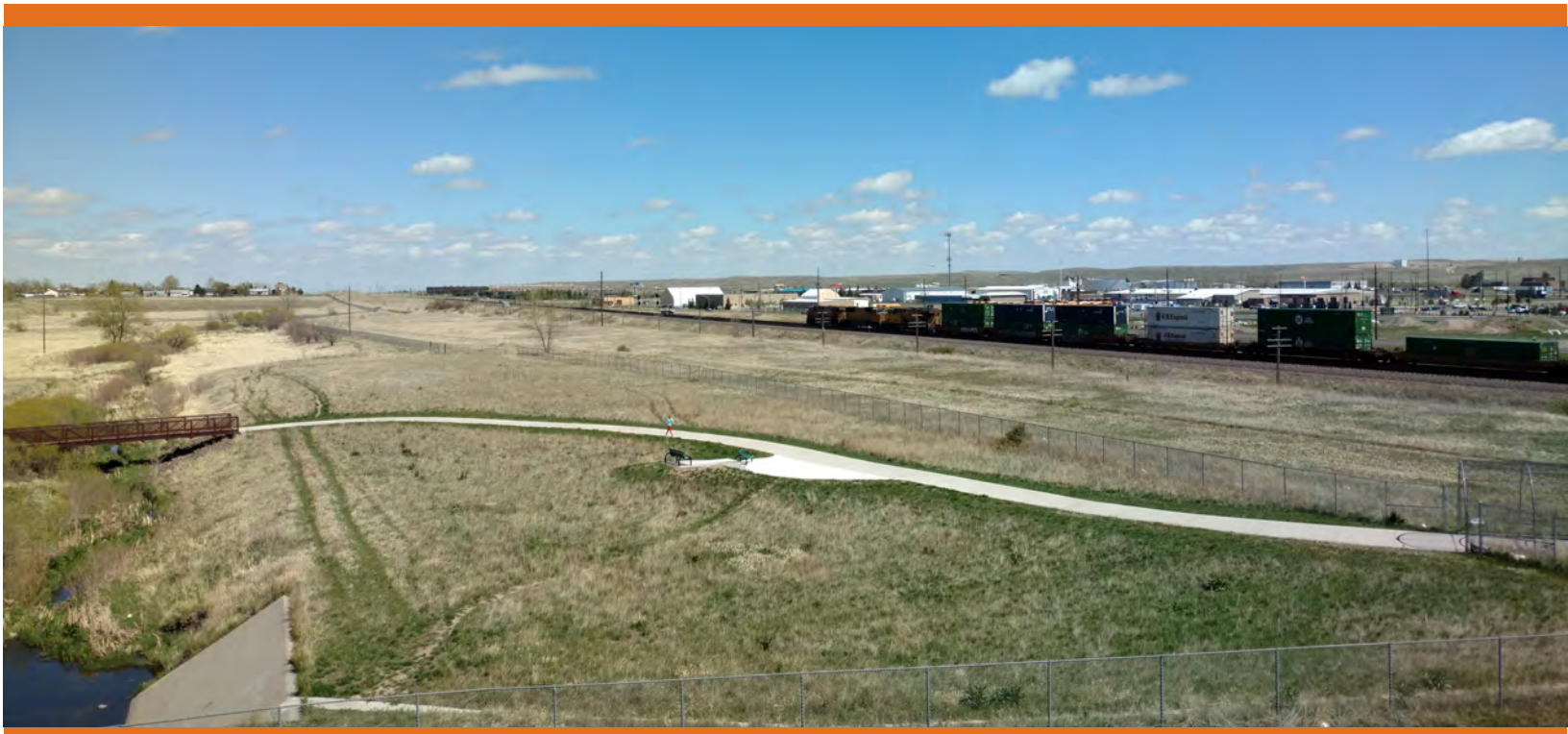
# Southeast Greenway Trail Connector Plan



Prepared for:

Cheyenne Metropolitan Planning Organization

**Draft: October 31, 2017**

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AYRES ASSOCIATES

# Southeast Greenway Trail Connector Plan

## Railroad Crossing Location and Structure Type Report Including 35% Design Plan

**Prepared for:**

**Cheyenne Metropolitan Planning Organization (MPO)**

**DRAFT October 2017**

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"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."

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File: x:\department folders\nancy's projects\southeast greenway trails connector\draft plan\se greenway trail connector_draft_nov 1.docx

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# Executive Summary

## Purpose

Greenway users in Cheyenne, Wyoming, have identified a crossing of the Union Pacific Railroad tracks, in the vicinity of the Sun Valley Neighborhood, as a priority. A connection is desired from the existing Greenway near the Sun Valley open space to the existing Greenway near the intersection of Burlington Trail and HR Ranch Road. These connection points are shown as red asterisks in Figure 1 The MPO undertook this planning effort to determine the optimal location that would be used by the most non-motorized travelers for this Greenway connector.


Figure 1: Area Location Map

## Considerations

Crossing the Union Pacific Railroad (UPRR) tracks near the Sun Valley Open Space will provide an opportunity for not only Greenway users to access future and existing Greenway trails, but will also serve a utilitarian function for users who wish to access the businesses along Campstool Road with a safe crossing of the railroad tracks. One such business, Walmart, was specifically named as a destination by more survey respondents than any other. Other named destinations included Laramie County Community College (LCCC), Sierra Trading Post, Echostar, Green House Data, Magpul, Lowes Distribution Center and the Dry Creek Reclamation Center.

Designing a crossing of a barrier, such as the railroad tracks, needs to be done with usability in mind. Grade separated crossings are expensive; installing a crossing that is not appealing to users could result in spending money to construct a crossing that doesn't get used. Thought must be given to design and placement of a grade separated crossing such that users will willingly use that crossing rather than any other available option. The other options for crossing the railroad tracks in this area are:

- Using the existing College Drive bridge, which lacks pedestrian and bicycle facilities, requiring users walk or bike on the shoulder of this high-speed roadway.
- Using the existing Norris Viaduct Bridge, which has a sidewalk but is located 1.5 miles west of College Drive.
- Using the soon-to-be constructed Christensen Road overpass, which will have a Greenway path but will be located nearly 3.5 miles east of College Drive.
- Walking directly across the railroad tracks - an option that is done so often that a path has been worn in the prairie grass between the tracks and the existing Greenway.

## Explored Alternatives

Three bridge locations were explored with this project. These locations are shown in Figure 2. Bridge location A was selected as the optimal location for the crossing. Bridge location B was selected as the second-best location because of its proximity to Walmart. It was discarded as the optimal location because a bridge in that location would require ramps on both sides of the bridge in excess of 30' high. Bridge location C was the most attractive option to the recreational Greenway user but would not provide a sidewalk to Walmart as the Greenway path in this location would cross Campstool Road and head directly south down Burlington Trail.


Figure 2: Bridge Location Options

Additionally, two underpass / tunnel locations were explored with this project. These locations are shown in Figure 3. An underpass was not selected as the optimal crossing type. Underpass Option 1 was selected as the optimal *location* for an underpass due to its proximity to Walmart for pedestrians and bicyclists. However, Underpass Option 2 is a better location from an *engineering* standpoint in that the existing topography in that location will allow for more clearance between the top of the underpass structure and the railroad tracks. Underpass Option 2 can be designed and constructed such that only nuisance storm water will enter the tunnel. Whereas, in Option 1 the south end of the tunnel is lower in elevation than the existing storm water ditch on the north side of Campstool Road, requiring additional piping or pumping of the storm water to ensure that the tunnel does not get flooded during a storm event.


Figure 3: Underpass Location Options

## Conclusion

The optimal location for the crossing of the UPRR was determined to be a pedestrian bridge near College Drive. This bridge location will allow for a Greenway path to be constructed along Campstool Road between the end of the pedestrian bridge and Burlington Trail and then continue south on Burlington Trail to HR Ranch Road. This Greenway path will provide pedestrian and bicycle access to Walmart as well as an opportunity to connect to the future LEADS trail and existing trails around Sierra Trading Post. A second Greenway path will be constructed around the perimeter of the Sun Valley Open Space. A Greenway loop trail around this open space would provide a 1.4-mile-long loop trail which interconnects to existing sidewalk in the Sun Valley neighborhood as well as to an existing trail head at the end of Baldwin Drive.


Figure 4: Preferred Overpass and Greenway Alignment

# Southeast Greenway Trail Connector Plan

## Introduction

Greenway users in Cheyenne, Wyoming, have identified a crossing of the Union Pacific Railroad tracks, near the Sun Valley Neighborhood, as a priority. A connection is desired from the existing Greenway near the Sun Valley open space to the existing Greenway near the intersection of Burlington Trail and HR Ranch Road. These connection points are shown as red asterisks in Figure 5: Area Location Map. The MPO undertook this planning effort to determine the optimal location that would be used by the most non-motorized travelers for this Greenway connector.


Figure 5: Area Location Map

A project Steering Committee was formed to help guide the project. The Steering Committee included: Derrek Jerred, Cheyenne LEADS; Jeff Wiggins and Jason Sanchez, Cheyenne Parks & Recreation Dept.; Tim Morton and Mariah Johnson, WYDOT; Mark Escobedo, City Engineer's Office; Logan Ward and Stephanie Lowe, Cheyenne City Urban Planning; Nancy Olson and Tom Mason, Cheyenne MPO; Darci Hendon, Ayres Associates; and Larry Gallagher, Summit Engineering. As part of the on-line survey interested citizens were asked to join the Steering Committee. These additional members were: Karen Clark-Bond, Citizen Member; Lee Woofenden, Citizen Member; and Jeff Morrow, Citizen Member.

# Existing Conditions

Currently the area around the Sun Valley Open Space, including College Drive and Campstool Road, is lacking in pedestrian and bicycle accommodations. College Drive, in this area, does not have a sidewalk. Additionally, the College Drive bridge over Campstool Road has a very narrow shoulder, specifically at the corner of Campstool Way and College Drive where dual left turns have been installed for southbound College Drive traffic. Because of the high traffic speeds and lack of pedestrian facilities on College Drive pedestrians are discouraged from walking on this roadway. However, there is not currently a safe way for pedestrian and bicyclists to cross the UPRR tracks in this location and thus, many people use the existing College Drive bridge.

Figure 6: College Drive Bridge over UPRR

Some bicyclists and pedestrians are walking directly over the UPRR tracks, using an existing hole in the chain link fence to get from the existing Greenway to Campstool Road . Neither of these current options; walking directly over the railroad tracks, nor walking adjacent to traffic on College Drive, is a safe option. The nearest pedestrian and bicycle friendly crossing of the UPRR tracks is at the Norris Viaduct bridge, located 1.5 miles west of College Drive via the existing Greenway path on the north side of the UPRR tracks. The Christensen Road project is scheduled to be constructed in 2018. This project is located 3.5 miles east of College Drive and will provide pedestrian facilities on a bridge over the Union Pacific Railroad (UPRR) tracks. Because of the distance between the Norris Viaduct bridge and the future Christensen Road bridge, another pedestrian crossing of the Union Pacific Railroad tracks is desired near the densely populated Sun Valley Neighborhood.

Designing a crossing of a barrier, such as the railroad tracks needs to be done with usability in mind. Grade separated crossings are expensive; installing a crossing that is not appealing to users could result in spending money to construct a crossing that doesn't get used – resulting in the continued crossing of the railroad tracks via the hole in the fence or on the College Drive bridge which lacks pedestrian facilities.

