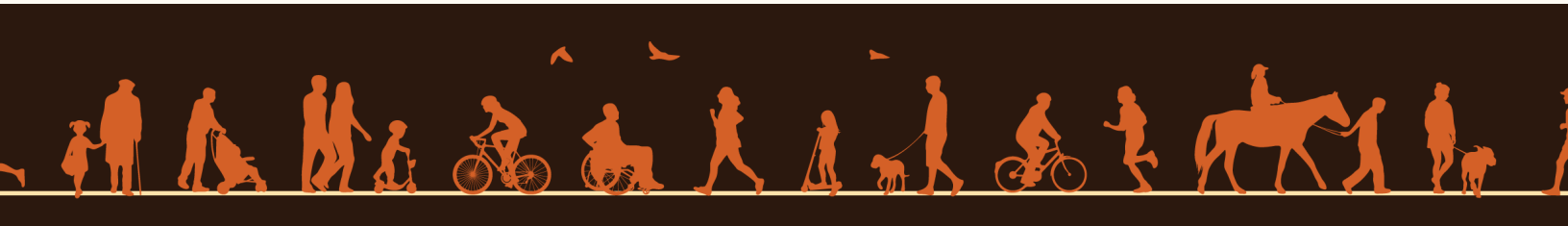
City of Fort Collins

STRATEGIC TRAILS PLAN

H

APPENDIX H:

Updated Grade Separated Crossings Prioritization Study Update



Memorandum

Date: June 3, 2025

To: Dave "DK" Kemp, City of Fort Collins & Taylor Broyhill, Logan Simpson

From: Nick VanderKwaak & Kelsey Lindquist, Fehr & Peers

Subject: Fort Collins Strategic Trails Plan: Grade Separated Crossing Methodology Changes

DN24-0814

Introduction and Purpose

This document summarizes the methodology for prioritizing Grade Separated Crossings (GSC) in the Fort Collins Strategic Trails Plan. The methodology is based on the methodology developed for the 2018 Grade Separated Prioritization Study.

Fehr & Peers was provided 34 proposed locations for GSCs which consists of existing trails crossing roads, proposed trails crossing roads, and trail crossings of railroads. The list is categorized by type in **Table 1.**

Table 2 outlines the criteria used to determine the priority of the GSCs. The evaluation matrix based on the previous study, but the definition, source, and range have all been updated with the most recent data. Metrics that are highlighted have been altered since the previous study. The **Changed Metrics** section provides more detail on how the metrics were altered.

Table 1: Grade Separated Crossing Locations

Map ID	Trail Name	Road Name	Road Type	Narrative Description	Coordinates
Existing Trails					
ET-A	West Poudre Trail	N Taft Hill Rd	Arterial	N Taft Hill Rd at West Poudre Trail	105° 06' 52.33" W 40° 36' 26.1" N
ET-B	East Poudre Trail	Linden St	Collector	Linden St at East Poudre Trail	105° 04' 15.06" W 40° 35' 29.4" N
ET-C	Mason Trail	W Prospect Rd	Arterial	Mason Trail at Prospect Rd	105° 04' 44.13" W 40° 34' 1.73" N
ET-D	Mason Trail	Drake Rd	Arterial	Drake Rd at Mason Trail	105° 04' 50.27" W 40° 33' 9.74" N
ET-E	Power Trail	Drake Rd	Arterial	Power Trail at Drake Rd	105° 02' 36.37" W 40° 33' 9.66" N
ET-F	Rendezvous Trail	Rigden Pkwy	Collector	Rigden Pkwy at Rendezvous Trail	105° 01' 46.8" W 40° 32' 52.03" N
ET-G	Rendezvous Trail	Ziegler Rd	Arterial	Zeigler Rd at Rendezvous Trail	105° 01' 13.84" W 40° 32' 46.63" N
ET-H	Mason Trail	Horsetooth Rd	Arterial	Horsetooth Rd at Mason Trail	105° 04' 51.75" W 40° 32' 17.04" N
ET-I	Power Trail	Horsetooth Rd	Arterial	Power Trail at Horsetooth Rd	105° 02' 36.5" W 40° 32' 16.79" N
ET-J	Mason Trail	Harmony Rd	Arterial	Harmony Rd at Mason Trail	105° 04' 52.58" W 40° 31' 24.64" N
ET-K	Longview Trail	E Trilby Rd	Arterial	E Trilby Road at Longview Trail	105° 05' 45.73" W 40° 29' 40.14" N
Proposed Trails					
PT-A	Proposed Trail	E Mulberry St	Arterial	E Mulberry St near Dawn Ave at proposed trail	105° 01' 3.24" W 40° 34' 52.67" N
PT-B	Proposed Trail	E Mulberry St	Arterial	East Mulberry St at proposed trail along Boxelder Creek	104° 59' 35.82" W 40° 34' 52.07" N
PT-C	Proposed Trail	I-25	Arterial	I-25 at Proposed Trail along Boxelder Creek	105° 00' 4.83" W 40° 34' 22.94" N
PT-D	Proposed Trail	E Prospect Rd	Arterial	E Prospect Rd at proposed trail north of Running Deer NA	105° 00' 32.29" W 40° 34' 0.27" N
PT-E	Proposed Trail	LCR 42C	Collector	LCR 42C at proposed trail along Overland Trl	105° 08' 3.07" W 40° 33' 24.98" N
PT-F	Future Rendezvous Trail	S Timberline Rd	Arterial	S Timberline Rd at Proposed Rendezvous Trail	105° 02' 21.24" W 40° 32' 40.93" N
PT-G	Proposed Trail	E Harmony	Arterial	E Harmony between Cinquefoil and Strauss Cabin at Proposed Trail	105° 00' 19.78" W 40° 31' 23.58" N
PT-H	Future Mail Creek Trail	S Lemay Ave	Arterial	S Lemay Ave at proposed Mail Creek Trail	105° 03' 29.14" W 40° 30' 47.9" N
PT-I	Proposed Trail	E County Rd 36/Ketcher Rd	Arterial	E County Rd 36/Ketcher Rd at proposed trail along FCRID	104° 59' 53.11" W 40° 30' 31.19" N
PT-J	Future Mail Creek Trail	Ziegler Rd	Arterial	Ziegler Rd at proposed Mail Creek Trail	105° 01' 11.51" W 40° 30' 12.64" N
PT-K	Proposed Trail	W Trilby Rd	Arterial	W Trilby Rd at proposed trail from Skyview Neighborhood	105° 04' 51.08" W 40° 29' 41.18" N
PT-L	Proposed Trail	S Timberline Rd	Arterial	S Timberline Rd at proposed trail along Carpenter Rd	105° 02' 21.37" W 40° 28' 49.76" N
PT-M	Proposed Trail	S College Ave	Arterial	S College Ave at proposed trail along Carpenter Rd	105° 04' 38.57" W 40° 28' 49.04" N
PT-N	Proposed Trail	S Lemay Ave	Arterial	S Lemay Ave at proposed trail along Carpenter Rd	105° 03' 29.71" W 40° 28' 48.75" N
PT-O	Proposed Trail	S Shields St	Arterial	S Shields St at Proposed Trail south of Colina Mariposa NA	105° 05' 46.53" W 40° 28' 48.29" N
PT-P	Proposed Trail	S County Rd 19/ S Taft Hill Rd	Arterial	S County Rd 19/Taft Hill and proposed trail to Coyote Ridge underpass and wildlife crossing	105° 06' 56.38" W 40° 28' 48.14" N
Railroads					
RR-A	Proposed Trail	BNSF, Vine Dr	RR	Vine Dr. and BNSF east of Timberline	105° 01' 40.69" W 40° 35' 45.66" N
RR-B	Proposed Trail	GWRR	RR	Proposed Trail at GWRR and North Greenfield Dr.	105° 00' 53.27" W 40° 35' 31.64" N
RR-C	Power Trail	UPRR	RR	Power Trail access crossing UPRR at Nancy Grey	105° 02' 35.74" W 40° 33' 29.63" N
RR-D	Mason Trail	BNSF RR	RR	Mason Trail to Foothills Pkwy (RR overpass)	105° 04' 49.5" W 40° 32' 33.13" N
RR-E	Power Trail	UPRR	RR	Power Trail access crossing UPRR at Caribou Drive	105° 02' 36.29" W 40° 31' 50.52" N
RR-F	Proposed Trail	UPRR	RR	South Fort Collins Trail along Carpenter Rd. crossing UPRR	105° 02' 31.04" W 40° 28' 50.24" N
RR-G	Proposed Trail	BNSF	RR	South Fort Collins Trail along Carpenter Rd. crossing BNSF	105° 05' 42.06" W 40° 28' 48.53" N

