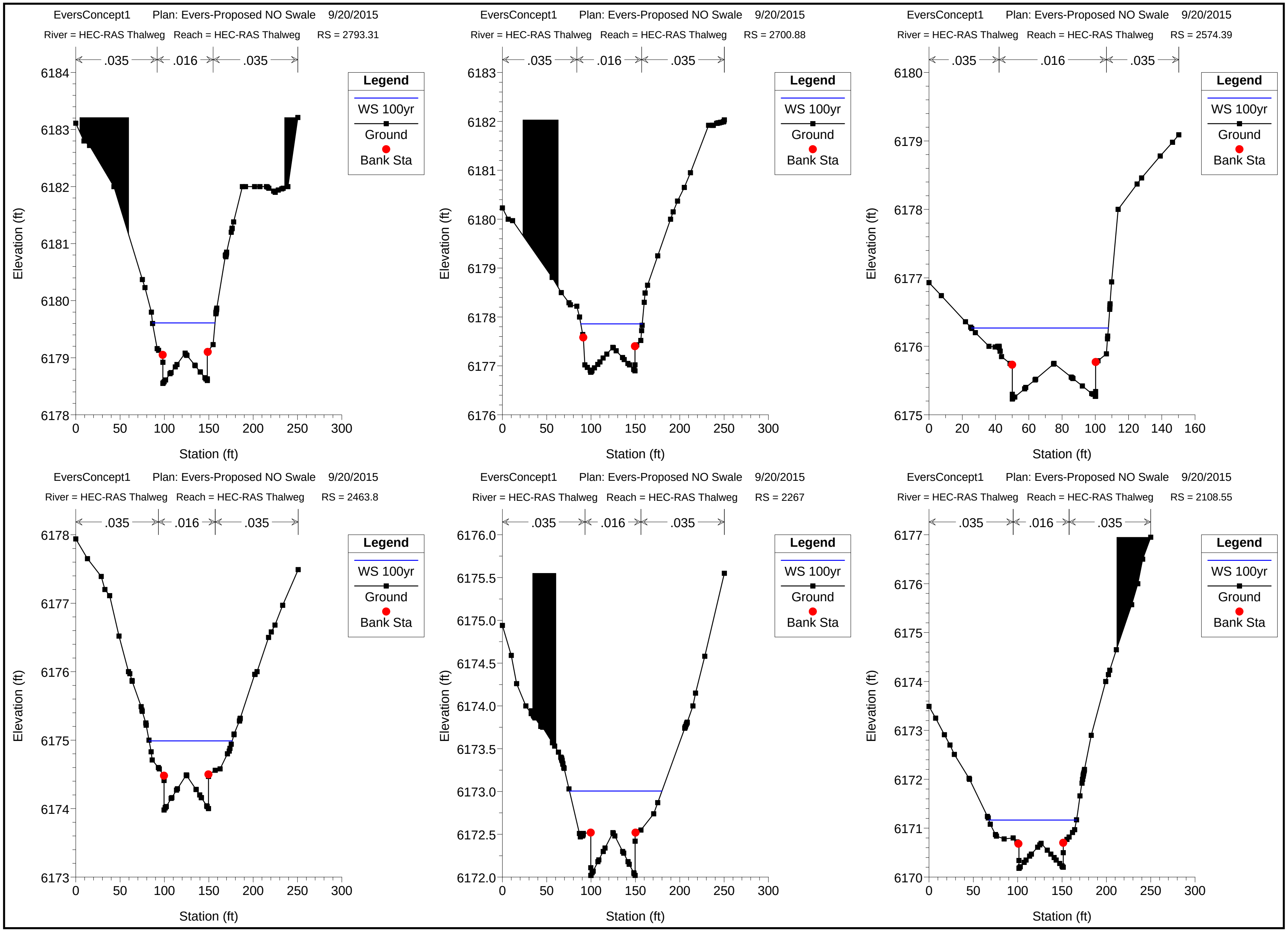
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
6188
6187
6186
6185
6184
6183
6182
Station (ft)
0 50 100 150 200 250 300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River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2793.31
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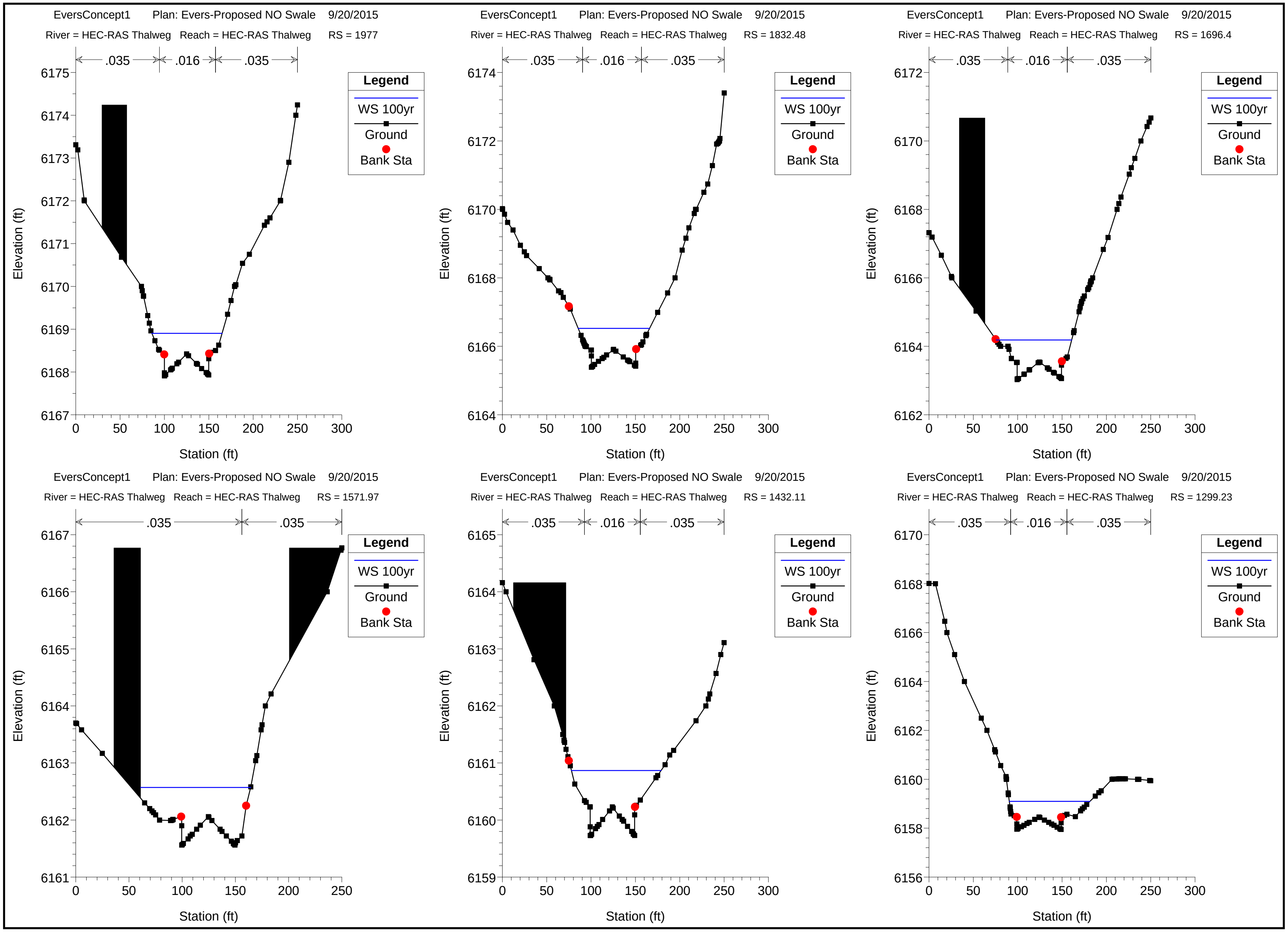
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept1 Plan: Evers-Proposed NO Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2700.88
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept1 Plan: Evers-Proposed NO Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2574.39
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept1 Plan: Evers-Proposed NO Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2463.8
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept1 Plan: Evers-Proposed NO Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2267
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept1 Plan: Evers-Proposed NO Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2108.55
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1977
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Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept1 Plan: Evers-Proposed NO Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1832.48
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept1 Plan: Evers-Proposed NO Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1696.4