Figure 7: Hole in Chain Link Fence, looking north

Figure 8: Track from Hole in Fence, looking south

Thought must be given to design and placement of a grade separated crossing so non-motorized travelers will voluntarily use that crossing rather than any other available option. According to Perils for Pedestrians, a television series examining issues affecting people who walk (www.pedestrians.org), "There is a natural 'desire line' that can be used for a gradual ramp up to the bridge [or underpass] without switchbacks." A pathway where users do not perceive the ramp as an inconvenience because it is along their natural line of travel will be voluntarily used by more people. Perils for Pedestrians further states, "Long winding ramps are perceived as inherently inconvenient by most pedestrians when a grade-level crossing is possible." Fencing can temporarily force pedestrians to cross at a grade separated crossing, but as is repeatedly seen at the fence adjacent to the Sun Valley Open Space, the hole in the fence is repaired by Parks staff just to reappear a short time later.

This particular Greenway location will likely get used by two different types of Greenway users: 1) commuters who are accessing a desired location and 2) users who are on the Greenway for recreational purposes and not necessarily to get to a specific destination. These two groups may have different expectations of the Greenway. A commuter is often seeking the most direct route to a destination. A recreational user is attracted to a Greenway segment because of the aesthetic experience of that route or a route that is removed from vehicular traffic. Recreational users are likely to use the proposed crossing of the railroad tracks at the Sun Valley Open Space wherever it is constructed as this grade separated structure will provide a much safer crossing of the tracks than the existing College Drive bridge. A commuter will have to make the choice between riding or walking on the College Drive bridge, which lacks pedestrian and bicycle facilities and where they are competing for space with vehicles traveling at high speeds, or using the grade separated crossing of the tracks that may not provide direct access to their destination. Both types of Greenway users were considered throughout this study.

# Greenway Planning

Providing a safe crossing of the UPRR tracks near the Sun Valley Open Space has long been a vision for the Cheyenne Greenway. The *2007 Greenway Extension Plans*, July 2009 by Nolte Associates, Inc. identifies a loop trail around the Sun Valley Open Space as well as a future crossing of the railroad tracks. *The Fox Farm Road Corridor Plan*, September 2013 by AVI Professional Corporation also identifies a possible future pedestrian crossing of the railroad tracks as well as a conceptual plan for the Greenway along Burlington Trail. Figure 9 identifies the loop trail around the Sun Valley Open Space, a crossing of the railroad tracks, and a trail adjacent to Burlington Trail as "Future Greenway – not currently funded." Additionally, Cheyenne LEADS is actively working to design and construct a Greenway along Campstool Road from just east of Burlington Trail to Christensen Road.


Figure 9: South East Connections Greater Cheyenne Greenway Map

This Plan explores both underpass and overpass crossings of the UPRR tracks. The crossing would then be tied into the existing Greenway adjacent to the Sun Valley Open Space and to the existing Greenway along HR Ranch Road.

## Sun Valley Open Space

The Sun Valley Open Space functions as a large detention pond for the Sun Valley area. It is bordered on the north and east by residential homes, on the west by College Drive, and on the south by the UPRR tracks. Storm water enters this open space via drainage channels along the south end of Monroe, Madison and Cleveland Avenues as well as a series of drainage structures under College Drive. Storm

water leaves this detention pond via three culverts located toward the eastern half of the pond that direct the water under the UPRR tracks and under Campstool Road.

The elevation varies along the perimeter of the open space, but is about four to six feet higher than the bottom of the detention area. A Greenway loop trail around this open space would be placed near the top of the open space detention pond so the trail will be submerged only during a very large flooding event. This loop trail would provide a 1.4-mile-long loop which would connect to existing sidewalk in the Sun Valley neighborhood as well as to an existing trail head at the end of Baldwin Drive. The Greenway will need to be designed and located such that the storage capacity of the Sun Valley Open Space pond is not reduced.

Conceptual plans for this Greenway loop around the Sun Valley Open Space are contained in Appendix E. An estimate of probable construction costs has been included in Appendix F.

# Union Pacific Railroad Crossing Considerations

The Union Pacific Railroad allows grade separated trail crossings of their tracks. Together, the UPRR and BNSF Railway produced a document: *Guidelines for Railroad Grade Separation Projects* which outlines procedures that must be followed for all projects involving the crossing of railroad property. This document addresses both underpass and overpass crossings.

## Underpasses

Section 7.3.2 of these Guidelines states: "The Railroad discourages the construction of new Underpass Structures. If an underpass structure is the only feasible structure type for the proposed site, a detailed type selection report must be submitted to justify its use. Underpass trail crossings which also serve to convey water are not permitted." Other requirements for underpasses include:

- Vertical clearance/height of the pathway underpass shall be not less than 8 feet.
- Union Pacific requires a ¼" maximum track settlement limit produced by any temporary or permanent construction. Continual measurement of track profile near the work will be required during construction.
- An underpass structure must meet the UPRR requirements of at least 3.5' of cover between the structure and the bottom of the railroad ties.
- Adequate lighting shall be provided per AASHTO Roadway Lighting Design Guide requirements.

Construction of an underpass can be done one of two ways: 1) building a temporary shoofly track and then constructing the underpass in an open cut or 2) constructing the underpass using a tunneling method where the underpass is constructed while the railroad tracks are still in service. At the east end of the Sun Valley Open Space there are two UPRR tracks; a third track is added about half-way between Burlington Trail and College Drive. The shoofly option would require at least two of these tracks, possibly all three at the discretion of the UPRR, to be constructed north of the existing tracks. While there is adequate room in the Sun Valley open space to construct these shoofly tracks, the construction would be very expensive. A significant amount of import fill material would be required to create an embankment equal to the elevation of the existing track on which to place the shoofly tracks. Signals and signal wiring would need to be installed along the shoefly tracks to match the existing signals in this location. Because of the great expense of a shoefly track installation, other construction methods were explored.

The UPRR permits pipe and concrete box culverts to be used as underpass crossings provided they are designed per Railroad and AREMA (American Railway Engineering and Maintenance-of-Way Association) requirements. A common type of construction of this nature is a jacked box culvert. This method starts by constructing a box culvert at one end of the embankment. A steel excavation shield is attached to the leading face of the box culvert and acts as both a cutting face and support to the remaining embankment above and to the sides of the open cut in front of the box culvert. The box is then jacked into the embankment a small distance. Then the soil is excavated. The process repeats until the box culvert face is jacked to the other side of the embankment.

Figure 10: Image of Box Culvert Jacking

Summit Engineering investigated an alternative construction method that was used to construct the Alkali Creek Tunnel in Billings, Montana. This is a pedestrian tunnel under Main Street, a 7-lane State Highway. It was constructed by Stillwater Excavating using CONTECH's 2-Flange Tunnel Liner Plate, a multi-plate arch: corrugated steel pipe. The liner plate is delivered unassembled to the job site; the sections are roughly 4' long by 18" wide. Prior to beginning assembly of the pipe 14' – 16' long rebar was inserted horizontally into the undisturbed soil. An I-beam was then installed with chains holding the exposed ends of the rebar in place; see Figure 11. This assembly secured the existing soil so that excavation could begin. A 10' long section of liner plate was assembled and placed to establish the correct alignment for the pipe and excavation began; see Figure 12
Beginning at the top of the structure and working the way down the sides, enough earth was excavated to allow the placement of an 18" wide section of liner plate. As a section was completed from top to

bottom the plates were bolted together and the excavation advanced another 18”; see Figure 13. Using this method, 4’ to 6’ of liner plate was installed each day. At the end of each day grout was injected between the earth and the structure to seal any air cavities resulting from the excavation. Following the grout injection more rebar was extended into the earth at the front of the liner plate to support the earth for the next day’s excavation and liner plate construction.

Figure 11: Alkali Creek Tunnel - Earth Support

Figure 12: Alkali Creek Tunnel – Excavation to Begin


Figure 13: Alkali Creek Tunnel - Liner Plate Assembly

A discussion on the underpass options explored with this report can be found in the Underpass Options section of this Plan, beginning on page 15.

## Overpasses

Section 5 of the *Guidelines for Railroad Grade Separation Projects* provides the requirements for an overpass structure. Section 5.5 of these Guidelines state: "…every effort shall be made to utilize a structure type that will not require interruption to Railroad operations during construction." For this reason, a pre-fabricated pedestrian bridge is the desired structure type for an overpass. A pre-fabricated bridge is made in a factory and brought to the site. The contractor then uses a crane to set the bridge on the structural supports that has previously been constructed. This method minimizes the time the railroad tracks are restricted to traffic compared to constructing a cast-in-place structure.

The Guidelines further state: "The preferred Overhead Structure is one that will span the entire Railroad right-of-way. Designs which do not clear span the Railroad right-of-way…should not progress beyond 30% without the Railroad's written approval." Section 5.2.2 states "Where it is impracticable to clear span the Railroad right-of-way, provide written justification and request for variance for the proposed design. The request should succinctly describe geometric, structural and other constraints which make a clear-span alternative unfeasible and shall show that all options have been exhausted. Cost alone should not be the determining factor."

The Railroad right-of-way in the vicinity of the Sun Valley Open Space exceeds 300'. A prefabricated bridge structure with a clear span longer than 300' is not a practical solution. CONTECH, a pre-manufactured bridge supplier, has manufactured a tied arch pre-fabricated pedestrian bridge for installation over Interstate 25 near Denver, Colorado. The cost of the bridge structure was over $1 million; this price does not include installation. Because a structure with such a long clear span is not a viable option, a variance will need to be requested of the UPRR to allow for piers to be placed inside

railroad right-of-way to support the structure. The College Drive bridge, located on the west side of the Sun Valley Open Space is supported by piers that are located inside UPRR right-of-way. This existing bridge should be discussed in the variance request and the proposed piers for the overpass shall be placed the same horizontal distance from the tracks as the existing College Drive Bridge.

Other requirements for overpasses, as stated in the Guidelines, include:

- Vertical clearance shall be 23'-4" measured from the top of the highest rail to the lowest obstruction under the structure. This clearance is to consider future tracks and future track raises as determined by the Railroad.
- Abutments and piers shall be located more than 25 feet measured perpendicular from centerline of nearest existing or future track.
- Fence shall be provided and provide a positive means of protecting the Railroad facility and the safety of the Railroad employees below from objects being thrown or falling off the structure.

## UPRR Approval Process

Prior to beginning final design of either an overpass or an underpass structure in this location a Preliminary Engineering Agreement (PEA) will need to be executed between the UPRR and the City of Cheyenne. A PEA letter is sent to the Manager of Special Projects for the UPRR. This letter includes preliminary design plans and photos of the project site. As stated on the PEA, the UPRR estimates that their review of the preliminary engineering and other preliminary costs will be $20,000. It is recommended that a geotechnical report and structural calculations accompany the submittal of the PEA and design plans. If an underpass is pursued, detailed construction methodology and accompanying structural calculations are to be included. A sample PEA has been included in Appendix A.

Section 3 of the *Guidelines for Railroad Grade Separation Projects* provides the following table outlining the design and construction submittals required for an overhead structure.