Table 2: Criteria Matrix

Category	Criteria	Definition	Source	Range
Demand	Bicycle Demand	Annual usage of bicycling infrastructure in the immediate area.	Strava Metro 2024 total bike trips. For non-existent crossings, marked as "no data".	15 to 37340. No data available in several locations.
	Pedestrian Demand	Walkability in the immediate area.	Walk score from Walkscore.com	0 to 84
	Population Density	Existing populations of census block groups within ½ mile of crossing.	US Census ACS Block Group. Block groups contained in buffer are proportionally weighted and summed.	2583 to 36359
	Youth Density	Population under 18 of census block groups within ½ mile of crossing.	US Census ACS Block Group. Block groups contained in buffer are proportionally weighted and summed.	9% to 37%
	Student Density	Number of schools within ½ mile of crossing. Assumption made that schools include public and private, pre, elementary, middle, and high schools.	City of Fort Collins, Poudre School District	0-23
	Senior Density	Number of seniors (65+) of census block groups living within ½ mile of crossing.	US Census ACS Block Group. Block groups contained in buffer are proportionally weighted and summed.	8% to 21%
Connectivity	Connectivity to Transit	Transit located within ½ mile of crossing.	City of Fort Collins bus stops.	MAX, bus, none
	Part of an Enhanced Travel Corridor (ETC)	Yes/No if projects is located in Enhanced Travel Corridors, defined by the FC TMP	FC Transportation Master Plan (TMP)	
	Regional Trail Connection	Yes/No if new regional trail connection is created	Fort Collins GIS	Yes/No
	Connects a Bicycle Path and/or Trail	Connects to an existing or future trail.	Fort Collins GIS	Existing/Future
	Alternate Crossing Location	Out of direction travel distance (in feet) of an alternate crossing location	Google Maps	0 to 5000 ft
	Connects to Existing Streets and Sidewalks	Yes/No if connects to existing streets and sidewalks	Google Maps	Yes/No
	Connectivity to Natural Resources	Proximity of walkable natural resources	Fort Collins GIS	0-5 min, 5-10 min, 10+ min
	Connectivity to Destinations and Amenities (BNA)	Calculation of increased connectivity by low stress networks factoring in destinations and amenities over a 1 2/3 mile radius	BNA tool	
Safety	Bike High Injury Network	Crossing is along Bike HIN as identified by 2022 Active Modes Plan	2022 Active Modes Plan	Yes/No
	Pedestrian High Injury Network	Crossing is along Pedestrian HIN as identified by 2022 Active Modes Plan	2022 Active Modes Plan	Yes/No
Public Support	Public Support Survey Ranking	Support provided in an online survey to provide feedback on various locations	Survey monkey sent to citywide stakeholders (TBD)	
Social Equity	Social Equity	Percent of population of census block groups within ½ mile of the project with low and moderate income populations.	US Census ACS. Block groups contained in buffer are proportionally weighted and summed.	4% to 31%
Cost and Construction	Order of Magnitude Cost & Overall Feasibility	Estimate based on level of right of way impact, physical barriers/ infrastructure, and estimated cost	Based on professional engineering judgement	
	Partnership or Funding Opportunities	Secured or near future non City funding and partnership opportunities	City of Fort Collins	

Changed Metrics

This section describes the metrics that have been altered, added, or removed since the previous study was completed.

Part of an Enhanced Travel Corridor (ETC)

This metric was removed from the analysis because the 2019 Fort Collins Transportation Master Plan replaced the ETC concept with the identification of priority transit, bicycle, pedestrian, and automobile corridors. Other criteria included in the evaluation include pedestrian, bicycle, and transit access, so a replacement for this criteria was not deemed necessary.

Connects a Bicycle Path and/or Trail

In the previous analysis, this metric looked at whether a GSC would connect to an existing or planned bicycle path or trail and the response was yes or no. Because all GSCs in this analysis connect to an existing or planned bicycle path or trail, we thought it would be more beneficial to evaluate whether the trail is existing or planned. An existing trail scores higher than a planned trail.

Connectivity to Destinations and Amenities (BNA)

This metric was calculated using a Bike Network Accessibility Analysis that was conducted by Toole Design Group during the 2018 prioritization process. The analysis tools to reproduce this network were not available. At this point, the metric was not replaced with another, but an analysis of the 15 minute city could result in a similar metric.

Bike and Pedestrian High Injury Networks (HIN) 2020 Low-Stress Network Location

The previous safety metrics were replaced with the Bike and Pedestrian HIN. The previous safety metrics included the 2020 Low-Stress Network and Crash Reduction Potential.

The Low-Stress Network metric used the 2014 Bicycle Master Plan to determine if the GSC is along the 2020 Low-Stress Network. The 2022 Active Modes Plan does not have an updated Low-Stress Network so the metric was updated to be two separate metrics. The Crash Reduction Potential metric looked at the number of pedestrian and bicycle related crashes near the crossing within the last 5 years.

Public Support Survey Ranking

This metric was removed because no survey was conducted. If a survey is completed, the metric can be included in a future evaluation.

Order of Magnitude Cost & Overall Feasibility

This metric looks at the estimated level of right of way impact, physical barriers/ infrastructure, and estimated cost to determine a level of feasibility. It was not included in this analysis because the estimates have not yet been completed. Once the estimates are completed, the metric can be included in the evaluation.

Partnership or Funding Opportunities

This metric looks at if the project has secured or near future non City funding partnership opportunities. This has not been looked at yet, but once completed could be added in the evaluation.

Results

The following tables and figures show the prioritization results by category and combined. **Table 2** lists and **Figure 1** shows the existing trail crossings by rank, **Table 3** lists and **Figure 2** shows the proposed trail crossings by rank, **Table 4** lists and **Figure 3** shows the railroad crossings by rank, and **Table 5** lists and **Figure 4** shows all locations for GSCs on existing and proposed trails by rank.

All data and detail of the evaluation table are included in a excel files which are provided as a separate deliverables.