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept1 Plan: Evers-Proposed NO Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1571.97
.035 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept1 Plan: Evers-Proposed NO Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1432.11
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept1 Plan: Evers-Proposed NO Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1299.23
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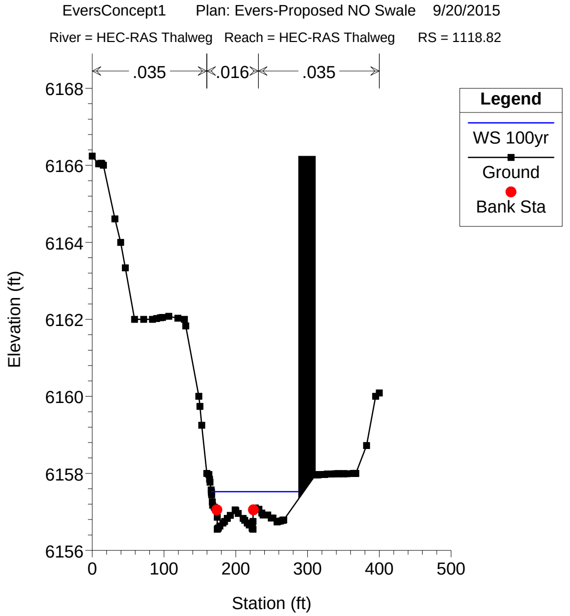
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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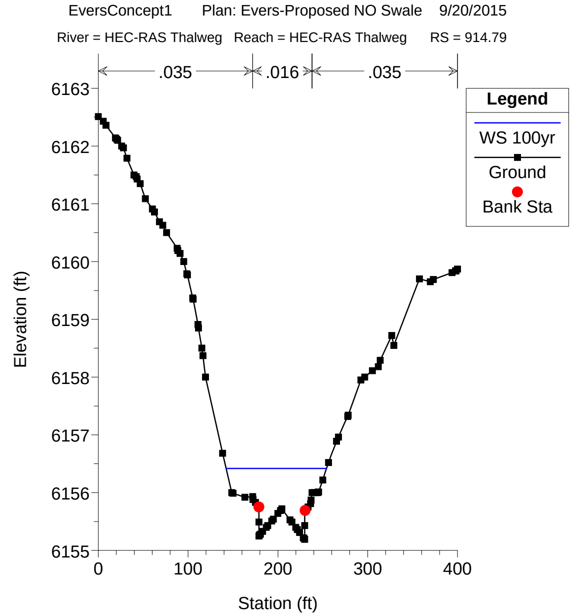
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
6168
6166
6164
6162
6160
6158
6156
0
100
200
300
400
500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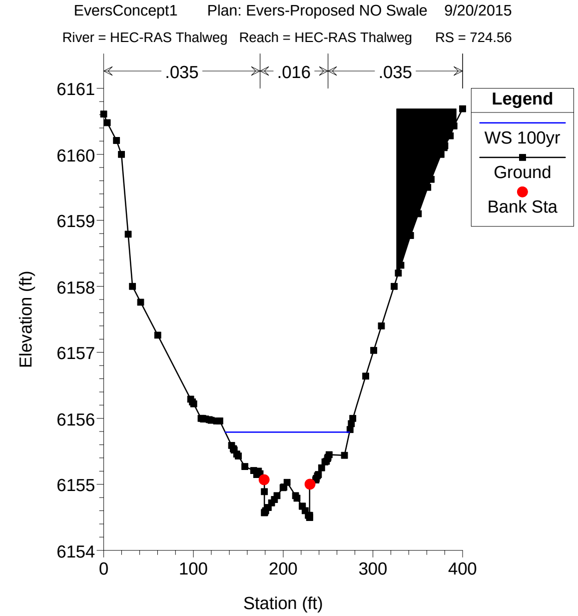
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
6163
6162
6161
6160
6159
6158
6157
6156
6155
0
100
200
300
400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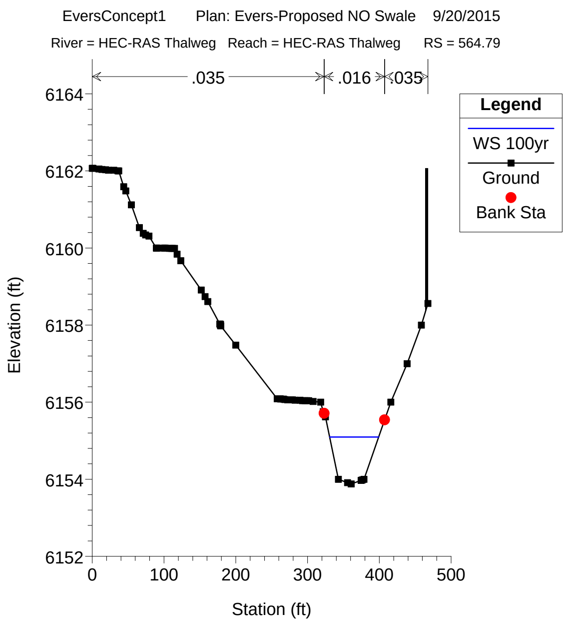
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
6161
6160
6159
6158
6157
6156
6155
6154
0
100
200
300
400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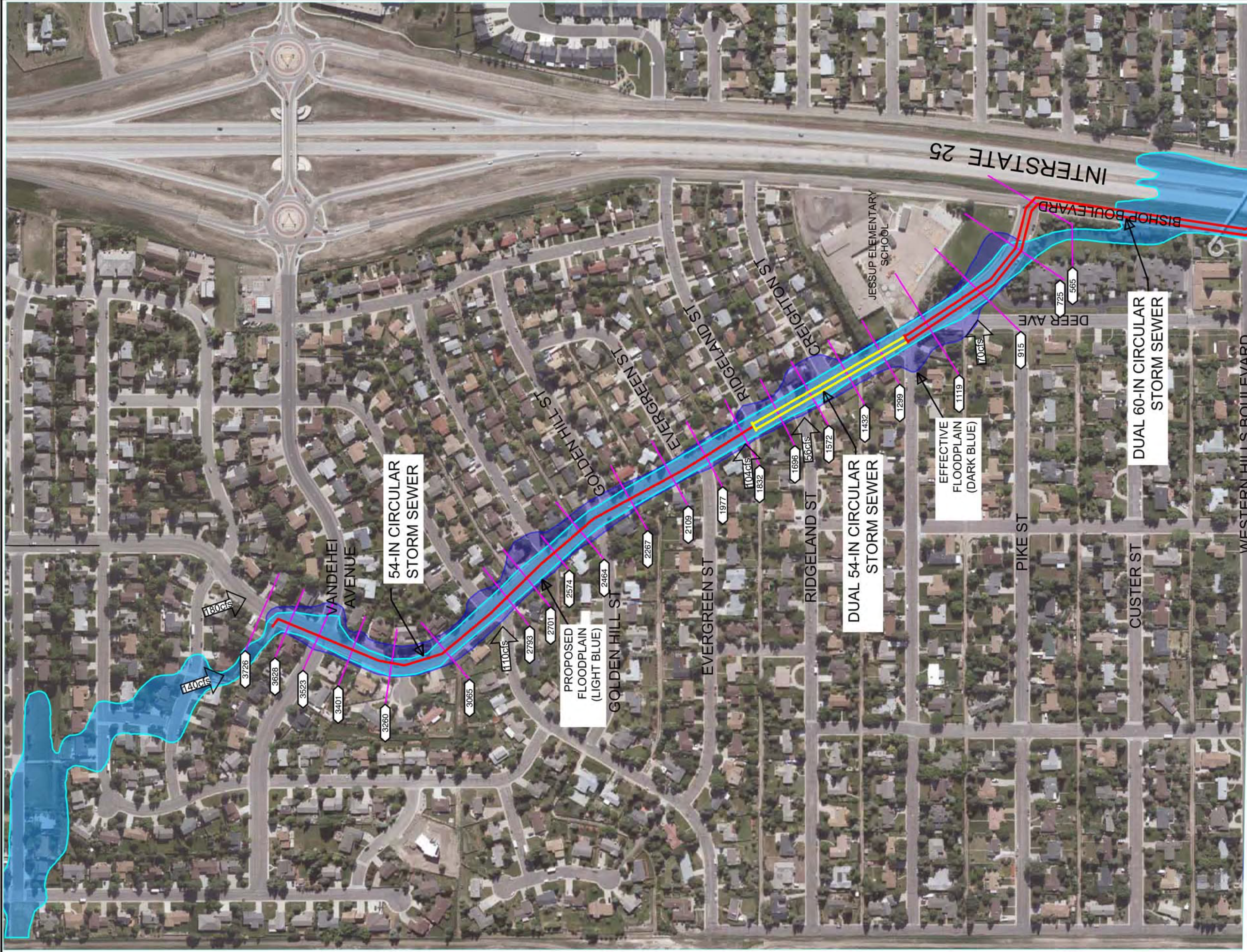
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
6164
6162
6160
6158
6156
6154
6152
0
100
200
300
400
500