Table 1: UPRR Overhead Structure Submittals

| Phase | | Type of Submittal | Format | Railroad Review Time |
|---|---|---|---|---|
| Design | A | Concept (Plans and Site Pictures) | PDF only* | 4 weeks** |
| | B | 30% (Applicant response, Design Plans, Project Specifications, Drainage Report & Plan, Shoofly Design, Construction Phasing Plans) | PDF only* | 4 weeks** |
| | C | Final Plans (Applicant response, Design Plans, Project Specifications, Drainage Report & Plan, Shoofly Design, Construction Phasing Plans) | PDF only* | 4 weeks** |
| Construction | | (Including but not limited to the following)<br>Shoring<br>Falsework<br>Demolition<br>Erection<br>Erosion Control<br>Construction Phasing Plans | PDF only * | 4 weeks** |

Table 2: UPRR Underpass Structure Submittals

| Phase | | Type of Submittals | Format | Railroad Review Time |
|---|---|---|---|---|
| Design | A | **Concept** (Plans and Site Pictures) | PDF * | 4 weeks*** |
| | B | 30% (Applicant response, Type Selection Report, Design Plan, Shoofly, Construction phasing) | PDF * | |
| | C | 60% (Applicant response, Design Plans and Calculations, Geotechnical Report, Project Specifications and/or Special Provisions, Drainage Report and Plan, Shoofly Design, Construction phasing) | PDF * | 6 weeks*** |
| | D | **Final Plans** (Applicant response, Design Plans and Calculations, Geotechnical Report, Project Specifications and/or Special Provisions, Drainage Report and Plan, Shoofly Design, Construction phasing) | PDF & 1 hard copy ** | 4 weeks*** |
| Construction | | (Including but not limited to the following)<br>Construction Phasing Plan<br>Shoring<br>Falsework<br>Demolition<br>Erection<br>Erosion Control<br>Construction Material Certifications<br>Concrete Mix Design<br>Structural Steel, Rebar and Strand Certifications<br>28 day Cylinder Test of Concrete Strength<br>Waterproofing Material Certification<br>Test reports for fracture critical members<br>Foundation Construction Reports (eg.: pile driving records, caisson drilling and/or crosshole sonic log testing for drilled shafts.)<br>Other project specific information as requested by the Railroad | PDF * | 4 weeks*** |
| Project Closing | E | **As Built** (Final Plans, Construction Documents, Shop Plans, Pile Driving Records.) | PDF * | N/A |

# Underpass Options

Two underpass locations were considered with this Plan. These underpass locations are show in Figure 14. When compared to an overpass, an underpass offers a crossing with much less vertical climb required for Greenway users. The topography of this area is ideal for an underpass crossing because the railroad tracks themselves are located on a tall embankment. The area on either side of the railroad tracks is at a lower elevation than the tracks. This allows for an underpass under the tracks that daylights at about the same elevation as Campstool Road. For this reason, a Greenway user won't feel like they are walking down into an underpass and back out again.

The main design considerations for an underpass in this location are:

- The underpass needs to be designed such that the integrity of the Sun Valley Open Space as a detention pond is maintained; the north end of the underpass cannot allow water from the detention pond to enter.
- An underpass that crosses under the railroad tracks at a 90-degree angle will be the shortest and likely the most cost effective crossing.

- The UPRR property is 300'± wide in this location. To keep Greenway users on the Greenway, and not free to enter the UPRR property, a fully enclosed chain link fence will be installed from the end of the underpass to the property fence.
- The UPRR will require full access to their maintenance road that runs parallel to the south side of the tracks. To maintain this access the underpass will extend under the maintenance road as well as under the tracks.


Figure 14: Underpass Options

## Underpass Option 1

The preliminary conceptual plan and profile for Option 1 is shown as Exhibit A. The north end of this underpass is located adjacent to the Sun Valley Open Space. The Greenway will need to run parallel to the southern embankment of the pond with either a retaining wall or earthen embankment built to keep the storm water in the detention pond and not flowing through the underpass. In order to meet the UPRR requirements of 3.5' of cover between the top of the structure and the bottom of the rail ties, the southern end of this underpass will be located at 3.5' to 4' lower than existing ground elevation. Storm water currently flows toward the east along the northern edge of Campstool Road. As can be seen in Exhibit A, storm water will gather at the low spot created by the installation of this underpass and will need to be mitigated either by the installation of a pipe to carry the water to the east and across Campstool Road to the existing drainage ditch, or by pumping the water up to the elevation of the existing ditch so that the water will continue to flow to the east.

Underpass Option 1 is located so that the Greenway will be brought to the existing traffic signal at Campstool Road and Campstool Way. Connecting this underpass location to the existing Greenway at HR Ranch Road will require a Greenway to be installed on the south side of Campstool Road between Campstool Way and Burlington Trail, then continuing down Burlington Trail to HR Ranch Road.

# TUNNEL OPTION 1:

TUNNEL TO INTERSECTION

- DIRECTS GREENWAY USERS TOWARD AN EXISTING SIGNALIZED INTERSECTION FOR A SAFER ROADWAY CROSSING.
- SOUTH END OF TUNNEL IS LOWER THAN EXISTING GROUND, DESIGN WILL HAVE TO ACCOUNT FOR DIRECTING STORM WATER OUT OF LOW SPOT.

CONNECT TO FUTURE GREENWAY

FENCED GREENWAY THRU RAILROAD ROW

PEDESTRIAN UNDERPASS

4+00 5+00 6+00 7+00 8+00 9+00 10+00+24

SUN VALLEY OPEN SPACE

UNION PACIFIC TRACKS (3)

CAMPSTOOL ROAD

CAMPSTOOL WAY

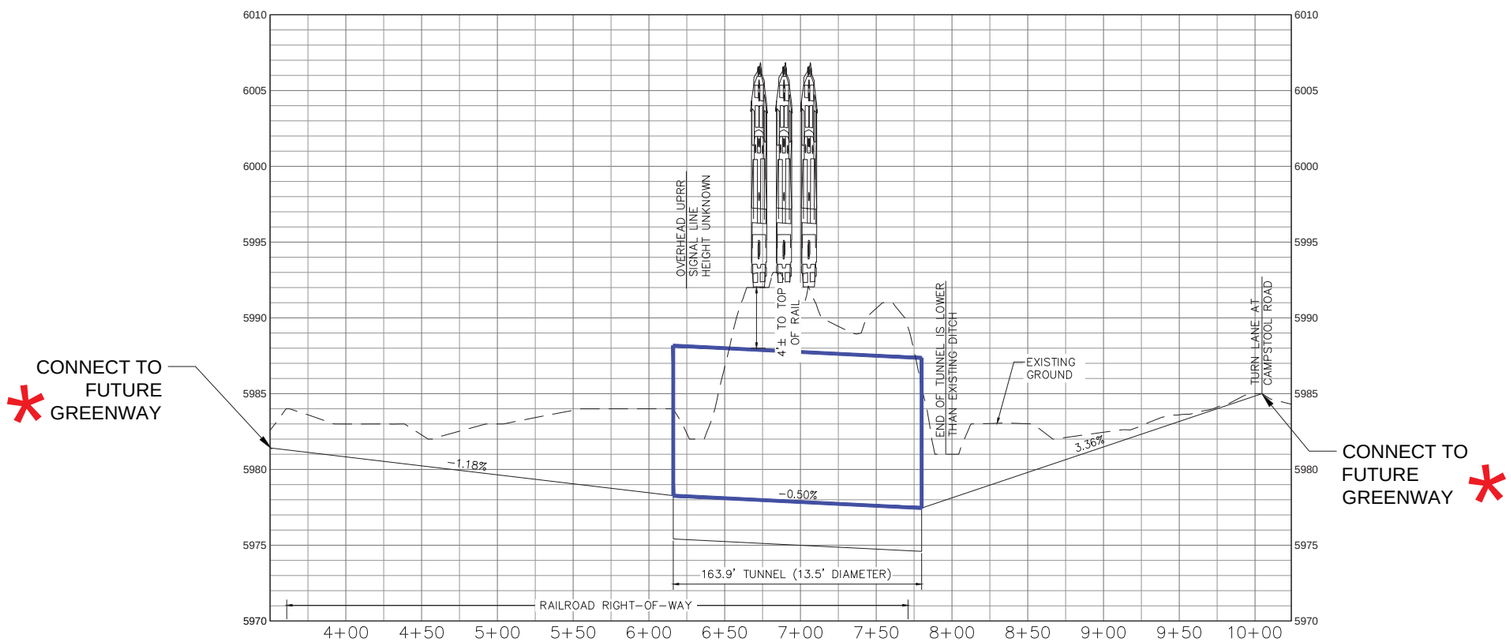
CONNECT TO FUTURE GREENWAY

STORM WATER WILL PUDDLE AT END OF TUNNEL. ELEVATION IS LOWER THAN EXISTING STORM SEWER FACILITIES (POND AND DITCHES), STORM WATER WILL HAVE TO BE PUMPED OR PIPED 1000'± TO THE EAST, PAST LEXINGTON AVENUE.

LCSD#1 STORAGE YARD

WALMART

N



## Underpass Option 2

The preliminary conceptual plan and profile for Option 2 is shown as Exhibit B. This underpass is located on the eastern edge of the Sun Valley Open Space and east of the detention pond inside this open space. Because this underpass is east of the detention pond, located east of the berm surrounding the pond, storm water from the pond will not flow into the underpass. The topography in this eastern location is such that the elevation of the railroad tracks is 22' higher than the elevation of Campstool Road. The height of the railroad embankment allows for the southern end of the underpass to daylight higher than the existing ground elevation, meaning that storm water on the north side of Campstool Road will not enter the tunnel. This location also allows for 8' of cover between the top of the underpass structure and the railroad embankment.