Table 3: Proposed GSCs on Existing Trails by Rank

Priority Ranking	Map ID	Narrative Description
Existing Trails		
1	ET-C	Mason Trail at Prospect Rd
2	ET-B	Linden St at East Poudre Trail
3	ET-J	Harmony Rd at Mason Trail
4	ET-D	Drake Rd at Mason Trail
5	ET-E	Power Trail at Drake Rd
6	ET-A	N Taft Hill Rd at West Poudre Trail
7	ET-H	Horsetooth Rd at Mason Trail
8	ET-G	Zeigler Rd at Rendezvous Trail
9	ET-K	E Trilby Road at Longview Trail
10	ET-I	Power Trail at Horsetooth Rd
11	ET-F	Rigden Pkwy at Rendezvous Trail

Figure 1: Proposed GSCs on Existing Trails

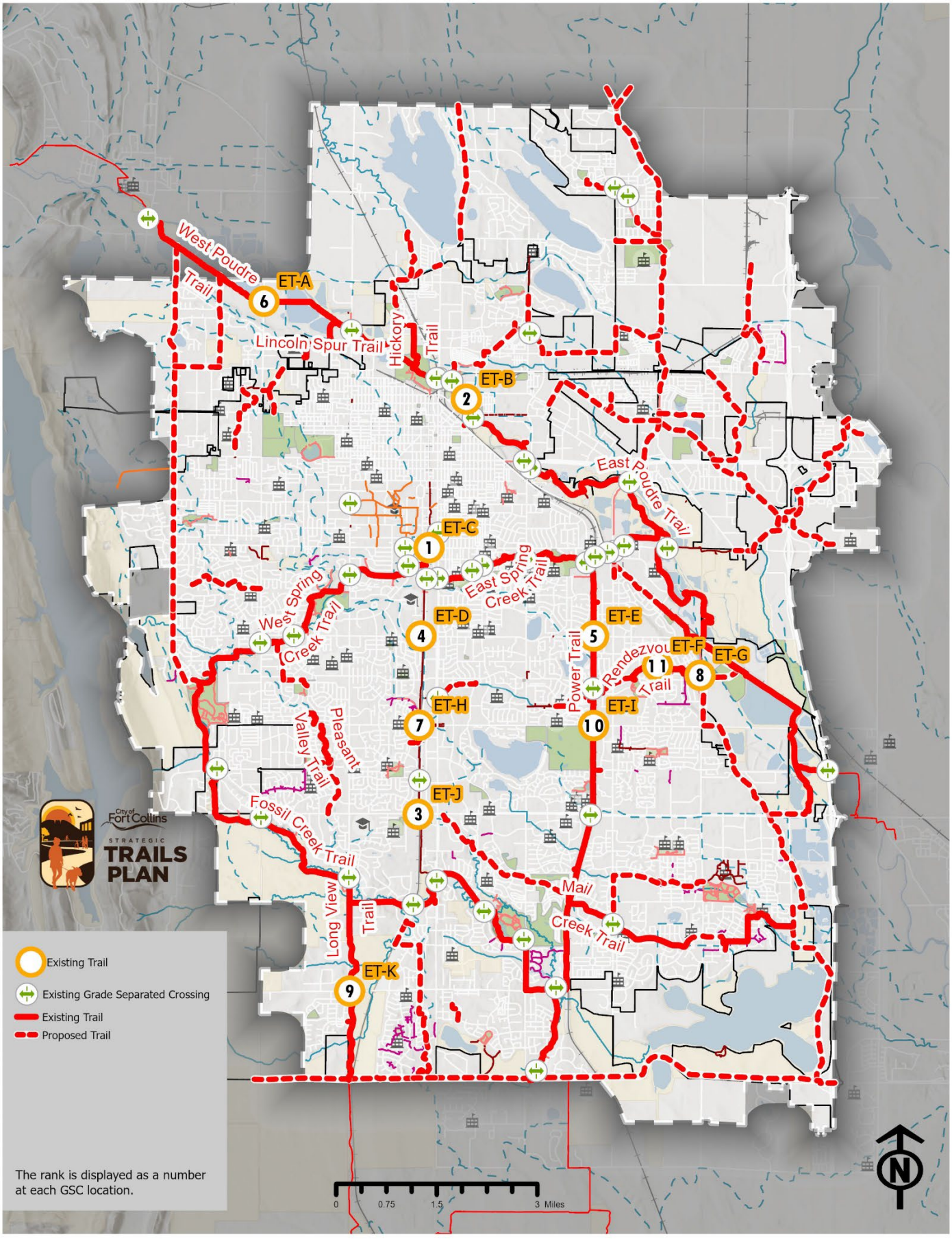


Table 4: Proposed GSCs on Proposed Trails by Rank

Priority Ranking	Map ID	Narrative Description
Proposed Trails		
1	PT-E	LCR 42C at proposed trail along Overland Trl
2	PT-O	S Shields St at Proposed Trail south of Colina Mariposa NA
3	PT-A	E Mulberry St near Dawn Ave at proposed trail
4	PT-B	East Mulberry St at proposed trail along Boxelder Creek
5	PT-F	S Timberline Rd at Proposed Rendezvous Trail
6	PT-H	S Lemay Ave at proposed Mail Creek Trail
7	PT-C	I-25 at Proposed Trail along Boxelder Creek
8	PT-K	W Trilby Rd at proposed trail from Skyview Neighborhood
9	PT-L	S Timberline Rd at proposed trail along Carpenter Rd
10	PT-I	E County Rd 36/Ketcher Rd at proposed trail along FCRID
11	PT-M	S College Ave at proposed trail along Carpenter Rd
12	PT-G	E Harmony between Cinquefoil and Strauss Cabin at Proposed Trail
13	PT-P	S County Rd 19/Taft Hill and proposed trail to Coyote Ridge underpass and wildlife crossing
14	PT-J	Ziegler Rd at proposed Mail Creek Trail
15	PT-D	E Prospect Rd at proposed trail north of Running Deer NA
16	PT-N	S Lemay Ave at proposed trail along Carpenter Rd