APPENIDX B

HYDRAULICS
CONCEPT 2



FLOODPLAIN

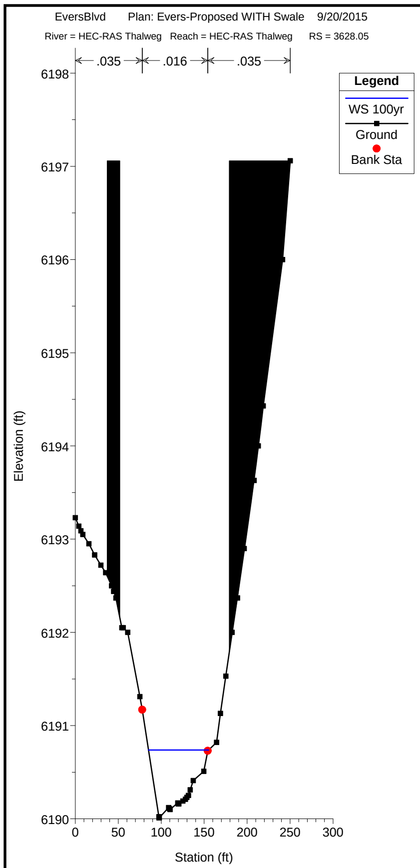
EXHIBIT 5.2

CONCEPT 2 - SWALE

AYRES ASSOCIATES

HEC-RAS Plan: swale River: HEC-RAS Thalweg Reach: HEC-RAS Thalweg Profile: 100yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
HEC-RAS Thalweg	564.79	100yr	230.00	6153.88	6154.90	6154.90	6155.28	0.004209	4.95	46.51	62.48	1.01
HEC-RAS Thalweg	724.56	100yr	230.00	6152.60	6155.53	6155.37	6155.78	0.002242	3.95	58.21	66.56	0.74
HEC-RAS Thalweg	914.79	100yr	230.00	6152.35	6155.86		6155.94	0.000389	2.29	103.84	84.69	0.34
HEC-RAS Thalweg	1118.82	100yr	192.00	6154.33	6157.03	6157.03	6157.35	0.004269	4.50	42.69	65.53	0.98
HEC-RAS Thalweg	1299.23	100yr	192.00	6155.96	6158.67	6158.67	6158.98	0.004150	4.45	43.19	66.04	0.97
HEC-RAS Thalweg	1432.11	100yr	212.00	6157.35	6160.09	6160.09	6160.44	0.004424	4.75	44.80	66.03	1.01
HEC-RAS Thalweg	1571.97	100yr	232.00	6162.10	6162.86	6162.86	6163.21	0.004418	4.74	49.49	76.21	1.02
HEC-RAS Thalweg	1696.4	100yr	205.00	6160.88	6163.59	6163.59	6163.94	0.004733	4.75	43.20	66.08	1.03
HEC-RAS Thalweg	1832.48	100yr	205.00	6163.29	6166.00	6166.00	6166.35	0.004665	4.73	43.38	66.07	1.03
HEC-RAS Thalweg	1977	100yr	146.00	6168.14	6168.82	6168.82	6169.08	0.004678	4.15	35.16	66.06	1.00
HEC-RAS Thalweg	2108.55	100yr	146.00	6169.07	6171.66	6171.66	6171.92	0.004625	4.12	35.42	66.01	0.99
HEC-RAS Thalweg	2267	100yr	157.00	6169.94	6172.56	6172.56	6172.83	0.004334	4.16	37.74	66.02	0.97
HEC-RAS Thalweg	2463.8	100yr	157.00	6173.95	6174.68	6174.68	6174.95	0.004282	4.17	37.64	65.68	0.97
HEC-RAS Thalweg	2574.39	100yr	157.00	6174.98	6176.03	6176.03	6176.32	0.005019	4.36	35.98	66.15	1.04
HEC-RAS Thalweg	2700.88	100yr	167.00	6174.96	6177.59	6177.59	6177.89	0.004750	4.38	38.40	71.94	1.02
HEC-RAS Thalweg	2793.31	100yr	167.00	6179.31	6180.00	6180.00	6180.29	0.004473	4.32	38.69	66.16	0.99
HEC-RAS Thalweg	2967.08	100yr	100.00	6180.73	6183.09	6183.09	6183.28	0.006079	3.56	28.08	80.32	1.06
HEC-RAS Thalweg	3064.75	100yr	100.00	6182.96	6185.33	6185.33	6185.56	0.005264	3.85	26.01	60.69	1.02
HEC-RAS Thalweg	3260.43	100yr	100.00	6184.15	6186.57	6186.57	6186.82	0.005355	3.99	25.09	54.78	1.04
HEC-RAS Thalweg	3401.18	100yr	107.00	6185.61	6188.08	6188.08	6188.31	0.004914	3.87	27.65	59.23	1.00
HEC-RAS Thalweg	3523.33	100yr	107.00	6187.99	6188.62		6188.75	0.002594	2.92	38.63	101.63	0.74
HEC-RAS Thalweg	3628.05	100yr	121.00	6190.01	6190.74	6190.74	6190.97	0.004908	3.85	31.42	69.90	1.01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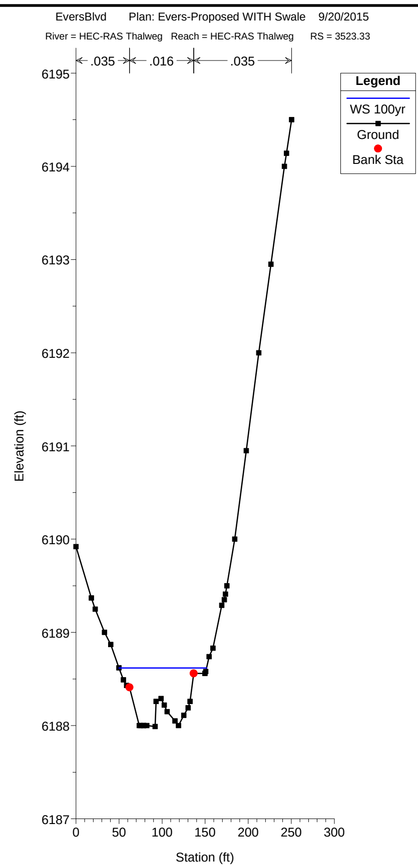
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
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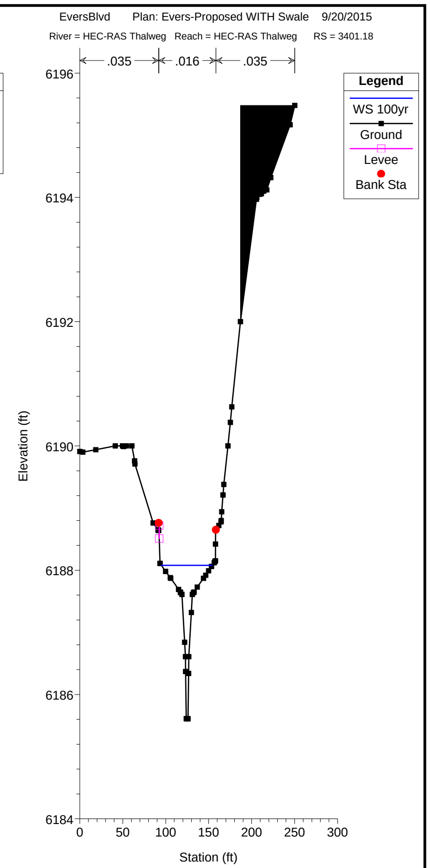
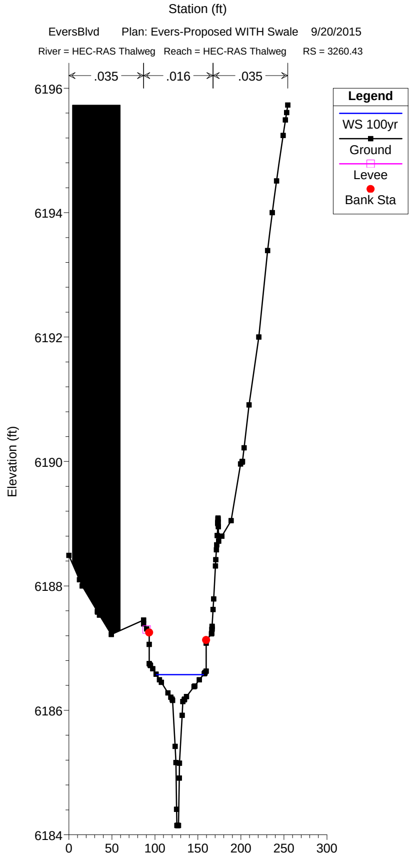
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 3401.18
.035
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
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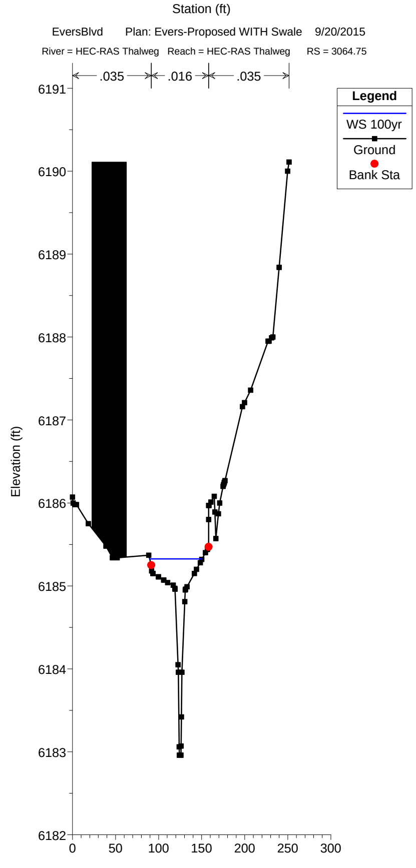
.035
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)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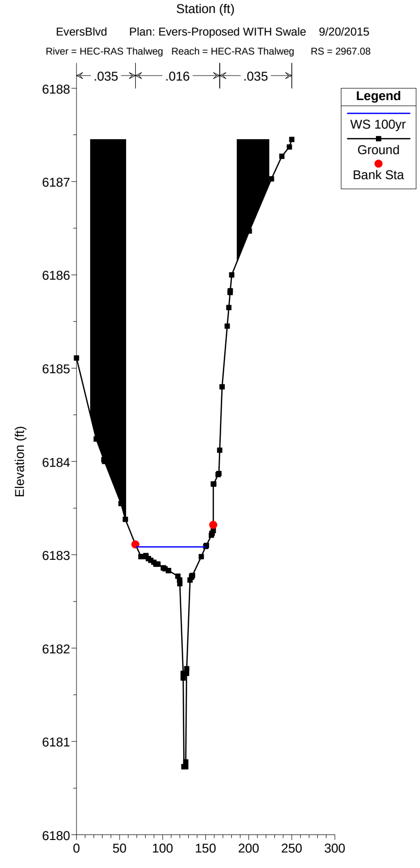
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)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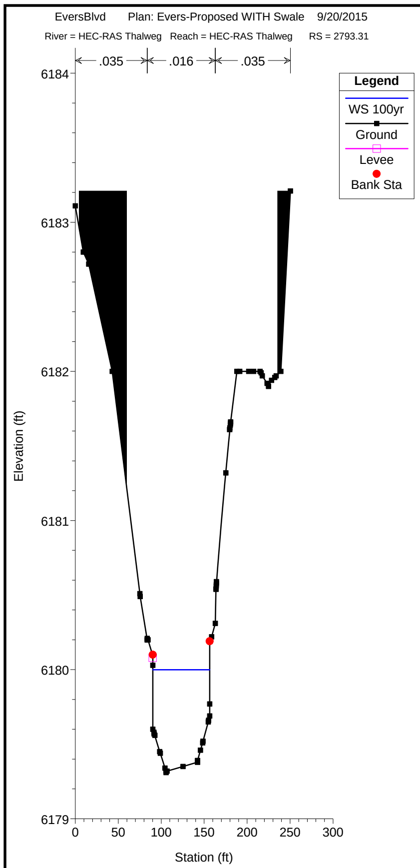
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
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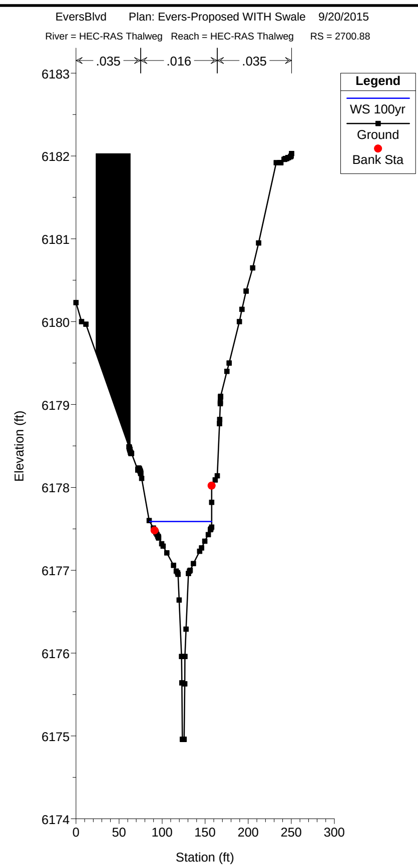
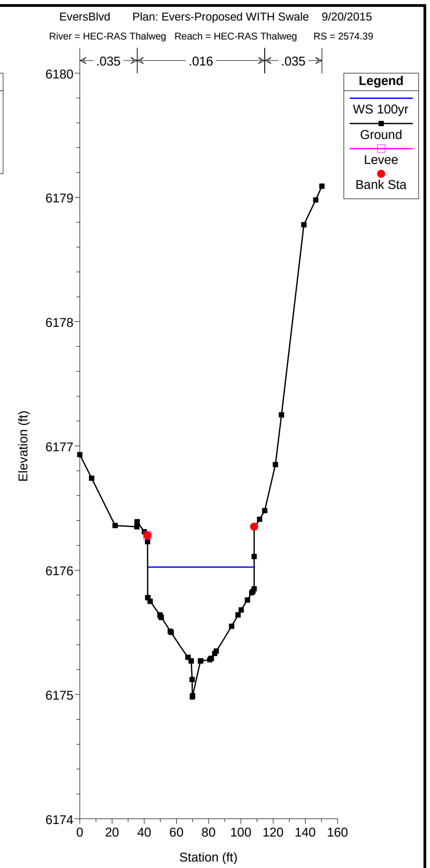
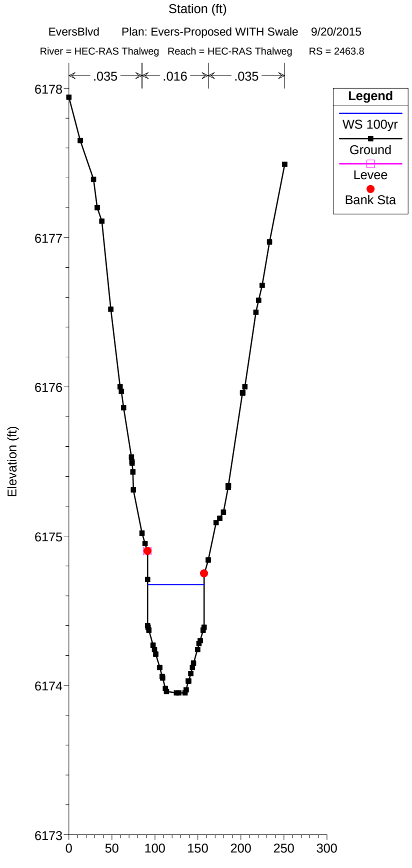
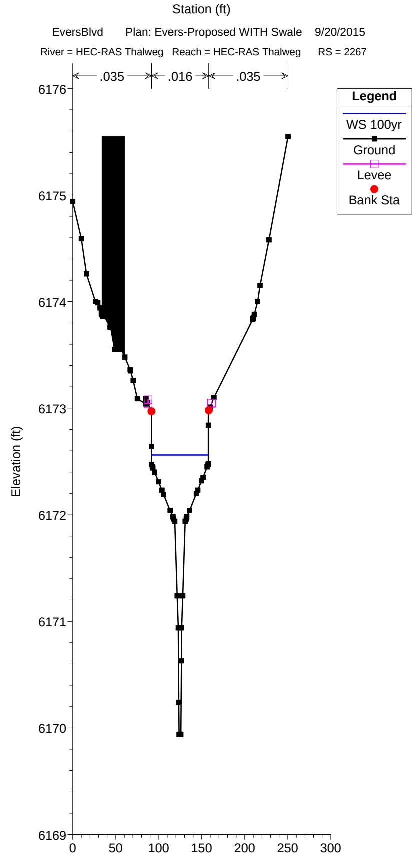
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
6179
6180
6181
6182
6183
6184
Station (ft)
0
50
100
150
200
250
300


EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2700.88
.035
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
6174
6175
6176
6177
6178
6179
6180
6181
6182
6183
Station (ft)
0
50
100
150
200
250
300


EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2574.39
.035
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
6174
6175
6176
6177
6178
6179
6180
Station (ft)
0
20
40
60
80
100
120
140
160


EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2463.8
.035
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
6173
6174
6175
6176
6177
6178
Station (ft)
0
50
100
150
200
250
300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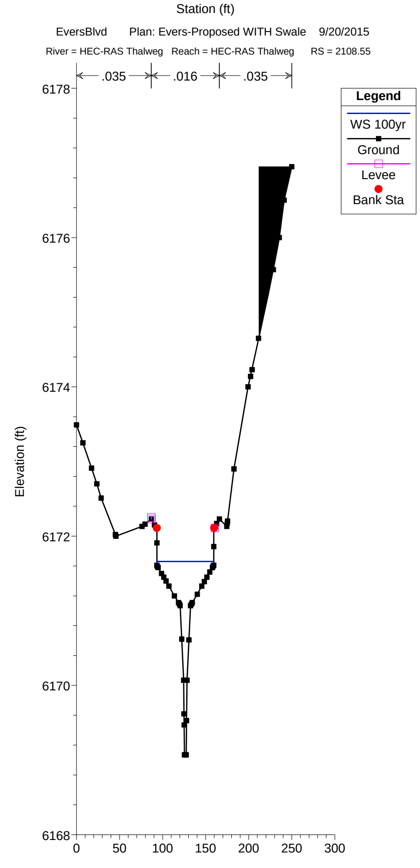
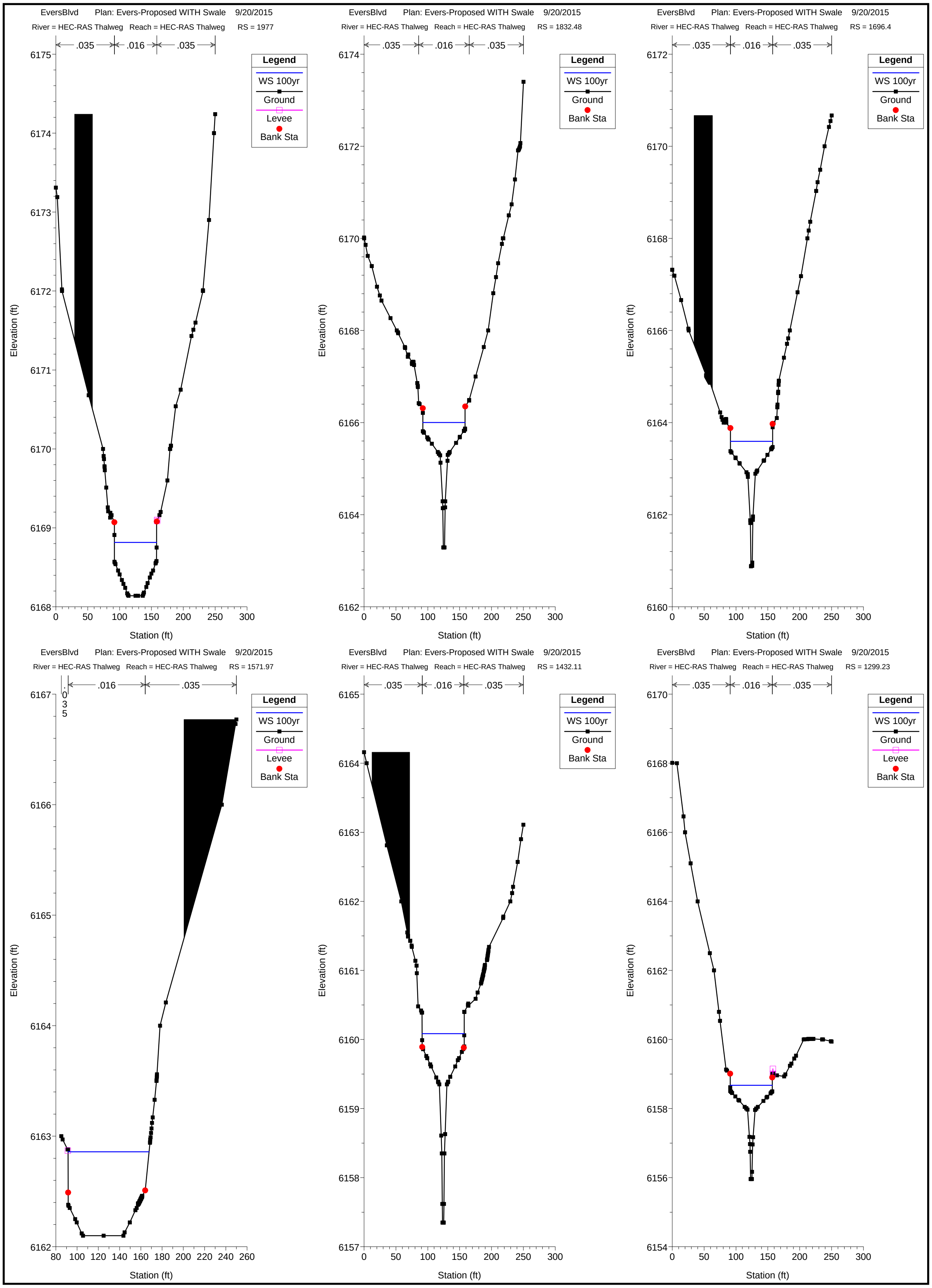
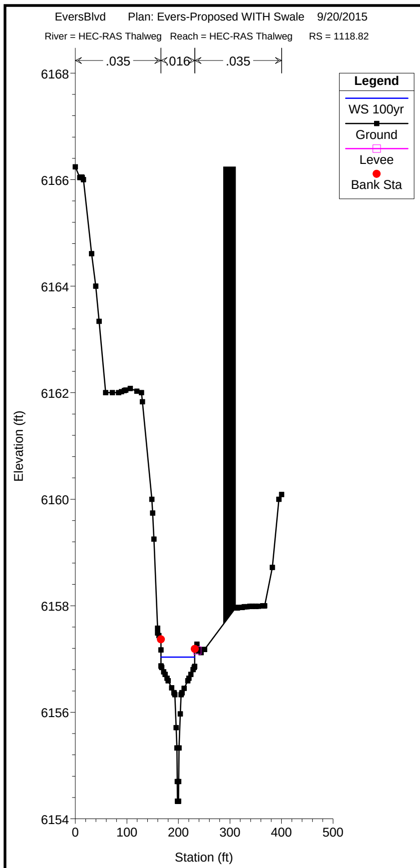
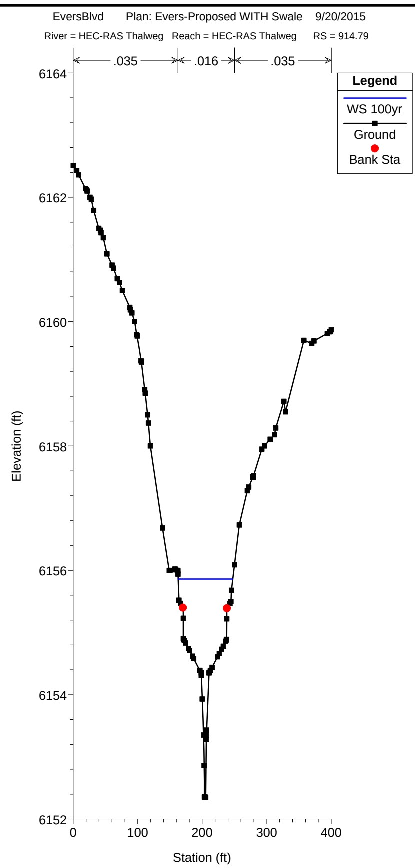
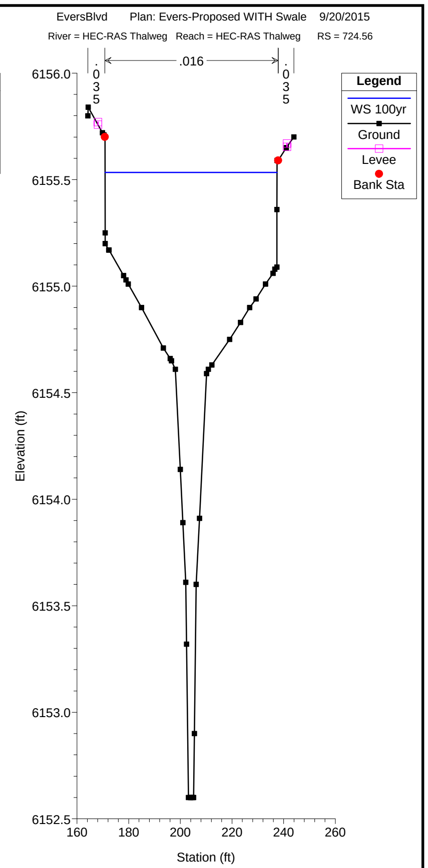
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2267
.035
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
6169
6170
6171
6172
6173
6174
6175
6176
Station (ft)
0
50
100
150
200
250
300

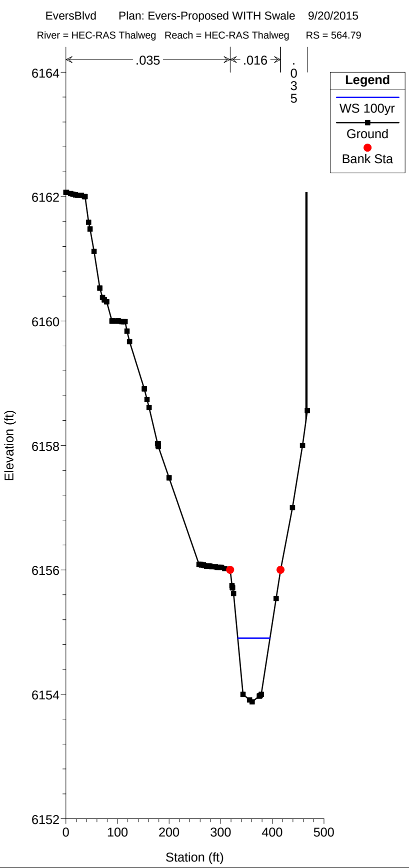

EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2108.55
.035
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
6168
6170
6172
6174
6176
6178
Station (ft)
0
50
100
150
200
250
300


EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1977
.035 .016 .035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1832.48
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1696.4
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1571.97
.035 .016 .035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1432.11
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1299.23
.035 .016 .035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1118.82
.035
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

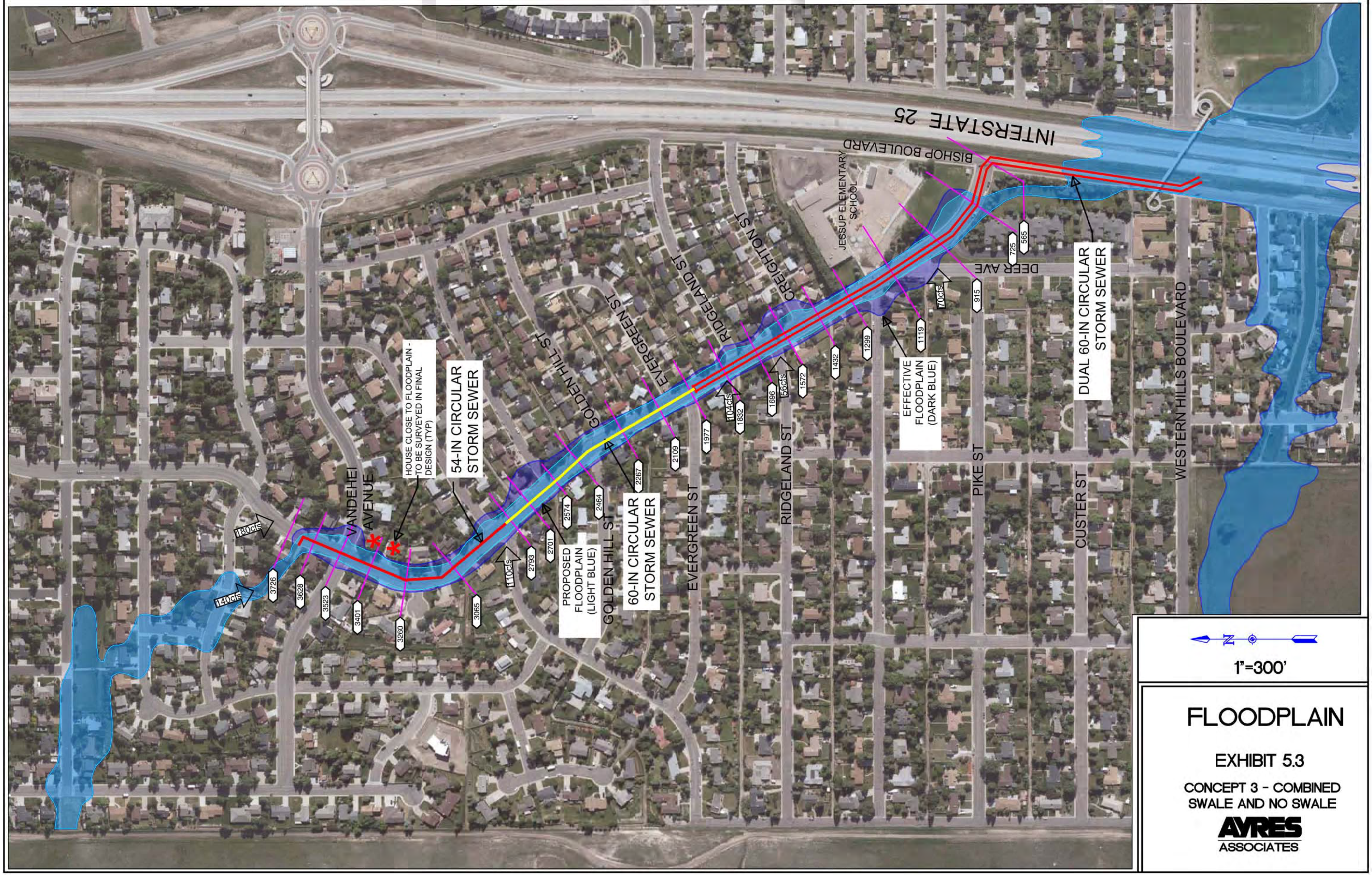

EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 914.79
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 724.56
.035
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