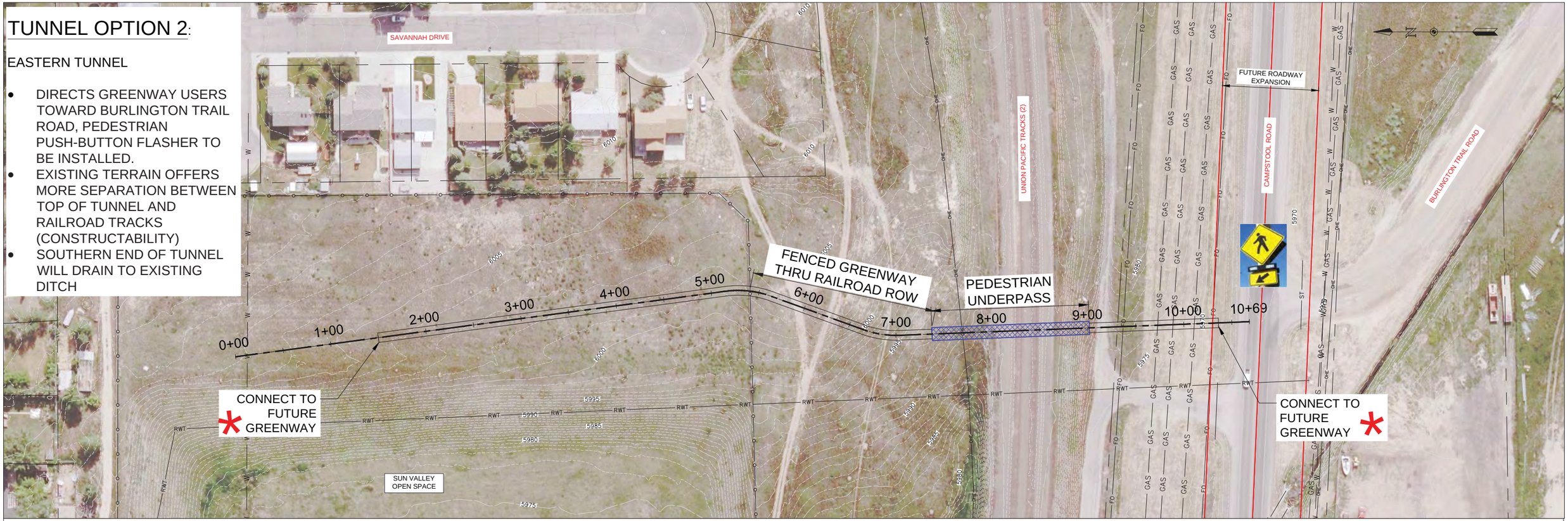
## Underpass Conclusions

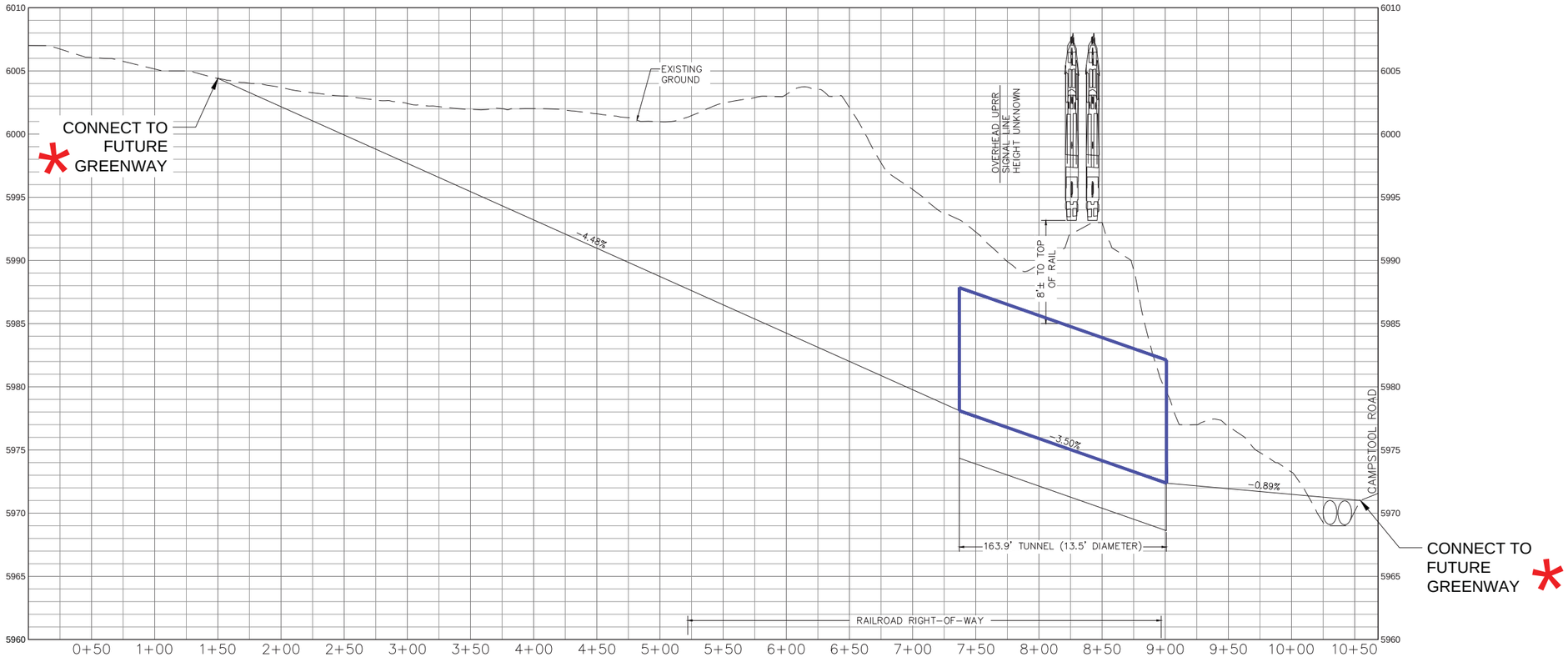
- Underpass 1 offers the safest crossing location of Campstool Road by bringing Greenway users to an existing traffic signal at the intersection of Campstool Road and Campstool Way. This existing signal can be modified by adding pedestrian heads and push buttons.
- Underpass 1 brings the Greenway facilities diagonally across the intersection to Walmart, which is a desired destination discovered in the public process. Full public participation feedback is contained in the Public Outreach section of this plan, beginning on page 36.
- Underpass 2 is the more favorable location from an engineering standpoint because it allows for the most cover between the top of the structure and the railroad tracks. Additionally, it is located east of the Sun Valley Open Space detention pond so storm water from the pond will not enter the north side of the underpass; the south end of the tunnel is at a higher elevation that the existing storm water ditch and will not require pumping or piping to keep storm water from flowing into the underpass.

# TUNNEL OPTION 2:

EASTERN TUNNEL

- DIRECTS GREENWAY USERS TOWARD BURLINGTON TRAIL ROAD, PEDESTRIAN PUSH-BUTTON FLASHER TO BE INSTALLED.
- EXISTING TERRAIN OFFERS MORE SEPARATION BETWEEN TOP OF TUNNEL AND RAILROAD TRACKS (CONSTRUCTABILITY)
- SOUTHERN END OF TUNNEL WILL DRAIN TO EXISTING DITCH



# Overpass Options

Five overpass options in three locations around the Sun Valley Open Space were considered with this plan. These considered options are shown in Figure 15.


Figure 15: Overpass Options

The main design considerations for an overpass in this location are:

- Pier supports for the bridge shall be spaced at the same intervals and distance from the tracks as the piers at the existing College Drive bridge, with 25' minimum from the tracks.
- The bottom of the bridge shall be 23'-4" above the existing track elevation. All options considered have been drawn with the bridge deck at 24'-4" above the track elevation to account for the thickness of the steel at the bottom of the bridge.
- All portions of the bridge structure, including the bridge and the ramp sections shall meet Americans with Disabilities Act (ADA) requirements for maximum slope. All considered options were laid out with a maximum slope under 5% as ADA allows a ramp at a 5% slope without periodically spaced level landings. A Greenway at a constant slope of 5% allows for easier snow removal than a Greenway with level landings; additionally, a prefabricated structure with a slope exceeding 5% is required to be constructed with a handrail and return rail of specific ADA design.
- The bridge and ramp sections shall be designed so snow can be removed from the structure using standard City of Cheyenne Greenway maintenance equipment. This requires a minimum radius of 30' for any pathway curvature.
    - A prefabricated bridge can be constructed with a radius given that the support piers are located at the point of tangent to the curve and not on the curve itself. This is important to understand why the overpass options were conceptually designed as they

are. To the greatest extent possible the piers are located outside of the UPRR right-of-way; each time a ramp section must turn it requires a 30' radius, which is a wider footprint than a ramp which can turn 90 degrees.
    - Maintenance of the Greenway is further discussed in the Design Considerations section of this Plan beginning on page 33.
- The structure going over the railroad tracks, including all portions crossing the railroad right-of-way, will be fully enclosed with fencing on the sides and top, per the UPRR fencing requirements for a trail crossing.

## Overpass Option A1

The preliminary conceptual plan and profile for Option A1 is shown in Exhibit C. This option is located on the west side of the Sun Valley Open Space with the bridge parallel to College Drive. The connection to the existing Greenway on the north side of the railroad tracks is shown south of the existing pedestrian bridge over Henderson Ditch. This point of beginning was thought to be ideal for Greenway users who would be coming from west of College Drive wishing to cross the tracks. In order to design the north ramp to meet ADA requirements of 5% maximum slope and be 23'-4"above the railroad tracks the ramp must be designed on a curve to allow for enough horizontal length to gain the necessary vertical height. Construction of the ramp will require either fill dirt to be brought to the site to elevate the ramp or the ramp will need to be a prefabricated steel structure on supports. Figure 16 shows what the area of impact would be for a Greenway in this location if fill dirt was used to support the pathway at 2:1, 3:1 and 4:1 slopes. As shown in the figure, supporting the path with fill dirt is not a viable option as the slopes will extend too far and impact the Henderson Ditch. To lessen the area of impact retaining walls could be installed to support the ramp on the northern side, closest to the Henderson Ditch. Overpass Option A1 is located so that the Greenway will be brought to the existing traffic signal at Campstool Road and Campstool Way, providing a safe crossing location of Campstool Road.

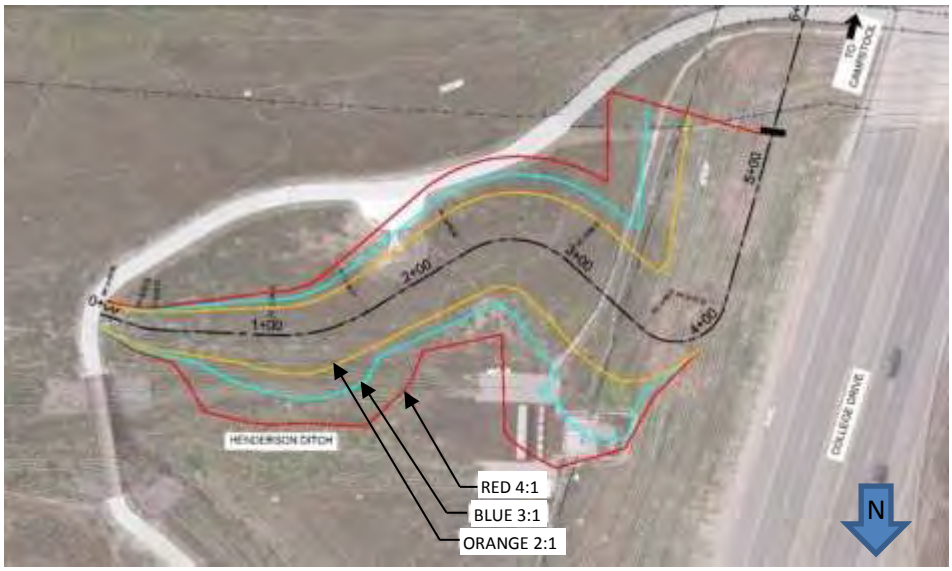



Figure 16: Earthen Slope Considerations, Option A1

# OPTION A1:

ADJACENT TO COLLEGE DRIVE BRIDGE

- DIRECTS GREENWAY USERS TOWARD AN EXISTING SIGNALIZED INTERSECTION FOR A SAFER ROADWAY CROSSING.
- REQUIRES A STEEL RAMP ON BOTH THE NORTH AND SOUTH SIDES OF THE RAILROAD.

EXISTING GREENWAY BRIDGE
STEEL RAMP
HENDERSON DITCH
SUN VALLEY OPEN SPACE
COLLEGE DRIVE
CONNECT TO EXISTING GREENWAY *
RAMP DECK IS 12'± ABOVE GROUND
PEDESTRIAN BRIDGE
RAMP DECK IS 26'± ABOVE GROUND
UNION PACIFIC TRACKS (3)
CONNECT TO FUTURE GREENWAY *
STEEL RAMP
CAMPSTOOL ROAD
LCSD#1 STORAGE YARD
CAMPSTOOL ROAD

499' PREFABRICATED STEEL RAMP
314' PEDESTRIAN BRIDGE
552' PREFABRICATED STEEL RAMP
RAILROAD RIGHT OF WAY
0.00%
TOP OF FENCE (RAMP WILL HAVE TOP AND SIDE FENCE)
RAMP SURFACE /GREENWAY PATH
4.91%
4.83%
RAMP DECK IS 12'± ABOVE GROUND
OVERHEAD UPRR SIGNAL LINE HEIGHT UNKNOWN (DRAWN AT 12')
23' - 4" MINIMUM
RAMP DECK IS 26'± ABOVE GROUND
EXISTING FULLY ENCLOSED GREENWAY TRAIL.
EXISTING GROUND
STRUCTURAL SUPPORTS FOR BRIDGE/RAMP
FILL DIRT
CONNECT TO EXISTING GREENWAY *
CONNECT TO FUTURE GREENWAY *

6030 6025 6020 6015 6010 6005 6000 5995 5990 5985 5980

0+50 1+00 1+50 2+00 2+50 3+00 3+50 4+00 4+50 5+00 5+50 6+00 6+50 7+00 7+50 8+00 8+50 9+00 9+50 10+00 10+50 11+00 11+50 12+00 12+50 13+00 13+50 14+00 14+50 15+00 15+50

## Overpass Option A2

The preliminary conceptual plan and profile for Option A2 is shown in Exhibit D. This option is also located on the west side of the Sun Valley Open Space with the bridge parallel to College Drive. In this option the north connection to the Greenway is located at the T intersection of the Greenway and the trailhead at Baldwin Court. The ramp on the north side of the bridge utilizes the existing embankment along College Drive, allowing the Greenway to follow this embankment to the T intersection. Overpass Option A2 is located so that the Greenway will be brought to the existing traffic signal at Campstool Road and Campstool Way, providing a safe crossing location of Campstool Road.