Figure 2:Proposed GSCs on Proposed Trails

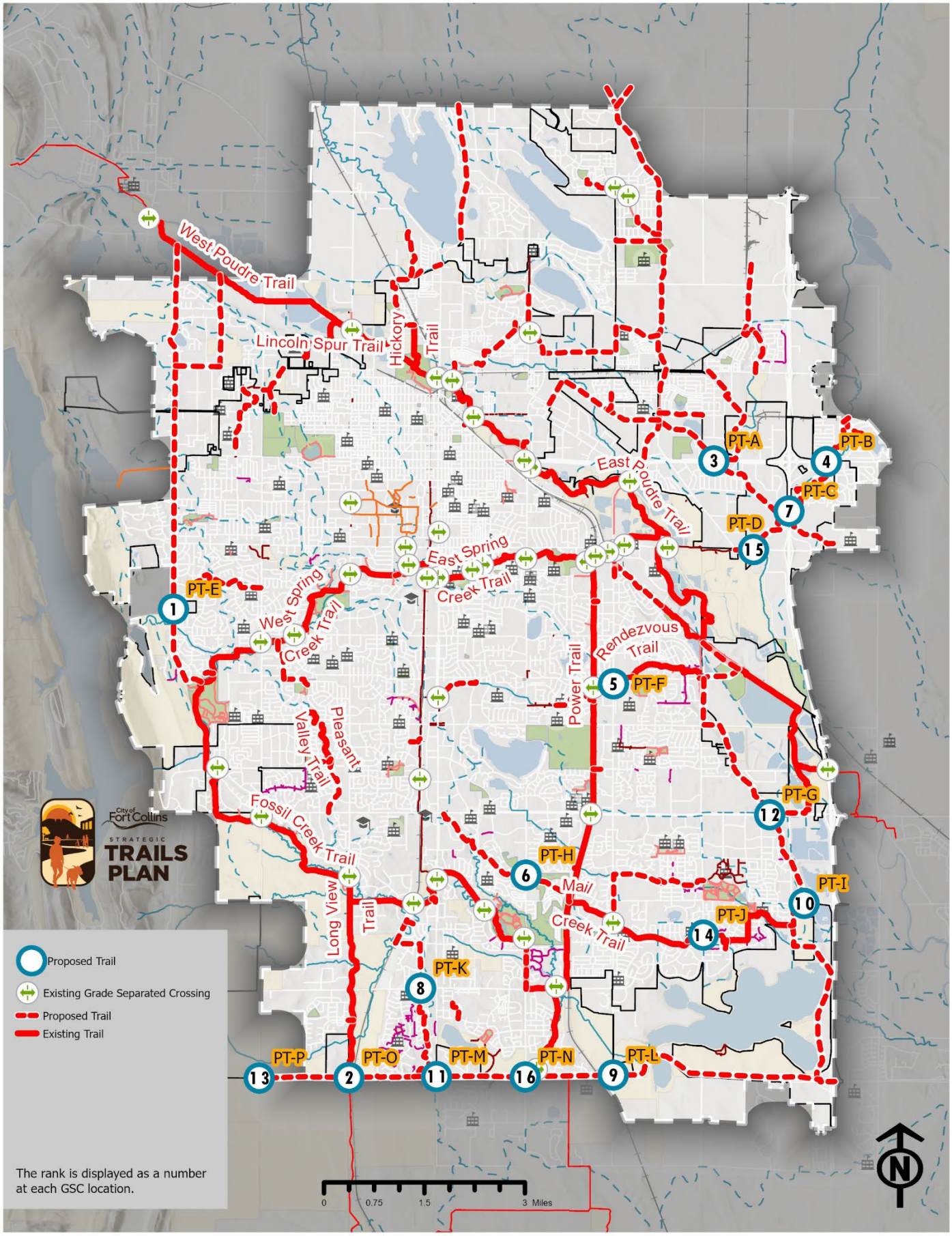


Table 5: Proposed GSCs on Railroads

Priority Ranking	Map ID	Narrative Description
Railroads		
1	RR-D	Mason Trail to Foothills Pkwy (RR overpass)
2	RR-C	Power Trail access crossing UPRR at Nancy Grey
3	RR-E	Power Trail access crossing UPRR at Caribou Drive
4	RR-A	Vine Dr. and BNSF east of Timberline
5	RR-B	Proposed Trail at GWRR and North Greenfield Dr.
6	RR-G	South Fort Collins Trail along Carpenter Rd. crossing BNSF
7	RR-F	South Fort Collins Trail along Carpenter Rd. crossing UPRR

Figure 3: Proposed GSCs on Railroads

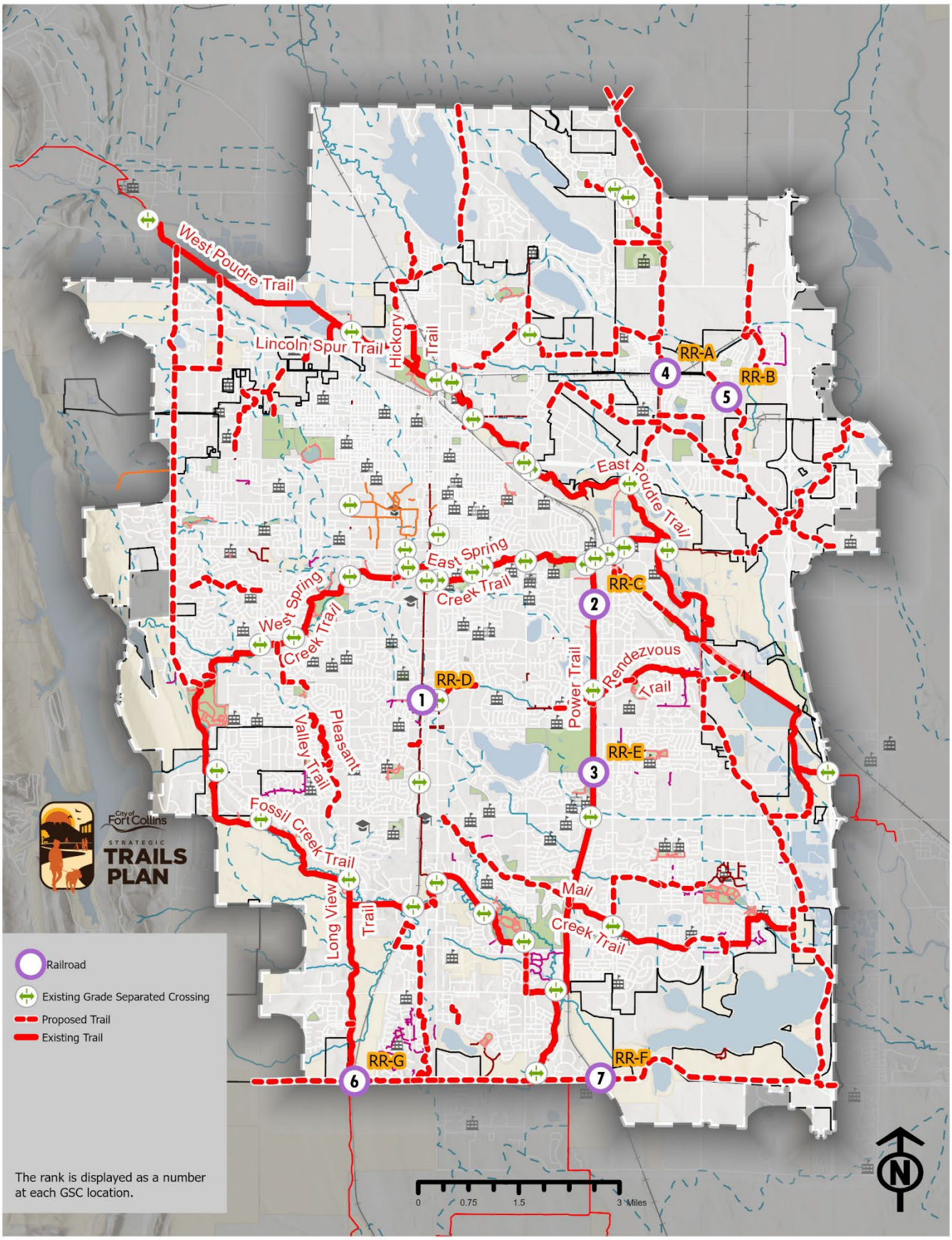
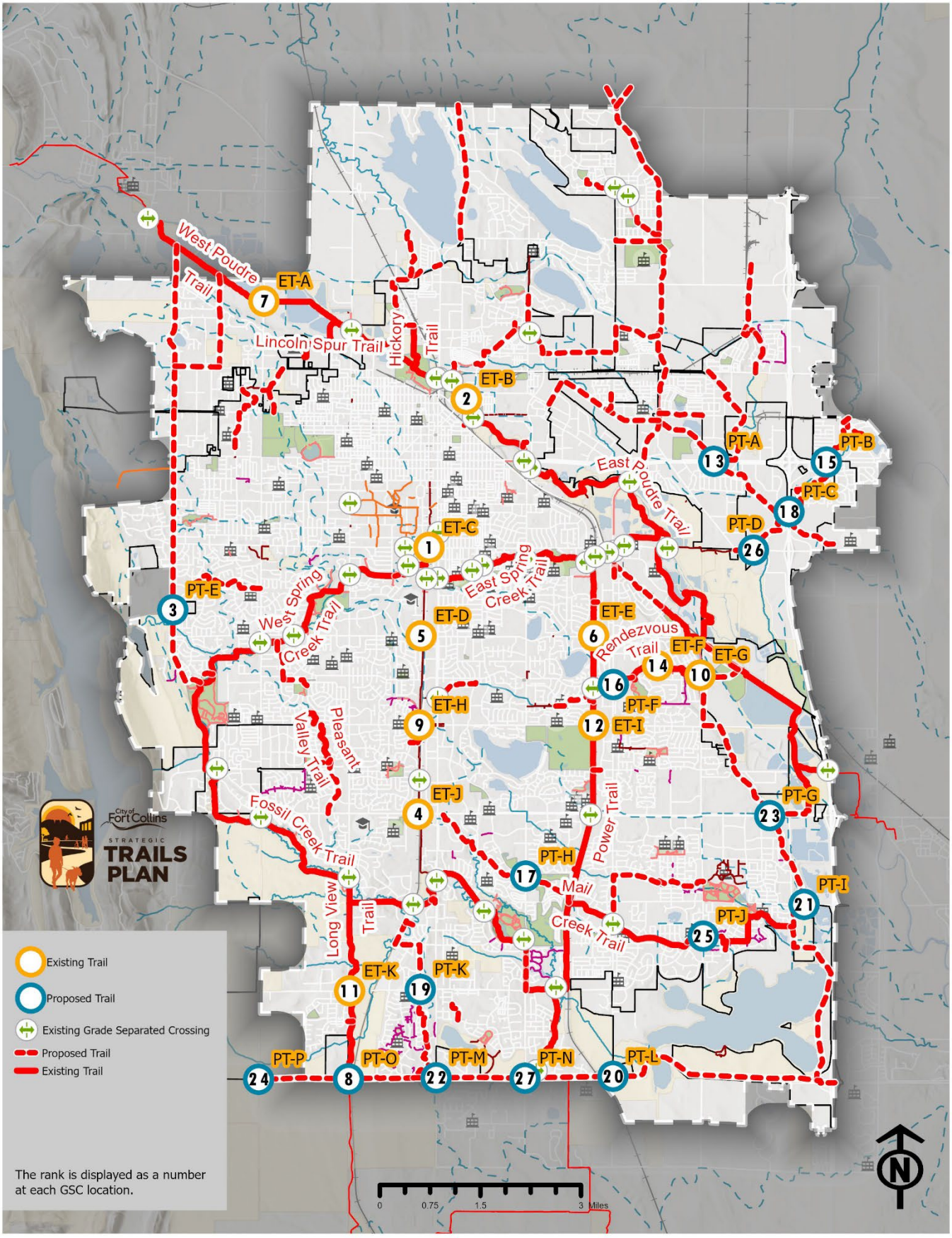