EversBlvd Plan: Evers-Proposed WITH Swale 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 564.79
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

APPENIDX B

HYDRAULICS
CONCEPT 3



FLOODPLAIN

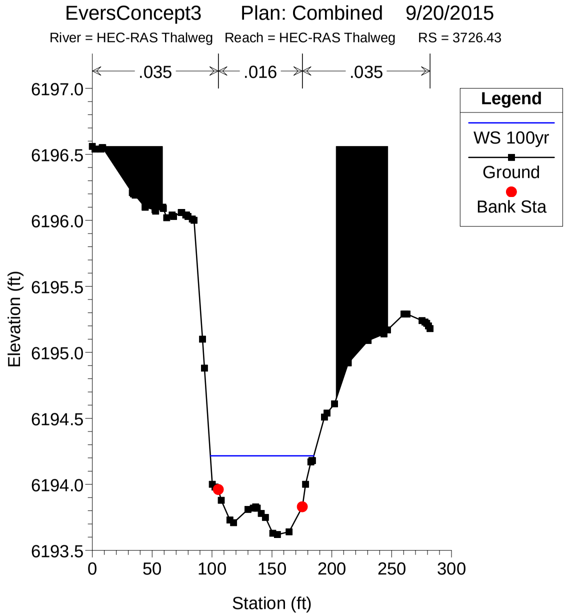
EXHIBIT 5.3

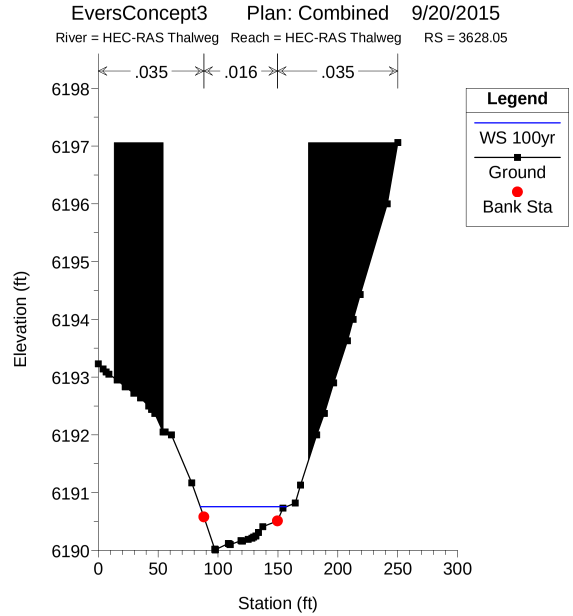
CONCEPT 3 - COMBINED SWALE AND NO SWALE

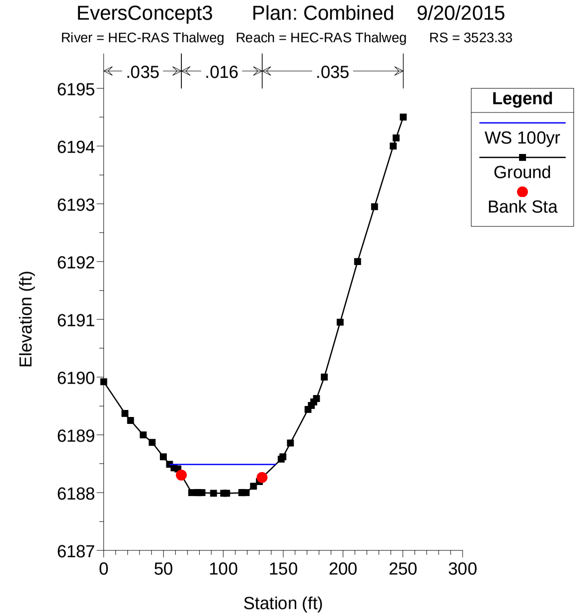
AYRES ASSOCIATES

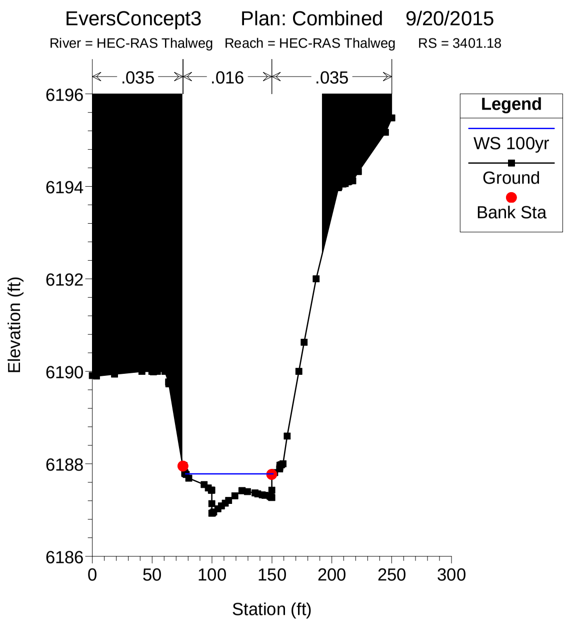
HEC-RAS Plan: Combined River: HEC-RAS Thalweg Reach: HEC-RAS Thalweg Profile: 100yr

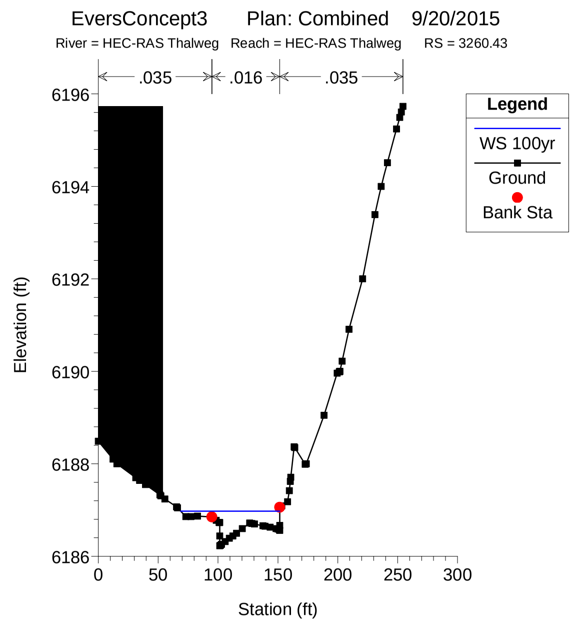
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
HEC-RAS Thalweg	564.79	100yr	138.00	6153.88	6154.65	6154.65	6154.95	0.004512	4.33	31.87	55.07	1.00
HEC-RAS Thalweg	724.56	100yr	138.00	6154.55	6155.29		6155.44	0.002102	3.07	46.92	92.94	0.69
HEC-RAS Thalweg	914.79	100yr	138.00	6154.71	6155.60		6155.69	0.000894	2.41	59.34	82.97	0.47
HEC-RAS Thalweg	1118.82	100yr	99.00	6156.26	6156.70	6156.70	6156.90	0.005153	3.63	27.25	66.03	1.00
HEC-RAS Thalweg	1299.23	100yr	102.00	6157.48	6158.13	6158.13	6158.34	0.004950	3.66	27.85	66.02	0.99
HEC-RAS Thalweg	1432.11	100yr	101.00	6159.63	6160.30	6160.30	6160.50	0.006439	3.63	27.83	72.49	1.03
HEC-RAS Thalweg	1571.97	100yr	122.00	6161.54	6162.28	6162.28	6162.51	0.002941	3.90	37.51	95.19	0.97
HEC-RAS Thalweg	1696.4	100yr	119.00	6163.03	6163.85	6163.85	6164.09	0.004195	3.99	31.34	66.68	0.95
HEC-RAS Thalweg	1832.48	100yr	119.00	6165.39	6166.21	6166.21	6166.47	0.004511	4.14	31.62	69.76	0.98
HEC-RAS Thalweg	1977	100yr	84.00	6167.91	6168.62	6168.62	6168.82	0.004617	3.64	25.31	71.74	0.96
HEC-RAS Thalweg	2108.55	100yr	84.00	6170.18	6170.88	6170.88	6171.07	0.004456	3.55	27.85	84.34	0.94
HEC-RAS Thalweg	2267	100yr	94.00	6172.02	6172.75	6172.75	6172.95	0.004276	3.66	30.43	89.61	0.93
HEC-RAS Thalweg	2463.8	100yr	94.00	6173.98	6174.74	6174.74	6174.94	0.004235	3.71	28.33	80.51	0.93
HEC-RAS Thalweg	2574.39	100yr	110.00	6175.23	6176.04	6176.04	6176.28	0.004282	3.97	30.45	72.58	0.95
HEC-RAS Thalweg	2700.88	100yr	127.00	6176.87	6177.63	6177.63	6177.88	0.004708	4.05	32.44	69.75	1.00
HEC-RAS Thalweg	2793.31	100yr	127.00	6178.55	6179.41	6179.41	6179.67	0.004106	4.09	34.07	68.21	0.95
HEC-RAS Thalweg	2967.08	100yr	76.00	6182.24	6182.84	6182.84	6183.02	0.005632	3.48	24.27	73.92	1.03
HEC-RAS Thalweg	3064.75	100yr	77.00	6184.83	6185.52	6185.52	6185.71	0.004723	3.55	23.27	66.37	0.96
HEC-RAS Thalweg	3260.43	100yr	77.00	6186.23	6186.98	6186.98	6187.15	0.004882	3.42	24.77	82.75	0.97
HEC-RAS Thalweg	3401.18	100yr	112.00	6186.93	6187.78	6187.78	6188.00	0.005338	3.74	29.94	73.14	1.02
HEC-RAS Thalweg	3523.33	100yr	112.00	6187.99	6188.49	6188.49	6188.69	0.004566	3.67	32.16	88.40	0.97
HEC-RAS Thalweg	3628.05	100yr	130.00	6190.01	6190.76	6190.76	6191.02	0.004676	4.08	32.65	72.18	1.00
HEC-RAS Thalweg	3726.43	100yr	130.00	6193.62	6194.22	6194.22	6194.44	0.004583	3.83	36.15	86.42	0.98


EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 3726.43
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 3628.05
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 3523.33
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 3401.18
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 3260.43
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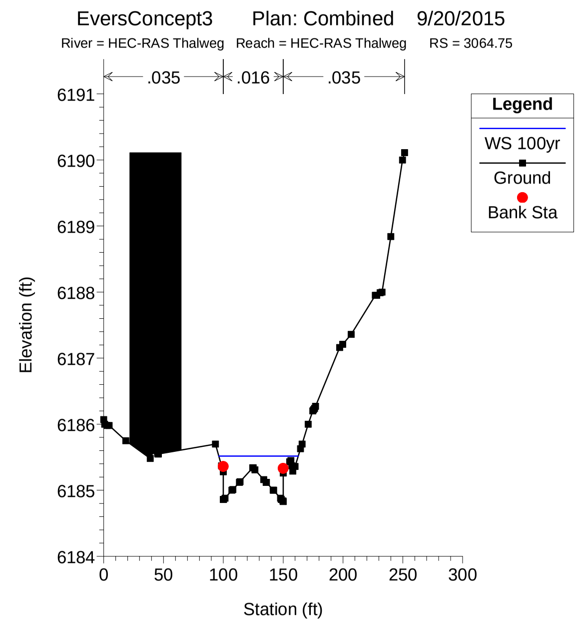
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 3064.75
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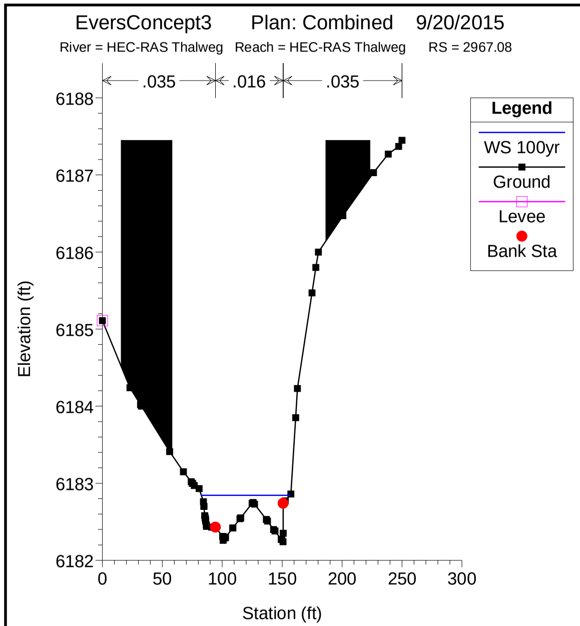
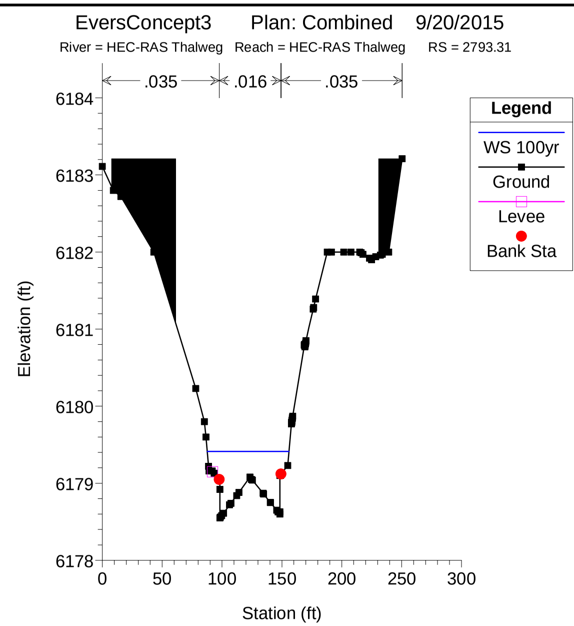
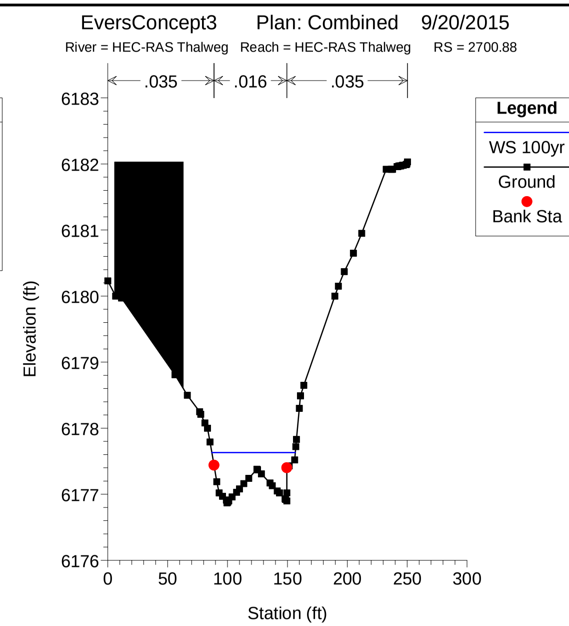
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)



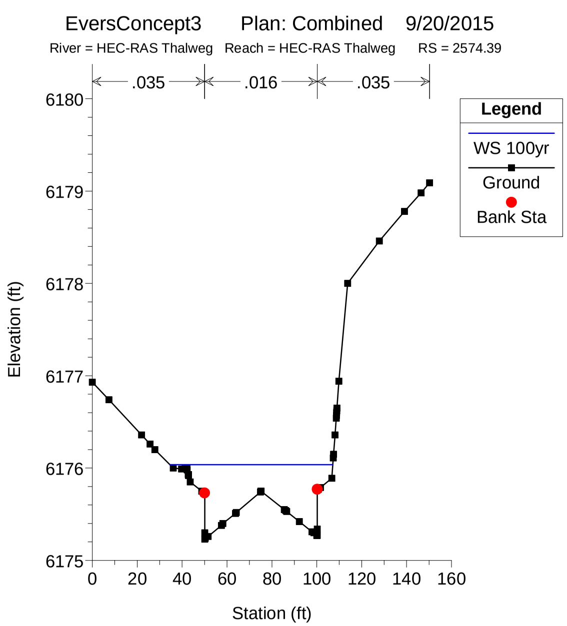
EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2967.08
.035
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)



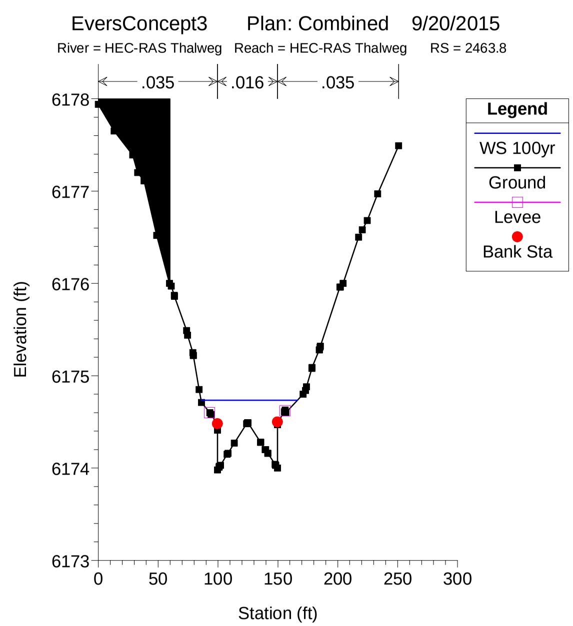
EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2793.31
.035
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)



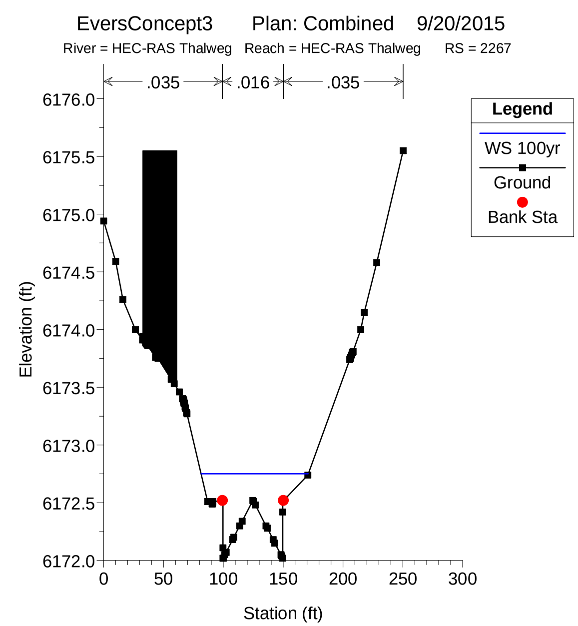
EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2700.88
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)



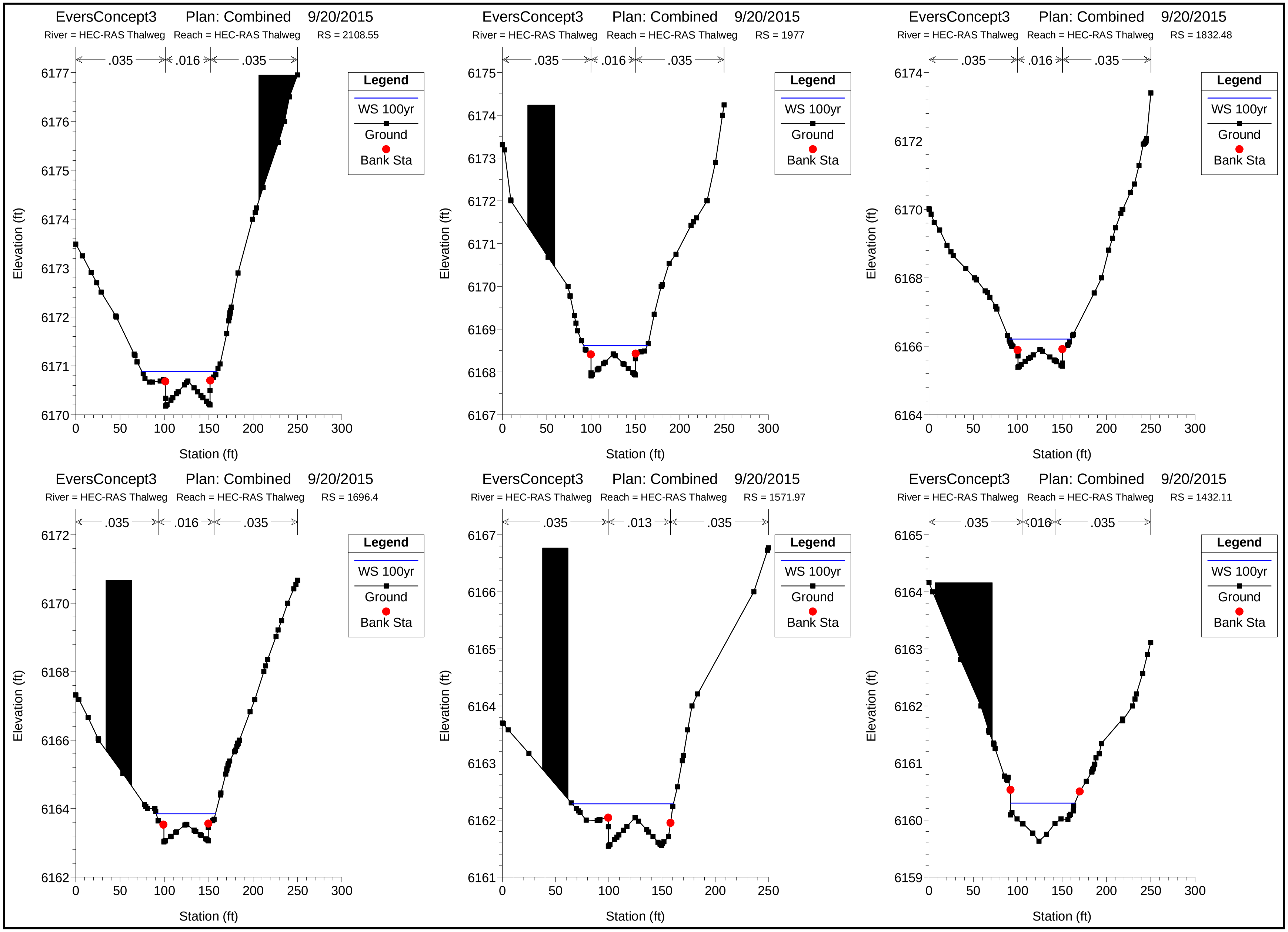
EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2574.39
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