This route will be less costly than Option A1 because the structural ramp length on the north side is much shorter as it utilizes the existing embankment to gain the necessary vertical clearance over the railroad tracks.

## Overpass Option B

The preliminary conceptual plan and profile for Option B is shown in Exhibit E. This option is located closer to the middle of the Sun Valley Open Space, in line with the intersection of Campstool Road and Campstool Way. As shown in the exhibit, the existing ground on both sides of the railroad tracks is much lower than the railroad embankment. This location requires long ramps on both sides of the bridge to gain the vertical height necessary for the 23'-4" clearance over the tracks. On the north side of the bridge the ramp will be located adjacent to the Sun Valley Detention Pond. This ramp structure will need to be designed so that it does not reduce the storage capacity of the detention pond. This can be done by installing retaining walls along the north side of the Greenway path ramp or by digging out existing material inside the pond equal to the volume of material needed to support the Greenway path ramp.

This route brings the Greenway directly to the intersection of Campstool Road and Campstool Way, allowing the users to cross at the existing traffic signal.

# OPTION A2:

ADJACENT TO COLLEGE DRIVE BRIDGE

- UTILIZES THE EXISTING GROUND ON THE NORTH SIDE OF THE RAILROAD TRACKS SUCH THAT THE RAMP LENGTH ON THE NORTH SIDE IS MINIMIZED.
- DIRECTS GREENWAY USERS TOWARD AN EXISTING SIGNALIZED INTERSECTION FOR A SAFER ROADWAY CROSSING.

CONNECT TO EXISTING GREENWAY

COLLEGE DRIVE

HENDERSON DITCH

SUN VALLEY OPEN SPACE

PEDESTRIAN BRIDGE

RAMP DECK IS 31'± ABOVE GROUND

CONNECT TO FUTURE GREENWAY

STEEL RAMP

CAMPSTOOL ROAD

LCSD#1 STORAGE YARD

N

263' PEDESTRIAN BRIDGE

600' PREFABRICATD STEEL RAMP

RAILROAD RIGHT OF WAY

TOP OF FENCE (RAMP WILL HAVE TOP AND SIDE FENCE)

-0.00%

3.25%

4.85%

-4.91%

FILL DIRT

RAMP SURFACE /GREENWAY PATH

23' - 4" MINIMUM

OVERHEAD UPRR SIGNAL LINE HEIGHT UNKNOWN (DRAWN AT 12')

RAMP DECK IS 31'± ABOVE GROUND

EXISTING GROUND

EXISTING FULLY ENCLOSED GREENWAY TRAIL

STRUCTURAL SUPPORTS FOR BRIDGE/RAMP

CONNECT TO EXISTING GREENWAY

CONNECT TO FUTURE GREENWAY

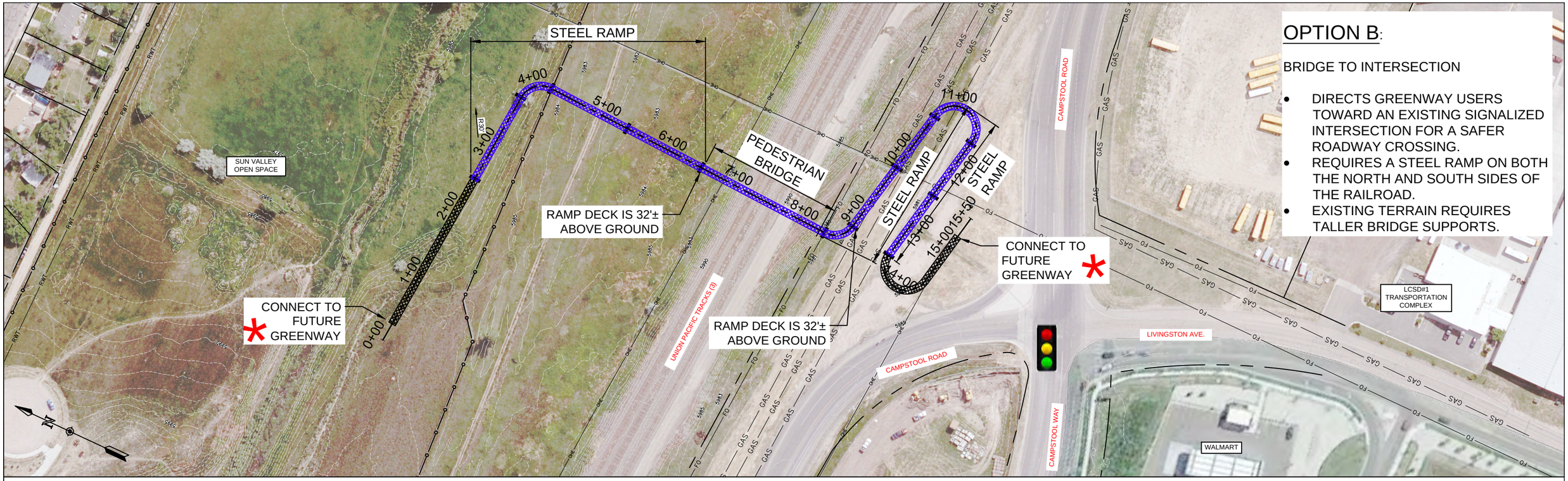
6035 6030 6025 6020 6015 6010 6005 6000 5995 5990 5985 5980

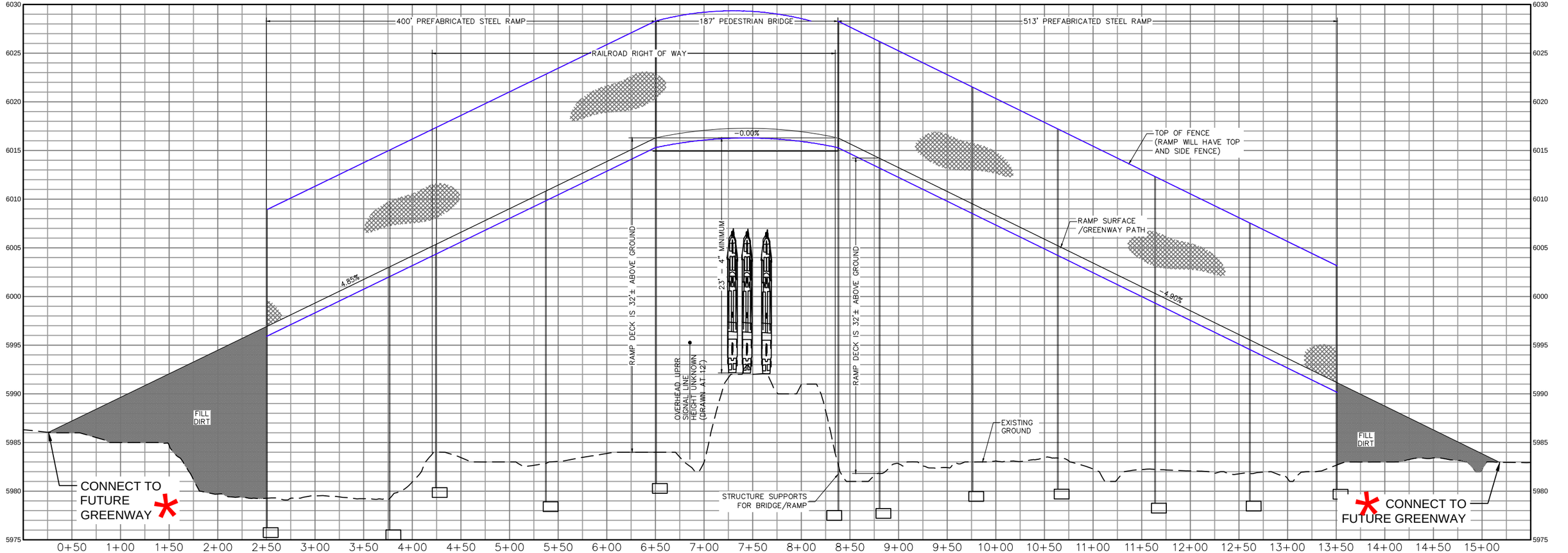
0+50 1+00 1+50 2+00 2+50 3+00 3+50 4+00 4+50 5+00 5+50 6+00 6+50 7+00 7+50 8+00 8+50 9+00 9+50 10+00 10+50 11+00 11+50 12+00 12+50 13+00 13+50 14+00 14+50 15+00 15+50

# OPTION B:

BRIDGE TO INTERSECTION

- DIRECTS GREENWAY USERS TOWARD AN EXISTING SIGNALIZED INTERSECTION FOR A SAFER ROADWAY CROSSING.
- REQUIRES A STEEL RAMP ON BOTH THE NORTH AND SOUTH SIDES OF THE RAILROAD.
- EXISTING TERRAIN REQUIRES TALLER BRIDGE SUPPORTS.



## Overpass Option C1

The preliminary conceptual plan and profile for Option C1 is shown in Exhibit F. This option is on the east side of the Sun Valley Open Space in the same location as the conceptual track crossing envisioned in both the *2007 Greenway Extension Plans* and the *Fox Farm Road Corridor Plan*. In this location, the existing ground elevation on the north side of the railroad tracks is higher than the tracks. This allows for a much shorter ramp section on the north side to gain the vertical clearance over the tracks that is required by the railroad. However, in this location the track elevation is 22' higher than the elevation of Campstool Road. Thus, the ramp on the south side of the tracks needs to be about 900' long to meet the ADA slope requirement of 5%. A ramp of that length in this location cannot be run out parallel to Campstool Road because of the existing UPRR maintenance access road. The ramp structure cannot block that road. Thus, the ramp must be turned 180 degrees east of the access road. Another consideration in the location is the possible future widening of Campstool Road. Campstool Road is classified as a minor arterial. It currently has one travel lane in each direction. The Cheyenne Unified Development Code typical section for a minor arterial requires two travel lanes in each direction and a center turn lane or median with a total right-of-way width of 100'. While there are no current plans to widen Campstool Road, the concepts in this Greenway plan have been developed to allow for the future widening of Campstool Road without impacting the Greenway concepts. The conceptual plan for Overpass Option C1 locates the support structures for the ramp outside of the footprint of any future widening of Campstool Road.

This route brings the Greenway directly to the intersection of Campstool Road and Burlington Trail. At this intersection Burlington Trail is stop controlled. A crosswalk and pedestrian activated flasher would be required to allow for the safe crossing of Campstool Road.

## Overpass Option C2

The preliminary conceptual plan and profile for Option C2 is shown in Exhibit G. This option is also on the east side of the Sun Valley Open Space, but the bridge crosses the tracks further to the east in a location where the existing ground is at the highest vertical elevation and the elevation difference between the tracks and Campstool Road is less than in Option C1. For this reason, the required ramp length on the south side of the bridge is less than that in Option C1. The conceptual plan shows the ramp on the south side of the bridge turning 180 degrees so that the ramp does not block access to the railroad maintenance road. The ramp would also terminate at the intersection of Burlington Trail, allowing for the direct continuation of the Greenway south on Burlington Trail. A crosswalk and pedestrian activated flasher would be required to allow for the safe crossing of Campstool Road. Ramp supports are located outside of the area required for the future roadway expansion of Campstool Road. In this option the Greenway would be located on private property between the Sun Valley Open Space and the bridge crossing of the tracks. An easement would be required from one or both adjacent property owners. The property on the west side of the path (approximately station 3+00 to 6+00, as seen in Exhibit G) is platted for single family residential but has not yet been developed. The property on the east side of the path belongs to the UPRR. Like the Greenway path located on UPRR property going under the College Drive bridge, a pathway located on UPRR property would require a chain link fence to fully enclose the Greenway to keep users from entering UPRR property.