Table 6: All Proposed GSCs on Existing and Proposed Trails by Rank

Priority Ranking	Map ID	Narrative Description
1	ET-C	Mason Trail at Prospect Rd
2	ET-B	Linden St at East Poudre Trail
3	PT-E	LCR 42C at proposed trail along Overland Trl
4	ET-J	Harmony Rd at Mason Trail
5	ET-D	Drake Rd at Mason Trail
6	ET-E	Power Trail at Drake Rd
7	ET-A	N Taft Hill Rd at West Poudre Trail
8	PT-O	S Shields St at Proposed Trail south of Colina Mariposa NA
9	ET-H	Horsetooth Rd at Mason Trail
10	ET-G	Zeigler Rd at Rendevous Trail
11	ET-K	E Trilby Road at Longview Trail
12	ET-I	Power Trail at Horsetooth Rd
13	PT-A	E Mulberry St near Dawn Ave at proposed trail
14	ET-F	Rigden Pkwy at Rendevous Trail
15	PT-B	East Mulberry St at proposed trail along Boxelder Creek
16	PT-F	S Timberline Rd at Proposed Rendezvous Trail
17	PT-H	S Lemay Ave at proposed Mail Creek Trail
18	PT-C	I-25 at Proposed Trail along Boxelder Creek
19	PT-K	W Trilby Rd at proposed trail from Skyview Neighborhood
20	PT-L	S Timberline Rd at proposed trail along Carpenter Rd
21	PT-I	E County Rd 36/Ketcher Rd at proposed trail along FCRID
22	PT-M	S College Ave at proposed trail along Carpenter Rd
23	PT-G	E Harmony between Cinquefoil and Strauss Cabin at Proposed Trail
24	PT-P	S County Rd 19/Taft Hill and proposed trail to Coyote Ridge underpass and wildlife crossing
25	PT-J	Ziegler Rd at proposed Mail Creek Trail
26	PT-D	E Prospect Rd at proposed trail north of Running Deer NA
27	PT-N	S Lemay Ave at proposed trail along Carpenter Rd

Figure 4: All Proposed GSCs on Existing and Proposed Trails



Prepared for the
City of Fort Collins

BICYCLE & PEDESTRIAN

Grade Separated Crossing Prioritization Study

April 10, 2018

Prepared by
AECOM Imagine it. Delivered.

Table of Contents

Figures

1. Introduction

Purpose of Study

The addition of grade separated crossings for bicycles and pedestrians in the City of Fort Collins can create new connections, make existing connections safer, and enhance the low stress bicycle network. The City has already invested in constructing several new crossing locations, and there is an identified need for investment in many other areas in the City. This prioritization study established an approach to prioritize candidate bicycle and pedestrian grade separation locations to direct future investment towards locations that need it most using a data driven approach using both data and engineering judgement. The prioritization process included:

- Crossing opportunities identification
- Evaluation criteria identification and definition
- Data compilation
- Screening and prioritization according to the benefits generated for the bicycle network and the community

Project Management Team (PMT)

The multi-disciplined team included representatives from multiple City departments to provide a balanced comprehensive assessment of project opportunities.

- Aaron Iverson, Transportation Planning
- Nancy Nichols, Safe Routes to School
- Tessa Greegor, FC Bikes
- Nicole Hahn, Capital Projects
- Suzanne Bassinger, Park Planning and Development
- Tim Tuttle, Traffic Engineering

Consultant team staff from AECOM and Toole Design Group also participated on the PMT.

2. Crossing Opportunities Identification

Prior to this prioritization study, many crossing locations were discussed in previous studies in other contexts. A consolidation of various sources was required to generate a comprehensive list and GIS data layer that could be used to measure each potential crossing location.

Review of Previous Studies

Previous studies identified key crossing locations and pedestrian and bicycle connectivity in Fort Collins. Each of the following studies was reviewed for relevant information to inform the prioritization of grade separated crossing locations:

- Fort Collins Bicycle Master Plan (2014)
- Paved Recreational Trail Master Plan (2013)
- Fort Collins CIP (2012)
- Pedestrian Plan (2011)
- NFRMPO Non-Motorized Plan (2017)

In addition to locations identified in previous studies, the PMT identified other crossing locations that had been identified as potential grade separations in the context of other projects. Together, the PMT agreed upon the locations that should be evaluated for further prioritization. Figure 1 on the next page shows the top 25 priority locations.

Map of Locations

Potential new crossing locations and all existing grade separated crossings are identified below.