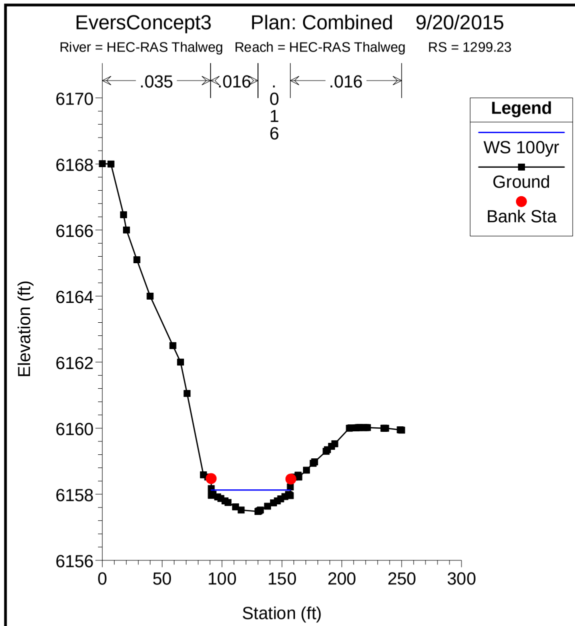


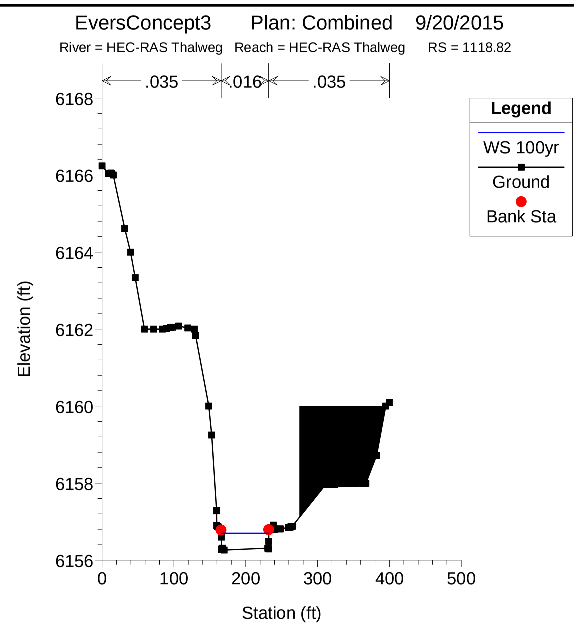
EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2463.8
.035
.016
.035
Legend
WS 100yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

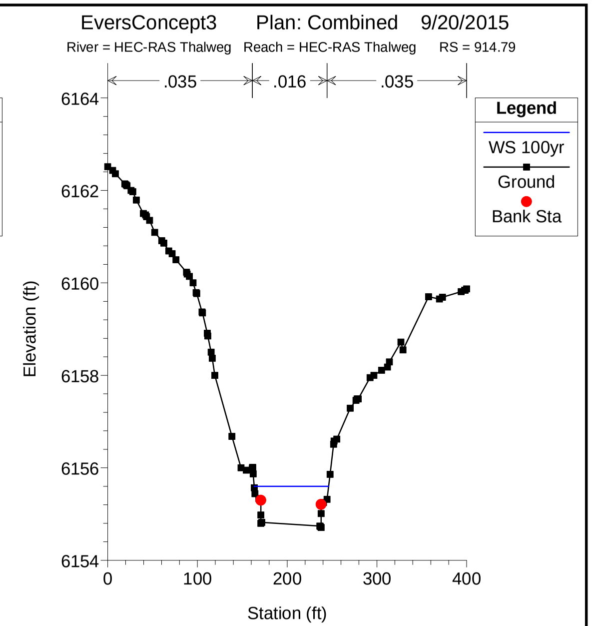


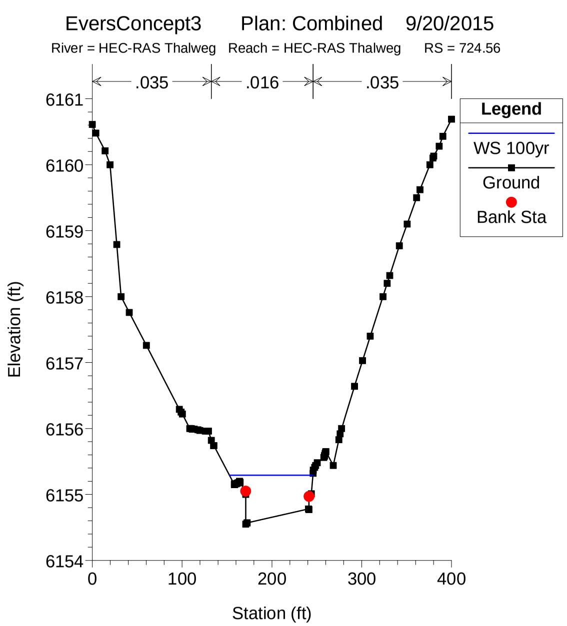
EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2267
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

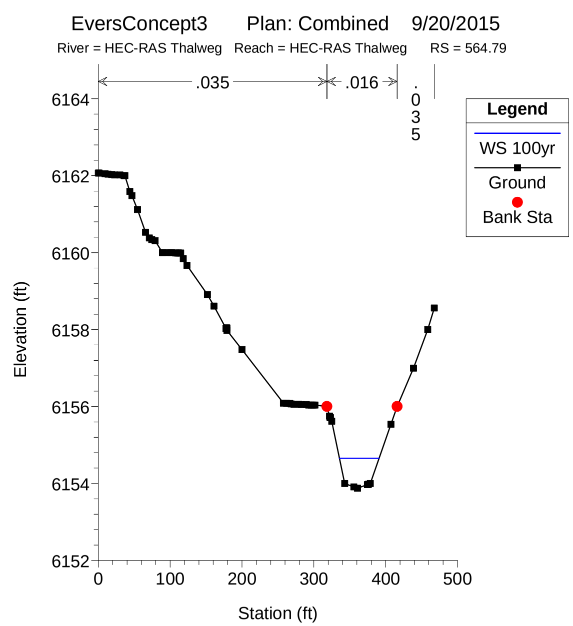

EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 2108.55
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1977
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1832.48
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1696.4
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1571.97
.035 .013 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1432.11
.035 .016 .035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1299.23
.035
.016
.016
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 1118.82
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 914.79
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 724.56
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


EversConcept3 Plan: Combined 9/20/2015
River = HEC-RAS Thalweg Reach = HEC-RAS Thalweg RS = 564.79
.035
.016
.035
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

APPENIDX C

COST ESTIMATES

BID SCHEDULE A - Alternative 1/Concept 1 (No Swale)					
Bid Item	Description	Estimated Quantity	Unit	Unit Price	Cost
1	General Work and Demolition	1	LS	$30,000.00	$30,000.00
2	Surveying	5966	LF	$2.50	$14,915.00
3	Material Testing	1	LS	$5,000.00	$5,000.00
4	Water Control	1	LS	$15,000.00	$15,000.00
5	Connection into existing storm sewer	1	LS	$15,000.00	$15,000.00
6	24-inch Dia. Storm Sewer Culvert - Laterals	800	LS	$84.00	$67,200.00
7	36-inch Dia. Storm Sewer Culvert - Laterals	150	LF	$106.00	$15,900.00
8	54-inch Dia. Storm Sewer Culvert	2233	LF	$220.00	$491,260.00
9	60-inch Dia. Storm Sewer Culvert	2748	LF	$252.00	$692,496.00
10	Manhole Risers/Bends	35	EA	$5,000.00	$175,000.00
11	Vault Manholes	4	EA	$18,000.00	$72,000.00
12	Curb Inlets (Concrete & Iron Works Installed)	100	EA	$3,500.00	$350,000.00
13	Trench Drain (Concrete & Iron Works Installed)	1	LS	$50,000.00	$50,000.00
14	Water Main Lowering	1	LS	$40,000.00	$40,000.00
16	Sanitary Sewer Pipe Replacement and Casing (15')	1	LS	$10,000.00	$10,000.00
				TOTAL COST	**$2,033,771.00**

BID SCHEDULE A: Alternative 2/Concept 2 (Swale)					
Bid Item	Description	Estimated Quantity	Unit	Unit Price	Cost
1	General Work and Demolition	1	LS	$30,000.00	$30,000.00
2	Surveying	6339	LF	$2.50	$15,847.50
3	Material Testing	1	LS	$5,000.00	$5,000.00
4	Water Control	1	LS	$15,000.00	$15,000.00
5	Connection into existing storm sewer	1	LS	$15,000.00	$15,000.00
6	24-inch Dia. Storm Sewer Culvert - Laterals	250	LS	$84.00	$21,000.00
7	36-inch Dia. Storm Sewer Culvert - Laterals	110	LF	$106.00	$11,660.00
8	54-inch Dia. Storm Sewer Culvert	3104	LF	$220.00	$682,880.00
9	60-inch Dia. Storm Sewer Culvert	2840	LF	$252.00	$715,680.00
10	Manhole Risers/Bends	35	EA	$5,000.00	$175,000.00
11	Vault Manholes	4	EA	$18,000.00	$72,000.00
13	Area Inlets (Concrete & Iron Works Installed)	50	EA	$4,500.00	$225,000.00
14	Trench Drain (Concrete & Iron Works Installed)	1	LS	$50,000.00	$50,000.00
15	Water Main Lowering	1	LS	$40,000.00	$40,000.00
16	Sanitary Sewer Pipe Replacement and Casing (15')	1	LS	$10,000.00	$10,000.00
				TOTAL COST	**$2,074,067.50**

BID SCHEDULE A - Alternative 3/Concept 3 (Combination of Concept 1 and 2)

Bid Item	Description	Estimated Quantity	Unit	Unit Price	Cost
1	General Work and Demolition	1	LS	$30,000.00	$30,000.00
2	Surveying	6755	LF	$2.50	$16,887.50
3	Material Testing	1	LS	$5,000.00	$5,000.00
4	Water Control	1	LS	$15,000.00	$15,000.00
5	Connection into existing storm sewer	1	LS	$15,000.00	$15,000.00
6	24-inch Dia. Storm Sewer Culvert - Laterals	558	LS	$84.00	$46,872.00
7	36-inch Dia. Storm Sewer Culvert - Laterals	116	LF	$106.00	$12,296.00
8	54-inch Dia. Storm Sewer Culvert	994	LF	$220.00	$218,680.00
9	60-inch Dia. Storm Sewer Culvert	5052	LF	$252.00	$1,273,104.00
10	Manhole Risers/Bends	35	EA	$5,000.00	$175,000.00
11	Vault Manholes	4	EA	$18,000.00	$72,000.00
12	Curb Inlets (Concrete & Iron Works Installed)	68	EA	$3,500.00	$238,000.00
13	Area Inlets (Concrete & Iron Works Installed)	28	EA	$4,500.00	$126,000.00
14	Trench Drain (Concrete & Iron Works Installed)	1	LS	$50,000.00	$50,000.00
15	Water Main Lowering	1	LS	$40,000.00	$40,000.00
16	Sanitary Sewer Pipe Replacement and Casing (15')	1	LS	$10,000.00	$10,000.00
				TOTAL COST	**$2,343,839.50**

Appendix D: Opinion of Probable Cost

- Preliminary Engineer’s Opinion of Probable Cost

EVERS BOULEVARD ROAD REHABILITATION 35% DESIGN PLAN
PRELIMINARY ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

TOTAL RECONSTRUCTION BISHOP BLVD. TO VANDEHEI AVENUE + SURFACING REPAIR FOR STORM SEWER TRENCH BISHOP BLVD. TO INLET/OUTFALL + SURFACING AND CURB & GUTTER REPAIR FOR STORM SEWER TRENCH, INLETS, AND TRENCH DRAIN FROM VANDEHEI AVENUE NORTH TO LIMITS OF STORM SEWER IMPROVEMENTS. WATER AND SANITARY SEWER IMPROVEMENTS ARE NOT INCLUDED.