# OPTION C1:

EASTERN BRIDGE

- UTILIZES THE EXISTING GROUND ON THE NORTH SIDE OF THE RAILROAD TRACKS SUCH THAT THE RAMP LENGTH ON THE NORTH SIDE IS MINIMIZED.
- DIRECTS GREENWAY USERS TOWARD BURLINGTON TRAIL ROAD, PEDESTRIAN PUSH-BUTTON FLASHER TO BE INSTALLED.
- EXISTING TERRAIN REQUIRES TALL BRIDGE SUPPORTS.

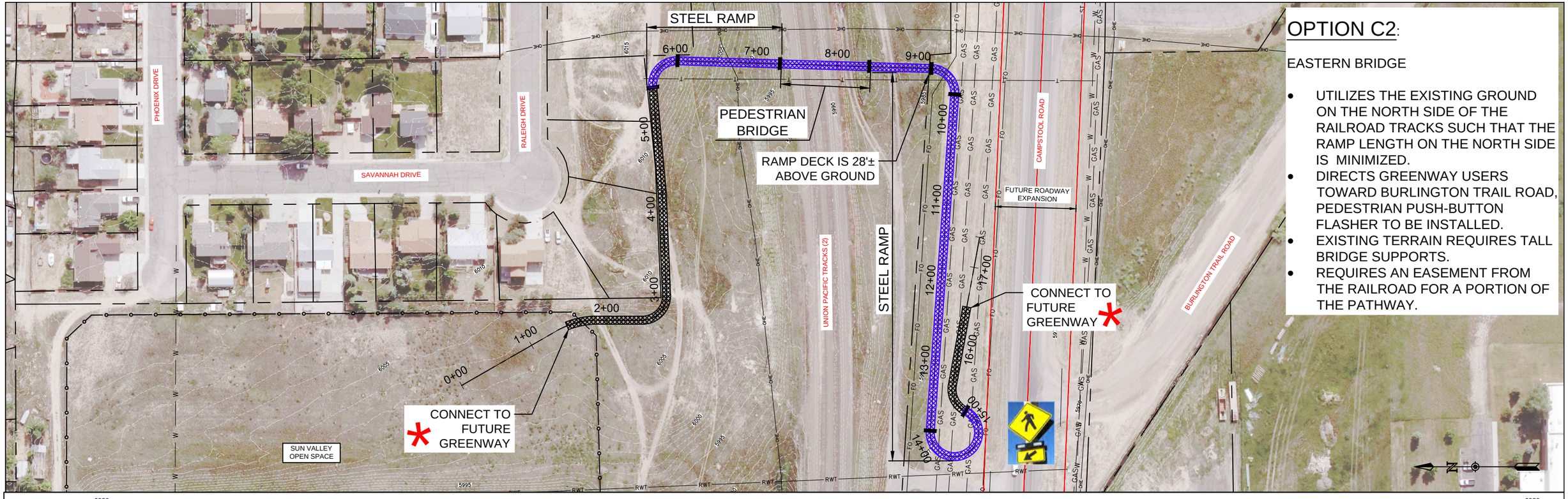
PHOENIX DRIVE
RALEIGH DRIVE
SAVANNAH DRIVE
SUN VALLEY OPEN SPACE
UNION PACIFIC TRACKS (2)
STEEL RAMP
PEDESTRIAN BRIDGE
FUTURE ROADWAY EXPANSION
CAMPSTOOL ROAD
BURLINGTON TRAIL ROAD
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00
12+00
13+00
14+00
14+98
CONNECT TO FUTURE GREENWAY
RAMP DECK IS 34'± ABOVE GROUND
CONNECT TO FUTURE GREENWAY

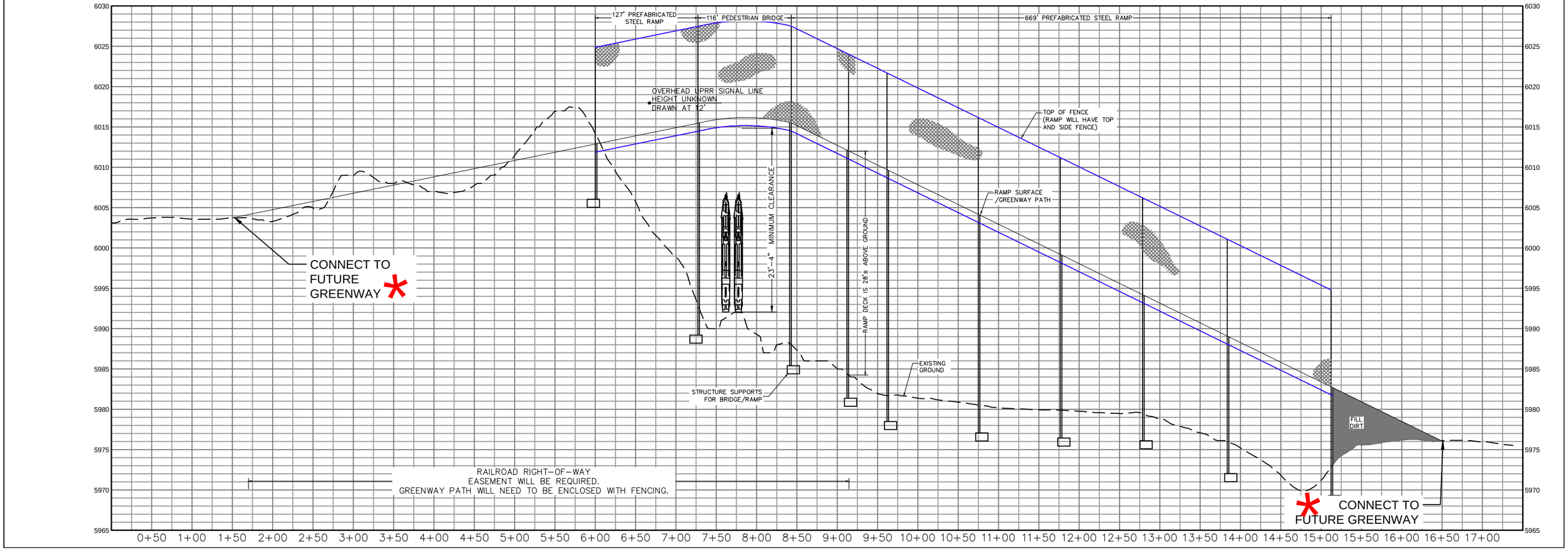
163' PREFABRICATED STEEL RAMP
158' PEDESTRIAN BRIDGE
711' PREFABRICATED STEEL RAMP
313'± RAILROAD ROW
4.90%
0.00%
4.89%
OVERHEAD UPRR SIGNAL LINE HEIGHT UNKNOWN DRAWN AT 12'
23'-4" MINIMUM CLEARANCE
RAMP DECK IS 34'± ABOVE GROUND
TOP OF FENCE (RAMP WILL HAVE TOP AND SIDE FENCE)
RAMP SURFACE /GREENWAY PATH
EXISTING GROUND
STRUCTURE SUPPORTS FOR BRIDGE/RAMP
FILL DIRT
CONNECT TO FUTURE GREENWAY
CONNECT TO FUTURE GREENWAY

# OPTION C2:

EASTERN BRIDGE

- UTILIZES THE EXISTING GROUND ON THE NORTH SIDE OF THE RAILROAD TRACKS SUCH THAT THE RAMP LENGTH ON THE NORTH SIDE IS MINIMIZED.
- DIRECTS GREENWAY USERS TOWARD BURLINGTON TRAIL ROAD, PEDESTRIAN PUSH-BUTTON FLASHER TO BE INSTALLED.
- EXISTING TERRAIN REQUIRES TALL BRIDGE SUPPORTS.
- REQUIRES AN EASEMENT FROM THE RAILROAD FOR A PORTION OF THE PATHWAY.



### Overpass Conclusions

- Overpass Options A and B offer the safest crossing location of Campstool Road by bringing Greenway users to an existing traffic signal at the intersection of Campstool Road and Campstool Way. This existing signal can be modified by adding pedestrian heads and push buttons.
- Overpass Options A and B bring the Greenway facilities diagonally across the intersection to Walmart, which is a desired destination discovered in the public process. Full public participation feedback is contained in the Public Outreach section of this Plan, beginning on page 35.
- The cost of an overpass increases with the amount of steel required in the prefabricated bridge and ramp sections as well as in the tower supports at each pier location.
- The cost of an overpass increases with the amount of prefabricated curved portions required.
- The overpass option with the least amount of prefabricated steel structure is Option A2.
- Option C1 could be further explored to have a ramp that does not turn 180 degrees but instead continues east on Campstool Road. This would reduce the cost of the structure because it would only have a single prefabricated curve rather than two. This concept would require a Greenway path to be brought back to the west to join with the path on Burlington Trail.

## Preferred Crossing Selection

Overpass Option A2 was selected as the preferred crossing of the railroad tracks. Table 3 shows the decision matrix used to evaluate the overpass options. Option A2 requires less prefabricated steel structural elements than other options. Utilizing the existing embankment of College Drive allows for less import fill material required than Options A1 or B. Option A1 provides access to Walmart, a desired destination as identified with the public process for this study. No property acquisitions or easements will be necessary for the construction of this overpass. An agreement will need to be reached with the UPRR for the construction of the structure.

Table 3: Decision Matrix for Overpass Options

| Option / Consideration | A1 | A2 | B | C1 | C2 |
|---|---|---|---|---|---|
| Construction Cost | $$$ | $$ | $$$ | $$ | $$ |
| Safety: Signalized pedestrian crossing of Campstool Road? | YES | YES | YES | NO | NO |
| Access: Provides access to Walmart, an identified destination? | YES | YES | YES | NO | NO |
| Recreation: Removes Greenway path from heavy traffic on College Drive and Campstool Road? | NO | NO | NO | YES | YES |
| Easement Required? | NO | NO | NO | NO | YES |

An underpass crossing was not selected as the preferred crossing. Underpass 1 provided access to Walmart, but was not the ideal location for an underpass because it has less clearance between the tracks and the top of the structure. In addition, the south end of the underpass would be lower than the elevation of the existing ground, requiring pumping or piping of storm water flowing east along the

north side of Campstool Road. While an underpass in this location can be designed to follow the natural 'desire line' of pathway users, eliminating the need for long winding ramps that would be required for an overpass structure, many responses received during the public comment period indicated that an overpass is preferred to an underpass because underpasses can frequently be closed if they are not designed to prevent flooding. Additionally, the UPRR prefers overpass structures to underpass structures. Significant preliminary engineering would need to be done to meet the UPRR requirements for a satisfactory construction method for an underpass design.

Recreational users of this proposed Greenway have indicated that they are concerned about the proximity of the Greenway to College Drive. The conceptual design creates as much separation between the Greenway and the roadway as possible; Figure 17 demonstrates both the vertical and the horizontal clearance between College Drive and this proposed Greenway section. Exhibit H contains the final conceptual plan and profile for the selected crossing.