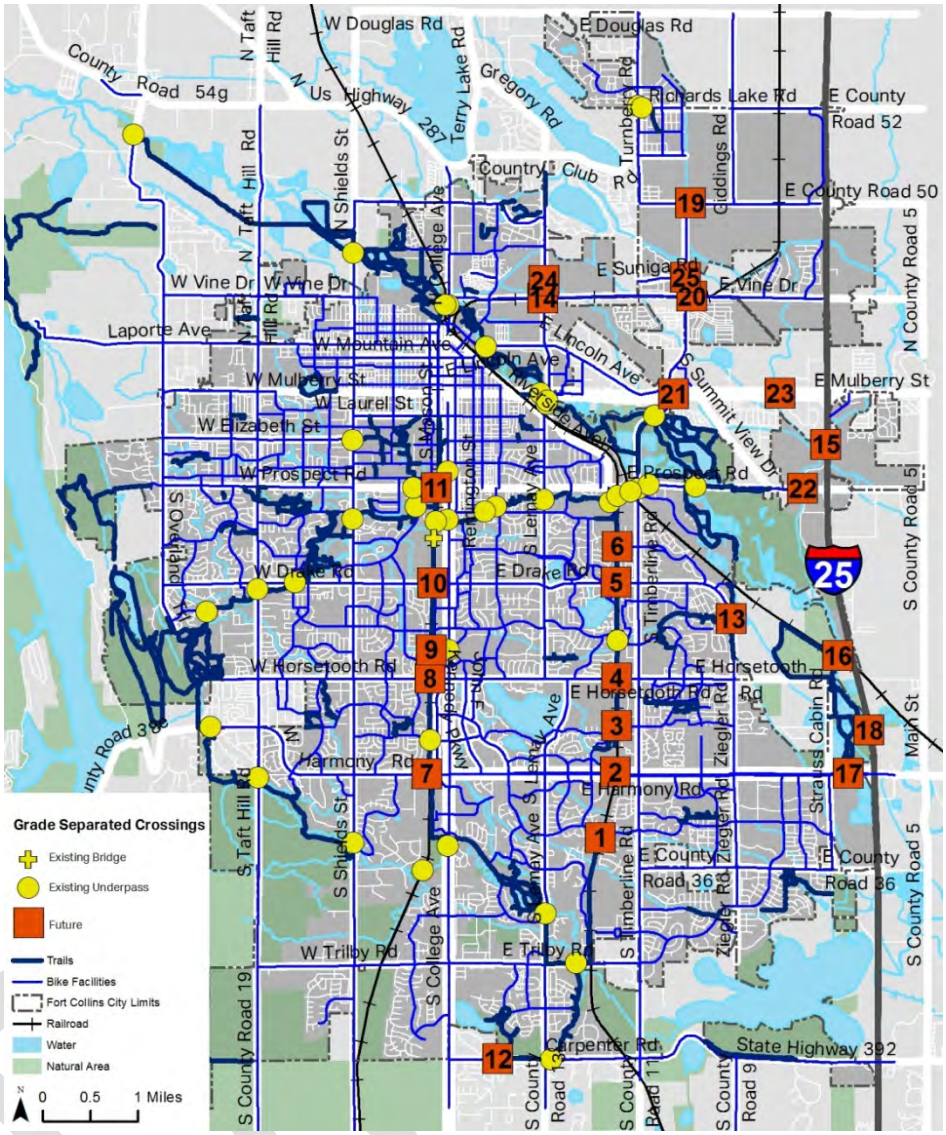


Figure 1: Identified Grade Separated Crossings

1	Power Trail Connection over UPRR	14	Future crossing over RR
2	Power Trail/Harmony	15	Boxelder Creek under I25
3	Caribou to Power Trail (RR Xing)	16	Poudre River Trail crossing GWR west of I25
4	Power Trail at Horsetooth Rd	17	Connection to future trail south of Harmony
5	Power Trail at Drake Rd	18	Poudre River Trail at I25 (funded with I25)
6	Nancy Gray to Power Trail (RR Xing)	19	Future Timberline Trail at Mountain Visa Dr
7	Mason Trail Crossing at Harmony Rd	20	Future Timberline Trail at Vine Dr
8	Mason Trail at Horsethooth Rd	21	Future Timberline Trail at Mulberry St
9	Mason Trail to Foothills Pkwy (RR overpass)	22	Future NE Trail at Prospect Rd (approximate)
10	Mason Trail at Drake Rd	23	Future NE Trail at Mulberry St (not in FC)
11	Mason Trail at Prospect Rd	24	Future Suniga crossing Lemay Ave
12	Carpender Road btwn College & Lemay	25	Future Suniga crossing Timberline Rd
13	Trail crossing Ziegler Rd near Drake Rd		

3. Prioritization Criteria

To support a data driven prioritization process, categories important to prioritization were identified and specific criteria were identified to roll up into a category score for each crossing. Specific criteria were identified within each category, as detailed below. The "range" identifies the metric for scoring or ranking each criterion, which was later used in spreadsheet format to compare criteria between each other.

Demand Category

Criteria	Definition	Source	Range
Bicycle Demand	Annual usage of bicycling infrastructure in the immediate area	Strava Metro 2016 total bike trips. For non-existent crossings, average activity taken on each side.	23 to 1339. No data available in several locations.
Pedestrian Demand	Walkability in the immediate area	Walkscore.com	1 to 76
Population Density	Existing populations within ½ mile of crossing	US Census ACS Block Group. Portion of block groups contained in buffer are proportionally weighted and summed.	371 to 3819
Youth Density	Population under 18 within ½ mile of crossing	US Census ACS Block Group. Portion of block groups contained in buffer are proportionally weighted and summed.	10% to 26%
Student Density	Number of schools within ½ mile of crossing	City of Fort Collins, Poudre School District	0-4
Senior Density	Number of seniors (65+) living within ½ mile of crossing	US Census ACS Block Group. Portion of block groups contained in buffer are proportionally weighted and summed.	6% to 22%

Connectivity Category

Criteria	Definition	Source	Range
Connectivity to Transit	Transit located within ½ mile of crossing	City of Fort Collins, Transfort bus stops.	MAX, bus, none
Part of an Enhanced Travel Corridor (ETC)	Yes/No if projects is located in Enhanced Travel Corridors, defined by the FC TMP	FC Transportation Master Plan (TMP)	Yes/No
Regional Trail Connection	Yes/No if new regional trail connection is created	Fort Collins GIS	Yes/No
Connects a Bicycle Path and/or Trail	Connects existing trail, connects future trail (if planned trail has not been constructed), or does not connect a trail	Fort Collins GIS	Yes/No
Alternate Crossing Location	Out of direction travel distance (in feet) of an alternate crossing location	Fort Collins GIS, Google	150 to 3620 ft
Connects to Existing	Yes/No if connects to existing streets and	Fort Collins GIS	Yes/No

Streets and Sidewalks	sidewalks		
Connectivity to Natural Resources	Proximity of walkable natural resources	Fort Collins GIS	0-5 min, 5-10 min, 10+ min
Connectivity to Destinations and Amenities (BNA)	Calculation of increased connectivity by low stress networks factoring in destinations and amenities over a 1 2/3 mile radius	BNA tool	0-100

Safety Category

Criteria	Definition	Source	Range
2020 Low-Stress Network Location	Crossing is along 2020 Low-Stress Network from Bicycle Master Plan	2014 Bicycle Master Plan	Yes/No
Crash Reduction Potential	Number of pedestrian and bicycle related crashes near crossing within last 5 years	Fort Collins Traffic Operations	Bike: no data,0,1,2-3,4-6; Ped: no data, 0,1
Quality of Existing Crossing	Existing quality level and availability of existing crossing	Aerial assessment and engineering judgement	No crossing, low, medium, high

Public Support Category

Criteria	Definition	Source	Range
Included in Previous Plan	Positively mentioned in documented planning study	Various studies	Yes/No

Social Equity Category

Criteria	Definition	Source	Range
Social Equity	Number of low and moderate income populations served within ½ mile of project	US Census ACS	15%-70%

Cost and Constructability Category

Criteria	Definition	Source	Range
Order of Magnitude Cost & Overall Feasibility	Estimate based on level of right of way impact, physical barriers/ infrastructure, and estimated cost	Based on professional engineering judgement	Low, Medium, Medium/High, High
Partnership or Funding Opportunities	Secured or near future non City funding and partnership opportunities	City of Fort Collins	no, partial, full

4. Screening Analysis

Data Collection

Available data for each crossing location was gathered and calculated. At some crossing locations, specific criteria data were not available (for example, future crossing locations where no existing bike activity occurs). Data sources for each of the criteria are documented in the spreadsheet tool.

Screening Process

To standardize the rollup of data in each criteria to the category score, the data for each criteria were standardized into a 0-100 scale score. Depending on criteria, locations with no data were given a score of 0 or other defined score.

A full set of collected data, category weighting, and screening results are available in the supplemental prioritization spreadsheet which is meant to be a living tool to be updated as future crossing locations are identified or evaluation criteria changes.

Figure 2 shows the results of the prioritization tool at the time this report was published.