9/22/2015

DESCRIPTION	UNIT	ESTIMATED QUANTITIES	UNIT COST	TOTAL COST
BONDS AND INSURANCE	LS	LUMP SUM	$41,110.00	$41,110.00
FORCE ACCOUNT WORK	$$	1	$200,000.00	$200,000.00
MOBILIZATION	LS	LUMP SUM	$360,000.00	$360,000.00
CONTRACTOR SURVEYING	LS	LUMP SUM	$65,000.00	$65,000.00
CONTRACTOR TESTING AND QUALITY CONTROL	LS	LUMP SUM	$40,000.00	$40,000.00
TEMPORARY CONSTRUCTION FENCE (AS DIRECTED)	LF	2000	$2.00	$4,000.00
REMOVE RETAINING WALL	LS	LUMP SUM	$10,000.00	$10,000.00
TREE REMOVAL	EA	5	$3,000.00	$15,000.00
EROSION CONTROL AND STORM WATER MGMT.	LS	LUMP SUM	$25,000.00	$25,000.00
DEMOLITION OF EXISTING STORM SEWER	LS	LUMP SUM	$2,500.00	$2,500.00
REMOVAL OF SURFACING	SY	22317	$5.50	$122,743.50
REMOVAL OF SIDEWALK	SY	2457	$8.00	$19,656.00
REMOVAL OF CURB AND GUTTER	FT	6320	$5.00	$31,600.00
REMOVAL OF DOUBLE GUTTER	SY	760	$9.00	$6,840.00
REMOVAL OF VALLEY PAN	SY	780	$9.00	$7,020.00
REMOVAL OF PIPE	LF	70	$18.00	$1,260.00
REMOVAL OF INLET	EA	3	$600.00	$1,800.00
REMOVE AND RESET FENCE (WYDOT ROW)	LF	50	$40.00	$2,000.00
REMOVE AND RESET FENCE (PRIVATE)	LF	100	$30.00	$3,000.00
UNCLASSIFIED EXCAVATION	CY	5675	$15.00	$85,125.00
IMPORT TRENCH BACKFILL	CY	322	$27.00	$8,694.00
EXCAVATION BELOW SUBGRADE	CY	1448	$15.00	$21,720.00
REGRADE GRAVEL DRIVEWAYS	LS	LUMP SUM	$2,000.00	$2,000.00
SODDING	SY	3264	$15.00	$48,960.00
TOPSOIL (4")	CY	425	$22.00	$9,350.00
CRUSHED BASE (8" UNDER PAVEMENT, 8" UNDER C&G, 4" UNDER SIDEWALK)	TON	10862	$34.00	$369,308.00
HOT PLANT MIX (6")	TON	6500	$99.00	$643,500.00
PRECAST WALL COMPONENT SYSTEM	SF	1022	$32.00	$32,704.00
24-INCH DIA. CULVERT - LATERALS	FT	558	$84.00	$46,872.00
36-INCH DIA.CULVERT - LATERALS	FT	116	$105.75	$12,267.00
54-INCH DIA. CULVERT	FT	994	$165.00	$164,010.00
60-INCH DIA. CULVERT	LF	5052	$252.00	$1,273,104.00
48-INCH DIA. MANHOLE AND MANHOLE RISERS/BENDS	EA	35	$5,000.00	$175,000.00
STORM SEWER VAULT MANHOLE	EA	4	$18,000.00	$72,000.00
CURB INLET (CONCRETE AND IRON WORKS, INSTALLED)	EA	68	$3,500.00	$238,000.00
AREA INLET (CONCRETE AND IRON WORKS, INSTALLED, BOTTOM OF SWALE)	EA	28	$4,500.00	$126,000.00
TRENCH GRATE (20' x 4')	LS	LUMP SUM	$50,000.00	$50,000.00
WATER LINE LOWERING (24" IN CASING PIPE)	LS	LUMP SUM	$40,000.00	$40,000.00
SANITARY SEWER PIPE REPLACEMENT AND CASING (15" IN CASING PIPE)	LS	LUMP SUM	$10,000.00	$10,000.00
4" SIDEWALK (CONC)	SY	3755	$50.00	$187,750.00
CURB AND GUTTER TYPE A	FT	7535	$22.00	$165,770.00
DOUBLE GUTTER	SY	1644	$62.00	$101,928.00
CONCRETE VALLEY GUTTERS	SY	953	$100.00	$95,300.00
CONCRETE ISLAND SLOPED NOSE	EA	6	$1,000.00	$6,000.00
2' CONCRETE STRIP, 6" THICK	SY	278	$62.00	$17,236.00
SWALE PLANTINGS	SF	4984	$28.00	$139,552.00
4' COBBLE CHANNEL	TON	187	$100.00	$18,700.00
TREE PROTECTION	EA	7	$3,300.00	$23,100.00
STAIR AND RAILING (JESSUP ELEMENTARY SCHOOL)	LS	LUMP SUM	$6,000.00	$6,000.00
SIGNS (INCL. REMOVE AND RESET EXISTING AND NEW SIGNS)	LF	2942	$7.25	$21,329.50
CROSSWALKS, THERMOPLASTIC	SF	495	$20.00	$9,900.00
STOP BARS, THERMOPLASTIC	SF	48	$19.00	$912.00
BIKE SYMBOL, THERMOPLASTIC	EA	18	$200.00	$3,600.00
"SCHOOL" LEGENDS, THERMOPLASTIC	EA	2	$1,900.00	$3,800.00
4 in STRIPE, EPOXY	LF	11432	$1.15	$13,146.80
FLAGGING	HR	2000	$29.00	$58,000.00
TEMPORARY TRAFFIC CONTROL	LS	LUMP SUM	$120,000.00	$120,000.00

TOTAL:	$5,379,167.80
15% CONTINGENCY:	$806,875.17
TOTAL ESTIMATED CONSTRUCTION COST:	$6,186,042.97
10% FINAL DESIGN:	$618,604.30
7% CONSTRUCTION ADMINSTRATION:	$433,023.01
TOTAL ESTIMATED COST:	**$7,237,670.27**

DISCLAIMER:

Because the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost or Project Cost provided herein are to be made on the basis of of Engineer's experience and qualifications, and represent Engineer's best judgement as an experienced and qualified Professional Engineer familiar with the construction industry. However, Engineer cannot and does not guarantee that proposals, bids or actual Project or Construction Cost will not vary from Opinions of Probable Cost prepared by Engineer. If, prior to Bidding or Negotiating for Construction, the Owner wishes greater assurance as to Construction Cost or Project Cost, Owner should employ an independent Cost Estimator.

Appendix E: Complete Streets Checklist

CONTEXT SENSITIVITY GUIDELINES FOR CONVERTING EXISTING COLLECTORS TO COMPLETE STREETS WHEN RECONSTRUCTION IS PLANNED

What is a Complete Street?

- Complete streets provide facilities for all modes of transportation within the public Right of Way on or adjacent to streets.

What are the various modes of transportation?

- Vehicular
- Pedestrian
- Bicycle
- Transit

Vehicles

YES	NO	
______	_____	Do the lane widths for the travel lanes match the width listed in the *City of Cheyenne Unified Development Code* for this type of Collector roadway?
______	_____	Is a center turn lane warranted?
______	_____	Is speeding an issue, either perceived or a reality?
______	_____	If yes, can raised medians, landscape buffers, or other traffic calming measures be incorporated into the reconstruction?
______	_____	Are there school zones within the corridor?
______	_____	If yes, are the school zones adequately signed to reduce vehicle speeds and increase driver awareness within the school zone?

Pedestrians

YES	NO	
______	_____	Is there existing sidewalk on both sides of the roadway?
______	_____	Is there a buffer between the sidewalk and the travel way in the form of a landscape area, hard scape, or parking lane?
______	_____	If there is no buffer the minimum desirable sidewalk width is 6 feet. Will a 6 foot sidewalk fit inside the available right-of-way?
______	_____	Do the existing sidewalks meet ADA design guidelines for cross slope?
______	_____	Do the existing sidewalks meet ADA design guidelines at driveway/approaches and street corners?

______ _____ Do the existing sidewalks meet ADA design guidelines for tripping hazards?

______ _____ If there are existing traffic signals, do they have pedestrian count down timers?

______ _____ If there is a school zone crossing within this corridor does it have rapid flashing beacons, school zone reverse flashers or hawk beacons at the crossing?

______ _____ Is there pedestrian scale street lighting?

Bicycle

YES NO

______ _____ Is there a dedicated on-street bicycle lane?

If there is not an existing on-street bicycle lane, one should be included in the reconstruction design based on the Collector Type (A, B, or C)

______ _____ If yes, does the width of the on-street bicycle lane meet the On-Street Facility Design Guidelines established in the latest adopted version of the *Cheyenne On-Street Bicycle Plan and Greenway Plan*?

______ _____ Is there on-street parking along this corridor? (Collector Type C)

______ _____ If yes, is there a high turn-over of the parked vehicles? If yes, consideration should be given to widening the shared parking/bike lane to provide additional space between vehicle doors being opened and the bike riders.

______ _____ Is this a Collector Type C adjacent to a school or City Park which would encourage bicycle usage by cyclists of all abilities? If yes, consideration should be given to including a dedicated on-street marked bicycle lane rather than a shared parking/bike lane.

______ _____ Is this roadway included as a future bicycle network facility in the latest adopted version of *Plan Cheyenne*, or as a Proposed Bikeway Network Project in the latest adopted version of the *Cheyenne On-Street Bicycle Plan and Greenway Plan*?

______ _____ If yes, design should include coordination with the Parks and Recreation Trails Planner / Coordinator.

______ _____ Are the drainage facilities along the corridor compatible with bicycles, such as appropriate inlet grates and bicycle lane widths in the vicinity of inlets?

Street Crossings

YES NO

______ _____ Are the existing crosswalks marked with paint and/or signage?

______ _____ Are existing crosswalks located in the ideal place where crossings most frequently occur?

______ _____ Has a stop bar been considered at crosswalk locations?

______ _____ Can crossing widths be reduced at crosswalk locations by adding bulbouts or refuge medians?

______ _____ Is there adequate lighting at the crossing location?

______	_____	Does the crossing location meet ADA guidelines for cross slope and vertical slope?
______	_____	Are there existing drainage issues which cause ponding at street crossing locations?
______	_____	Do the corner radii meet the criteria established in the *Uniform Development Code*?
______	_____	Large corner radii encourage speeding for turning vehicles – can the radii be reduced?
______	_____	If there is a channelized right turn lane, is it warranted or can it be eliminated?
______	_____	If there is a channelized right turn lane, does it have a low-angle (112°) design to slow drivers and provide improved visibility?
______	_____	Is there a median pedestrian refuge island that is adequately designed for pedestrian access and visibility of pedestrians?
______	_____	If the intersection is signalized, are 'right turns on red' prohibited?

Transit

YES	NO	
______	_____	Is there a transit stop along this corridor?
______	_____	If yes, is there adequate, direct pedestrian sidewalk access to the transit stop?
______	_____	If yes, does the transit stop meet ADA guidelines for widths, slopes, clearance, etc.?
______	_____	If yes, is there appropriate pedestrian lighting at the transit stop?
______	_____	If yes, is there a transit passenger shelter, bench, bike rack, or other amenities?

Context Sensitive Design

In a Context Sensitive Design the character and desired functionality of a corridor is incorporated into the design. This is achieved by including the land owners and corridor users in the design process to solicit their input and incorporate it into the design to a reasonable extent. A context sensitive design is not achieved by *telling* the public what will be done, but rather by *asking* them what they would like to have included in the design and then using engineering judgement to decide which elements can be included. A broad range of engagement strategies shall be used to reach and to gather input from affected persons.

YES	NO	
______	_____	Have the adjacent landowners been contacted about the proposal to reconstruct the street?
______	_____	Are there any destinations outside of the reconstruction area which would be accessed along the reconstruction area or by crossing the reconstruction area?
______	_____	If yes, has an effort been made to contact the public who access the destination via this reconstruction area?
		Public participation in a context sensitive design is outcome based. The desire is to achieve a consensus. To accomplish this there needs to be a minimum of two public involvement processes; one to ask for input from interested persons and one to present the ideas gathered and share the intended design for comment.
______	_____	Has there been at least two public involvement processes?
______	_____	Was a consensus achieved among the participants in the public involvement process?
______	_____	Were additional public involvement efforts made to achieve a context sensitive design outcome? Examples of additional opportunities include the use of MindMixer, project mailers, etc.
______	_____	Does the street design reflect the adjacent land use context character?
______	_____	Does the design include landscaping?