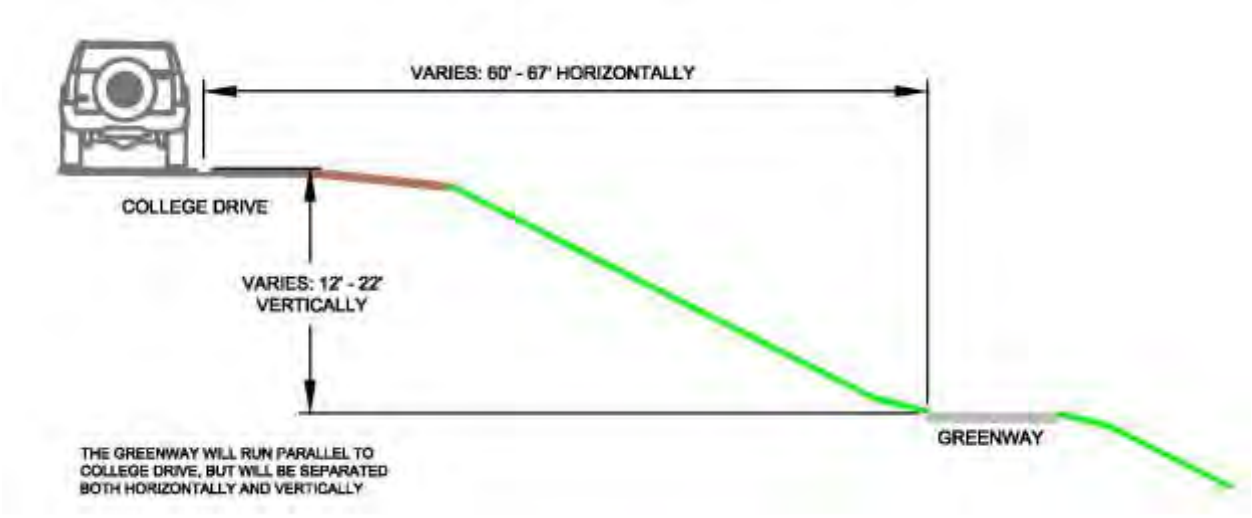



Figure 17: Proposed Greenway Adjacent to College Drive

At the second public meeting participants were concerned about the distance Greenway users coming from west of College Drive would have to travel to access the overpass. Users coming from the west would have to travel across the pedestrian bridge over the Henderson Ditch and continue north to the intersection of the proposed Greenway path that leads to the overpass. It was suggested that a stairway be constructed on the south side of the Henderson Ditch, just north of the existing College Drive bridge to provide this connection. While a stairway will not meet ADA requirements, an ADA accessible route would be provided to meet the requirements.

# RECOMMENDED OPTION:

ADJACENT TO COLLEGE DRIVE BRIDGE

- UTILIZES THE EXISTING GROUND ON THE NORTH SIDE OF THE RAILROAD TRACKS SUCH THAT THE RAMP LENGTH ON THE NORTH SIDE IS MINIMIZED.
- DIRECTS GREENWAY USERS TOWARD AN EXISTING SIGNALIZED INTERSECTION FOR A SAFER ROADWAY CROSSING.

CONNECT TO EXISTING GREENWAY *

COLLEGE DRIVE

0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00 11+00 12+00 13+00 14+00 15+00 15+53

STEEL RAMP

HENDERSON DITCH

SUN VALLEY OPEN SPACE

FUTURE GREENWAY

PEDESTRIAN BRIDGE

RAMP DECK IS 30.5'± ABOVE GROUND

CONNECT TO FUTURE GREENWAY *

CAMPSTOOL ROAD

STEEL RAMP

LCSD#1 STORAGE YARD

CAMPSTOOL ROAD

FUTURE GREENWAY

N

140' PREFABRICATD STEEL RAMP | 130' PEDESTRIAN BRIDGE | 646' PREFABRICATD STEEL RAMP

RAILROAD RIGHT OF WAY

6035 6030 6025 6020 6015 6010 6005 6000 5995 5990 5985 5980

0.00%

4.43%

2.39%

4.27%

4.90%

FILL DIRT

OVERHEAD UPRR SIGNAL LINE

23'

4" MINIMUM

RAMP DECK IS 30.5'± ABOVE GROUND

RAMP SURFACE /GREENWAY PATH

EXISTING GROUND

EXISTING FULLY ENCLOSED GREENWAY TRAIL

STRUCTURAL SUPPORTS FOR BRIDGE/RAMP

CONNECT TO EXISTING GREENWAY *

CONNECT TO FUTURE GREENWAY *

FILL DIRT

0+50 1+00 1+50 2+00 2+50 3+00 3+50 4+00 4+50 5+00 5+50 6+00 6+50 7+00 7+50 8+00 8+50 9+00 9+50 10+00 10+50 11+00 11+50 12+00 12+50 13+00 13+50 14+00 14+50 15+00 15+50 16+0

# Desired Greenway Destinations in Southeast Cheyenne

Through this planning process many respondents indicated a desire for a Greenway connection to Laramie County Community College (LCCC). Currently there are no pedestrian facilities to grant access to LCCC from the Sun Valley area to LCCC. A conceptual alignment for this connection is shown in Figure 18. This alignment goes through private property, currently owned by Old Horse Pasture, Inc. C/O Cynthia Lummis, and would require an easement from this property owner for construction of the Greenway. In this conceptual route the Greenway goes under Interstate-80 (I-80), the westbound I-80 College Drive on-ramp and the eastbound I-80 College Drive off-ramp via the three existing bridges where these structures cross Crow Creek. From there the pathway continues south along the edge of the College Drive right-of-way to LCCC. Greenway users could utilize the proposed pedestrian bridge over the UPRR tracks, then cross Campstool Road at the intersection of Campstool Way to access this route to LCCC. There are existing Greenway facilities around the LCCC property which provide access to the Arp Elementary School neighborhood and the Greenway facilities in that location.


Figure 18: Conceptual Greenway Alignment to LCCC

# Design Considerations

## Union Pacific Railroad Approval

To expedite the final design and approval process of the selected crossing of the UPRR it is recommended that a prefabricated bridge manufacturer be retained to complete the design of the bridge, abutments and piers to the 30% design level. This information shall be submitted to the UPRR with the Preliminary Engineering Agreement. Following UPRR approval of the structure type and pier locations, final design of the structure shall be completed. Most pre-manufactured pedestrian bridge companies will work with municipalities with a Memorandum of Understanding stating that they will provide the structural engineering necessary for a structure. If their structure is purchased for installation the bid price for that structure will include the previously performed engineering analysis. If their structure is not purchased for installation, they will bill the municipality for the structural work performed during the approval process.

## Snow Removal

Snow is removed from the existing Greenway by both small and full-size pickups with snow plow blades. Where the existing Greenway is located on UPRR right-of-way, such as the section of Greenway under College Drive bridge west of the Sun Valley Open Space, there is an agreement and insurance requirements that the City must adhere to between the City and the UPRR. The City must purchase supplemental insurance to meet the UPRR requirements for a snow removal vehicle on this portion of the Greenway. In this insurance policy between the City and the insurance provider, the City must explicitly identify which vehicle(s) will be used to plow snow on the Greenway that is located on UPRR property. The City maintenance vehicle currently insured to the UPRR requirements is a small pickup that requires a turning radius of 30'. A future Greenway over or under the UPRR will require a similar agreement between the City and the UPRR. For this reason, the selected structure shall be designed to meet a minimum radius of 30'.

Consideration has also been given to the width of the proposed structure. Wherever possible, the Greenway is designed to allow for a 10' width plus a 2' "handlebar clearance" on either side of the path. For a structure, such as a bridge or underpass, the width is often 12'. A structure that is 12' wide is costlier than a 10' wide structure. The prefabricated pedestrian bridge over Converse Avenue, south of Dell Range is 10' wide. This structure does not have interior hand railings, leaving the full 10' width clear space. Because the proposed Sun Valley Open Space structure has a 90 degree turn inside the structure itself and has a total length of 916' that is fully enclosed and elevated, it is recommended that this structure be 12' wide to provide more maneuverability for the snow plow vehicle.

## Overpass Structure

In locations where the Greenway is fully enclosed, having a fence over the top, the Community Recreation and Events Department has indicated that snow loads can cause the top of the fence to sag. Final design consideration should be given to spacing of supports along the top of the structure to minimize open space that would allow for sag, or placing the fencing on the outside of the top of the support structure.

## Maintenance Within UPRR Right-of-Way

The owner of the structure, in this case the City of Cheyenne, is responsible for maintenance. During Preliminary Engineering design discussions with the UPRR the procedures required by the UPRR to initiate maintenance of the structure within their right-of-way need to be identified.

- What steps need to be taken to gain access to the exterior of the structure?
- Will any temporary insurance be required during maintenance activities?
- Will railroad flagging be required during maintenance activities?

## Burlington Trail Greenway Section at Interstate-80 Bridge

Burlington Trail is currently a gravel roadway. The *Fox Farm Road Corridor Plan*, September 2013 by AVI Professional Corporation, provides a conceptual plan for the alignment and road section of Burlington Trail between South Industrial Road and Campstool Road – including the realignment of the intersection of Burlington Trail and South Industrial Road. In the *Fox Farm Road Corridor Plan* the road section of Burlington Trail will be as shown in Figure 19.

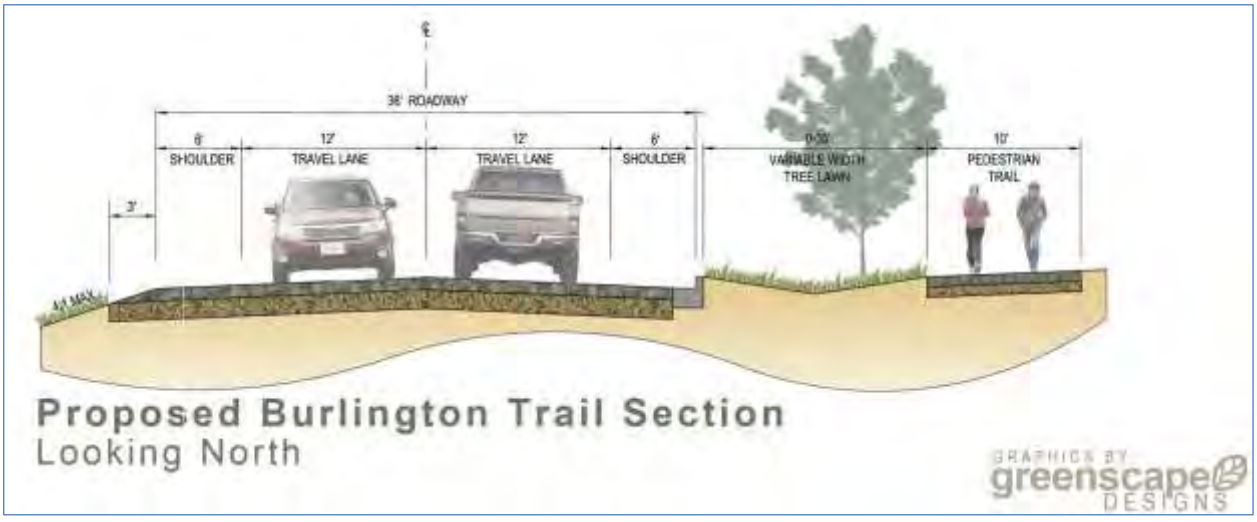



Figure 19: Burlington Trail Roadway Section, from AVI Professional Corporation, *Fox Farm Road Corridor Plan*

At the intersection of Burlington Trail and South Industrial Drive, the *Fox Farm Road Corridor Plan* proposes a raised channelizing island and free right-turn onto South Industrial Road to accommodate WB-67 design vehicles. This proposed intersection reconfiguration and the proposed Greenway, as shown in the conceptual plan and profile sheets within the *Fox Farm Road Corridor Plan*, will not fit in between the existing concrete pier supports for the Interstate-80 (I-80) bridge over Burlington Trail. The conceptual plan and profile sheets included in Appendix F of this Plan show two options for placement of the Greenway under the I-80 bridge.