	Demand ☑ Bicycle Demand ☑ Pedestrian Demand ☑ Population Density ☑ Youth Density ☑ Senior Density ☑ School Density	Connectivity ☑ Transit ☑ Nature ☑ ETC ☑ Regional ☑ Connects Path/Trail ☑ Alt Crossing ☑ Destinations (BNA)	Safety ☑ Crash Reduction Potential ☑ Low Stress Network ☑ Quality of Existing Crossing	Public Support ☑ Included in Previous Plan	Social Equity ☑ Low/Moderate Income	Cost and Constructability ☑ Order of Magnitude Cost ☑ Partnership/ Funding Opportunities	Overall Score	Overall Rank
	Category weights must add to 100%							
Map # Location	25%	25%	25%	0%	15%	10%	100%	
2 Power Trail/Harmony	80	57	100	0	37	63	71	1
3 Caribou to Power Trail (RR Xing)	72	61	100	0	43	13	66	2
11 Mason Trail at Prospect Rd	77	79	50	0	94	0	66	3
8 Mason Trail at Horsethooth Rd	78	66	50	0	82	13	62	4
1 Power Trail Connection over UPRR	69	57	100	0	29	0	61	5
9 Mason Trail to Foothills Pkwy (RR overpass)	71	79	33	0	83	13	60	6
6 Nancy Gray to Power Trail (RR Xing)	55	62	83	0	51	13	59	7
5 Power Trail at Drake Rd	68	62	67	0	49	25	59	8
10 Mason Trail at Drake Rd	83	57	50	0	65	0	57	9
4 Power Trail at Horsetooth Rd	69	61	67	0	33	25	56	10
7 Mason Trail Crossing at Harmony Rd	69	57	50	0	51	25	54	11
13 Trail crossing Ziegler Rd near Drake Rd	54	57	67	0	24	25	50	12
19 Future Timberline Trail at Mountain Visa Dr	51	48	50	0	52	50	50	13
21 Future Timberline Trail at Mulberry St	51	36	50	0	100	0	49	14
20 Future Timberline Trail at Vine Dr	52	37	50	0	69	13	46	15
25 Future Suniga crossing Timberline Rd	52	38	50	0	55	25	46	16
23 Future NE Trail at Mulberry St (not in FC)	52	29	50	0	83	0	45	17
22 Future NE Trail at Prospect Rd (approximate)	43	36	50	0	61	25	44	18
24 Future Suniga crossing Lemay Ave	50	41	50	0	41	25	44	19
16 Poudre River Trail crossing GWR west of I25	41	64	50	0	22	13	43	20
15 Boxelder Creek under I25	53	51	17	0	68	25	43	21
14 Future crossing over RR	51	36	50	0	57	0	43	22
18 Poudre River Trail at I25 (funded with I25)	49	50	50	0	23	0	41	23
12 Carpender Road btwn College & Lemay	46	50	33	0	36	25	40	24
17 Connection to future trail south of Harmony	44	46	50	0	22	13	40	25

Figure 2: Prioritization Results

5. Concept Design at Priority Locations

To be better prepared for future funding opportunities such as CIP funding, BFO offer, or grant applications, a more detailed analysis on the constructability of the top five priority crossing locations was completed to catalog order of magnitude cost estimates, major construction items, and major opportunities and constraints. The detailed analysis on these locations does not preclude moving forward with other locations but serves as a starting point to direct future investments and grant opportunities. Variables, such as new funding sources, could become available for locations outside of these five which could rank others higher in the future. The intent is to make this a living tool that can be modified over time.

The top five locations from the screening process are:

1. Power Trail/Harmony
2. Caribou to Power Trail (RR Xing)
3. Mason Trail at Prospect Rd
4. Mason Trail at Horsetooth Rd
5. Power Trail Connection over UPRR

In addition to these five crossings, the PMT decided to also investigate Mason Trail at Drake Rd due to the planned development in the area that could potentially contribute towards funding a new crossing.

Design Standards and Assumptions

Concept development of pedestrian and bicycle grade separated crossings for each location included an evaluation of bridge and underpass options depending on adjacent topography and site constraints. A wide variety of structure types are available at each location, but for the purposes of cost estimating the following general assumptions were made on structure type.

- Grade separated approaches and crossings were designed to accommodate a maximum grade of five percent (conforms with Americans with Disabilities Act (ADA) Standards)
- The minimum inside clear width of a pedestrian bridge on a pedestrian accessible route is 8 feet (AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2004).
- Pedestrian grade separations at railroad locations shall be in accordance with the 2016 BNSF-UPRR Railroad Guidelines for Railroad Grade Separation Projects.
- Underpass options assume the following:
  - Width of 16 feet and vertical clearance of 12 feet
  - 3-ft and 6-ft vertical cover over roadways and railroad tracks; respectively.
  - Headwalls extend approximately 5-ft (min) beyond edge of roadway or sidewalk.
  - Retaining wall and approach ramp geometric requirements based on 5% approach grades.

Power Trail at Harmony

The existing Power Trail alignment stretches 5 miles from Trilby Road on the south, to Prospect Road on the north, paralleling the west side of the Union Pacific Railroad. A 1-mile gap in the trail exists in the vicinity of Harmony Road due to the lack of a safe crossing location. Trail counts for 2017 at Horsetooth Road (1-mile north of Harmony Road) equaled 120,000. At the Southridge Greens counter (1-mile south of Harmony) the trail count equaled 78,000. The Power Trail has been identified by the North Front Range MPO as Fort Collin's portion of the Front Range Trail, identified by the state of Colorado to one day to stretch from New Mexico to Wyoming. The missing section of trail and grade separated crossing at Harmony Road will complete this popular and heavily used trail through Fort Collins.

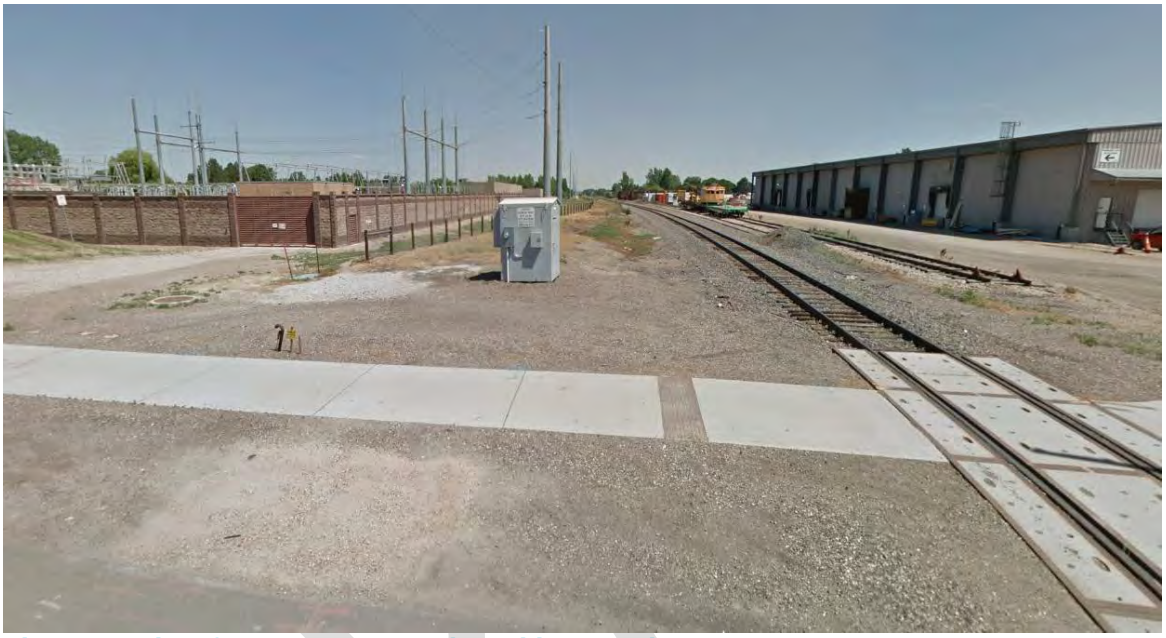


Figure 3: View from Harmony Rd Looking North

Figure 4: View from Harmony Rd Looking South

An underpass with ramps aligned parallel to the trail is the concept that was considered as a design in this location. The trail would be extended to the north and south of the crossing to connect with the existing Power Trail. Other tunnel and bridge concepts could be further explored as part of a more detailed design effort.