The first option is to remove the existing concrete slope paving on the east side of the bridge and replace it with a modular block retaining wall. The Greenway path would then be constructed on the outside of the existing concrete pier, between the pier and the bridge abutment, as shown on sheet C30 of the plan and profile sheets. WYDOT has allowed their slope paving to be removed and replaced with

a modular block retaining wall provided that there is adequate horizontal distance to allow for the necessary geogrid between the block wall and the existing bridge abutment. Geogrid material is installed behind a modular block wall and placed horizontally at an engineered length behind the wall and into the soil. Generally, the taller the wall, the longer the horizontal length of geogrid required.

Figure 20: I-80 Bridge over Burlington Trail, Looking Northwest toward Campstool Road

The second option is an interim option, one that will allow the Greenway to be constructed in this location without the expense of removing the slope paving and replacing with a modular block wall. The interim option is to construct the Greenway adjacent to the bridge piers, placing concrete jersey barrier between the travel way of Burlington Trail and the Greenway. This option will keep the Greenway separated from the vehicles on Burlington Trail. It is assumed that the modifications to the slope paving would take place when Burlington Trail is reconstructed. The cost estimate for both of these options is included in Appendix G.

## Public Outreach

Public comment was sought on the overpass and underpass crossing options. An emphasis was placed on asking respondents why they would use this Greenway path: for recreation or to access a specific location; as well as asking where that specific location would be. Additionally, respondents were asked to rank the overpass and underpass location options and then to select their optimal location preference. To solicit public comment, a public meeting was held, and an on-line survey deployed.

## Public Meeting Number One


Figure 21: Sunrise Elementary School Marque

The first public meeting took place on June 15, 2017. Conceptual plan and profile drawings of the various overpass and underpass options were shown as well as conceptual drawings of the future Greenway trails in the Sun Valley area. Project team members were on hand to answer questions and explain the project. The meeting participants agreed that a crossing of the railroad tracks is a necessity. The public meeting was advertised in the Wyoming Tribune Eagle and the Trader's Shoppers Guide. Fliers announcing the meeting were placed at various locations around town including LCCC, Starbucks, Laramie County Library, Walmart and Sierra Trading Post. At the 2017 Spring into Green event on June 10th, Ayres Associates set up a table with information about the Southeast Greenway Trail Connector project and invited people to partake in the on-line survey and to attend the public meeting. Two Constant Contact newsletters went out to a large email list inviting recipients to attend the meeting or take the survey. Lists included Greenway and bicycle supporters, MPO general lists, Planning Commission, City Council and MPO committees.

## On-Line Survey Number One

The on-line survey was open for five weeks between May 30, 2017 and July 5, 2017. One hundred twelve responses were received. An email inviting people to participate in the survey was sent to the Greenway and Cheyenne LEADS email distribution lists. Additionally, both the MPO web page and Facebook page and the Cheyenne Greenway Foundation Facebook page advertised the survey and the public meeting. Appendix B contains all the public participation results including the public meeting sign in sheet, comment forms, and on-line survey results. A summary of the comments received from the on-line survey follows:

**How would people use this Greenway route?** (Respondents could choose more than one answer)

- 88% would use it for recreation
- 41% would use it to get to a specific location
    - 23 responses to go east on Campstool (Sierra Trading Post, Echostar, Green House Data, Magpul, Lowes Dist. Center, etc.)
    - 17 responses to go to Walmart
    - 1 to go to the Dry Creek Reclamation Center (off HR Ranch Road)

When asked which **overpass** location they would prefer, ranked as 1st, 2nd and 3rd, the yellow crossing (eastern most overpass, Option C) got the most LAST place votes. The teal crossing (closest to the intersection, Option B) got the most 2nd place votes. The magenta/red crossing (near College, Option A) got the most 1st place votes.

When asked which **underpass** location they would prefer the results were nearly tied, but many people commented that tunnels on the Cheyenne Greenway system often flood and that they thought tunnels were more unsafe. Some responses did indicate that tunnels are easier for bicycles (i.e. less grade change).

When asked which crossing type and location they would select as a **first choice** 27% chose the yellow overpass (eastern most overpass, Option C) and 26% chose the teal crossing (to the intersection, Option B).

- All the overpass options received more votes than either of the underpass options.
- Comments on the red overpass (closest to College, Option A):
    - Most Convenient
    - Too close to College/busy traffic
- Comments on the teal overpass (closest to intersection, Option B)
    - More pleasant recreational experience
- Comments on the yellow overpass (eastern most overpass, Option C)
    - Safest
    - Too far away from destination

When asked about **future connections** 12 responses (10%) said they want to go to LCCC. One interesting response said to connect Sun Valley to South High School, because it is in the South Triad.

**Other Comments Received Multiple Times:**

- It is too dangerous on College and Campstool for biking and walking.
- Build the most cost-effective crossing.
- If the crossing is a tunnel and it is closed for flooding, then there is no safe way across the tracks.

## Public Meeting Number Two

In September 2017, the steering committee recommended an overpass structure on the west side of the Sun Valley Open Space as a crossing of the Union Pacific Railroad tracks. A public meeting and an online survey was held to verify that the recommended location was favorable by the public and potential Greenway users. Both the survey and the open house were advertised on Facebook, the MPO web page, newspaper ad and Traders ad. A couple of Constant Contact newsletters went out to a large email list inviting recipients to attend the meeting or take the survey. Lists included Greenway and bicycle supporters, MPO general lists, Planning Commission, City Council and MPO committees.

The public meeting was held on Wednesday, September 27, 2017 at Sunrise Elementary School, in the gym, from 5:30 – 7:00 pm. Eleven people signed in at the meeting. A presentation was made to the

audience outlining the steps taken in the plan to get to the recommended crossing location and type. This presentation was livestreamed on the MPO Facebook page.

### On-Line Survey Number Two

Forty-nine people responded to the second on-line survey. An email inviting people to participate in the second survey was sent to the Greenway email distribution list and the Cheyenne LEADS. Additionally, the MPO web page and Facebook page advertised the survey and the public meeting. Appendix C contains all the public participation results including the second public meeting sign in sheet, comment forms, and second on-line survey results. A summary of the comments received from the online survey follows:

**Do you agree with the selection of an overpass structure adjacent to College Drive for the crossing of the railroad tracks in this location?**

- **86% responded Yes, they agree with this selection**
- **14% responded No, they do not agree with this selection**

**Why or Why Not?**

- **Comments in favor of this selection included:**
  - **Connection to Walmart**
  - **I'll take anything that gets my commute off of College Drive**
  - **No tunnels, they are too often closed**

- **Comments not in favor of this selection included:**
  - **I believe the Greenway gets more use if it is away from very busy road traffic. The eastern side of the open space would be used more.**

## Project and Steering Committee Meetings

### Wyoming Department of Transportation

A project meeting was held on April 3, 2017 with Ayres Associates, the Cheyenne MPO and the Wyoming Department of Transportation (WYDOT). College Drive is a WYDOT roadway and consists of a series of bridges both over Interstate-80 and over Campstool Road and the UPRR tracks. This meeting was held with WYDOT to present the idea of a crossing of the railroad tracks and to determine if WYDOT would allow Greenway facilities inside their right of way.

At this meeting WYDOT stated that there is not adequate room on the existing structure for a Greenway path. An additional left turn lane was recently added for southbound College Drive traffic wishing to turn onto Campstool Way. As can be seen in Figure 22: College Drive Bridge, there is only a 6' shoulder on the bridge. Mike Menghini, State Bridge Engineer stated that it would be possible to widen the existing structure to accommodate a Greenway path, but because of the way in which the bridge support piers are constructed, this option would likely cost more than a standalone pedestrian bridge structure. WYDOT has no plans to widen and or replace this structure in the foreseeable future.

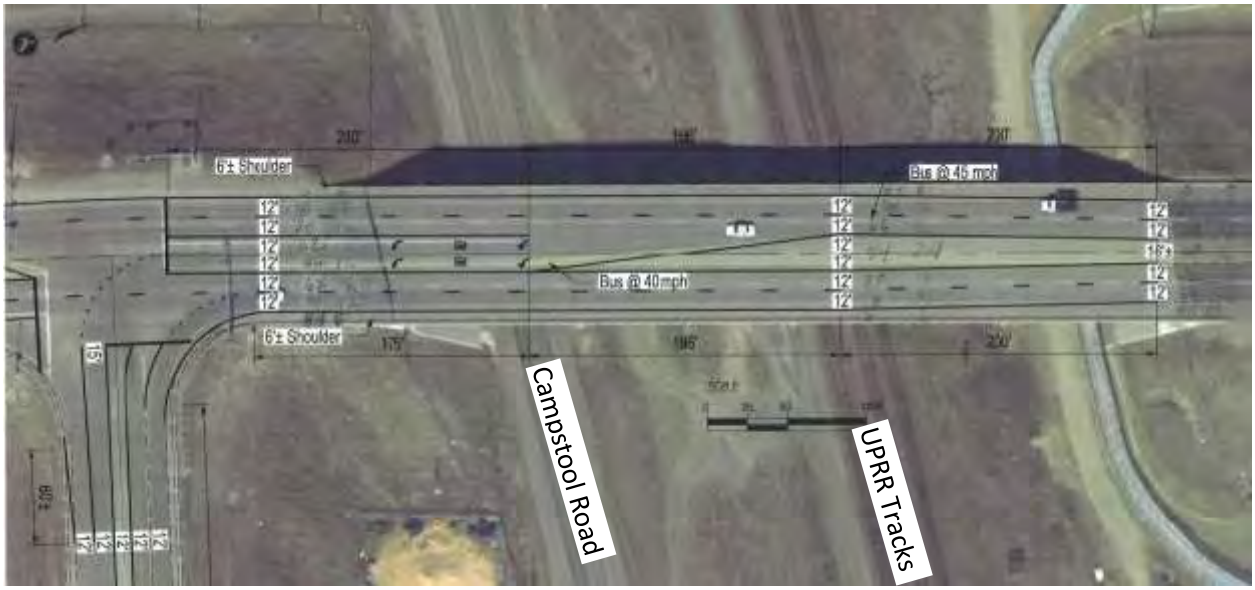



Figure 22: College Drive Bridge

At this meeting a conceptual plan for a pedestrian bridge located adjacent to and east of the College Drive bridge was discussed. Placing a bridge in this location would allow for the north end of the bridge to use the existing embankment fill for College Drive as a location for the Greenway, which would allow the Greenway to ramp up to the elevation required to cross over the UPRR tracks without needing as much import fill material or a prefabricated ramp structure. WYDOT was supportive of this location for a pedestrian bridge and would allow the bridge, ramp, structural bridge supports and Greenway to be placed inside WYDOT right of way provided that the Greenway was located so it would not encourage users to walk or bike along College Drive, but to remain on the Greenway path and the pedestrian bridge to cross the UPRR tracks. It was discussed that a fence along the western side of the Greenway path may be necessary to keep Greenway users on the Greenway and off College Drive. Complete notes from this meeting can be found in Appendix E.

## Project Steering Committee

A Steering Committee was formed to assist with guiding the project. The first steering committee meeting was held on April 25, 2017. The purpose of this meeting was to present the crossing options to the Steering Committee members and explain the design parameters that will need to be followed to be in compliance with the UPRR requirements as well as the Greenway design standards. Appendix E contains notes from all the project steering committee meetings.