Power Trail at Harmony Assumptions

- Assume 12 feet high by 16 feet wide by 200 feet long
- Assume 1 foot slab and wall thickness
- Assume 3-ft of cover (Roadway to Top of Structure)
- Assume 8" of PCCP pavement removal and replacement
- Structure excavation is computed in accordance with the CDOT M&S standard specifications.
- Retaining walls extend along a straight 5% grade between the bottom of the underpass to finished grade
- Assume north and south approaches are 240 feet each.
- Assumes 4850 linear feet of trail required to connect with existing trails

Power Trail at Harmony Challenges

- Right of way/easement requirements likely needed from railroad. Temporary signals may be required to accommodate the phased construction
- City of Fort Collins Utilities' substation on the north side of Harmony Road is an unknown utility conflict and will require significant design coordination efforts
- Manhole structures both north and south of Harmony Road may require relocation
- Constraint for the trail is limited at railroad right of way
- Revisions to the roadside drainage along Harmony Road are anticipated
- Potential PCBs from Fort Collins Utilities' substation
- Parcel south of Harmony Rd has parking lot that extends into the right of way where the trail would go. This will need to be addressed with the parcel owner.

Power Trail at Harmony Concept level cost detail

- See cost estimate sheet for a preliminary cost estimate

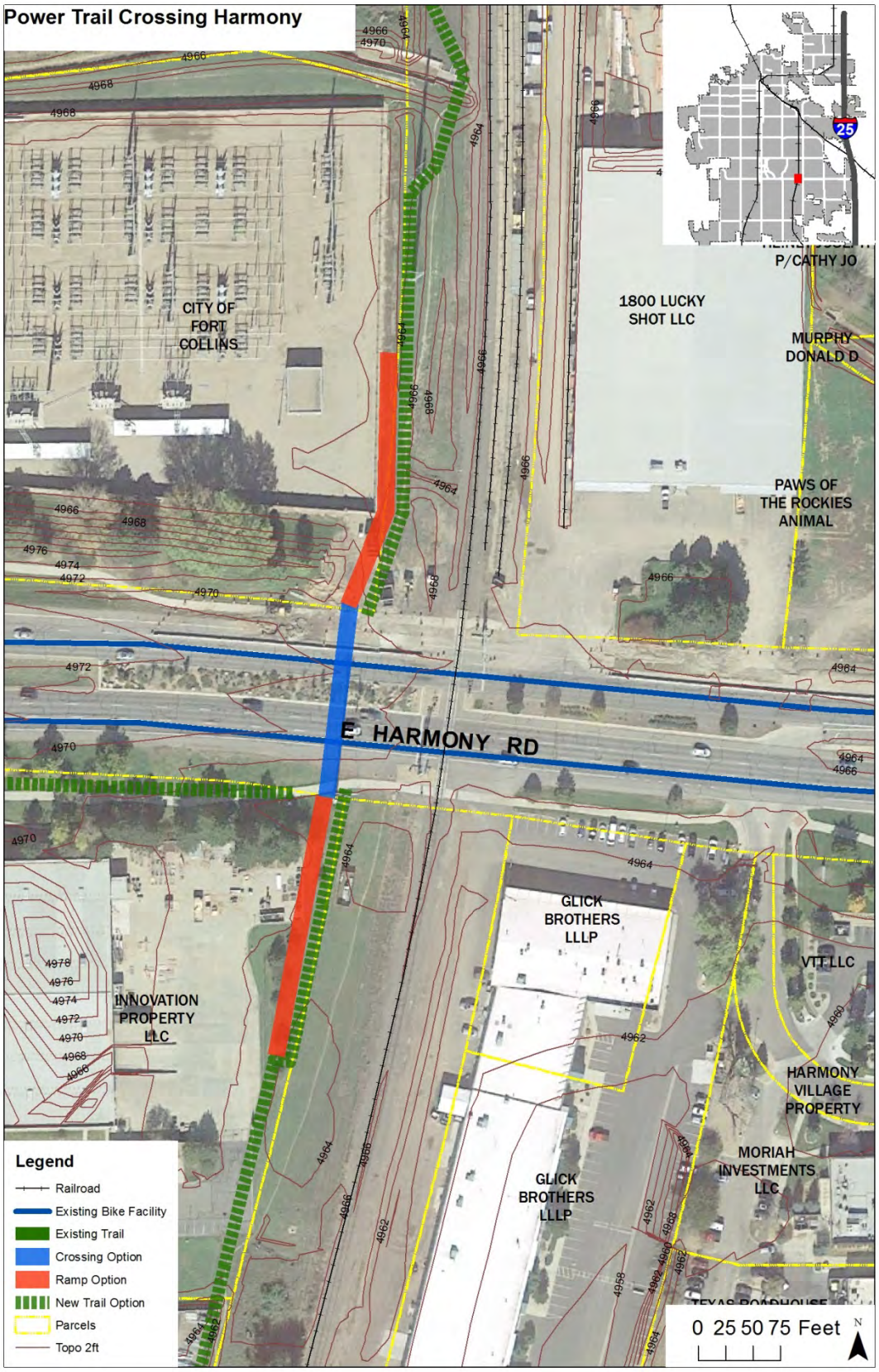


Figure 5: Power Trail at Harmony Underpass Concept

Mason Trail at Prospect Road

The Mason Trail runs east of the railroad and MAX transitway on the north side of Prospect Rd, and switches to the west side of the railroad south of Prospect Rd. Trail users cross the transitway and railroad at grade and then cross Prospect Rd at a signalized at grade crossing. A grade separated crossing at this location could create a more direct and safer route for trail users and could also improve traffic conditions.

Figure 6: Mason Trail at Prospect Rd Looking North

Figure 7: Mason Trail at Prospect Rd Looking South

This location is challenging because the Mason trail moves from the east side of the railroad on the north side of Harmony Road to the west side of the railroad on the south side of Harmony Road. Several concepts were explored, and the option that was explored as part of this effort is a tunnel under Prospect Road that does not cross the railway and transitway to join up with the Mason Trail. With this tunnel, trail users would have a grade separated crossing at Prospect Road but would still need to cross at grade over the railroad and transitway. A switchback ramp on the north side of Prospect was developed to allow this movement to happen, and a straight ramp on the south side was developed to join up with the Mason Trail.

Mason Trail at Prospect Road Assumptions

- Tunnel crossing Prospect Rd only (not crossing the railroad)
- Assume 12 feet high by 16 feet wide by 75 feet long. (Beneath Prospect, West of Mason)
- Assume 1 foot slab and wall thickness
- Assume 3-ft of cover (Roadway to Top of Structure)
- Assume 8" of PCCP pavement removal and replacement
- Structure excavation is computed in accordance with the CDOT M&S standard specifications.

- Assume underpass structure extends 10 feet past either side of roadway
- Retaining walls extend along a straight 5% grade between the bottom of the underpass to finished grade. North of Prospect Road, sidewalk to trail access via switch back is proposed
- Assume north and south approaches are 260 feet and 300 feet; respectively.

Mason Trail at Prospect Road Challenges

- Construction of this underpass will still require an at-grade crossing of the railroad and MAX guideway
- Right of way/easement requirements likely needed from railroad. Relocation of the railroad signal/communication house at the north side of Prospect Road may have significant cost impacts
- Revisions to the roadside drainage along Prospect Road are anticipated
- Retaining walls parallel to railroad tracks may require shoring and need to be designed to accommodate E80 railroad live load surcharge loading and will have significant cost impacts

Mason Trail at Prospect Road Concept level cost detail

- See cost estimate sheet for a preliminary cost estimate

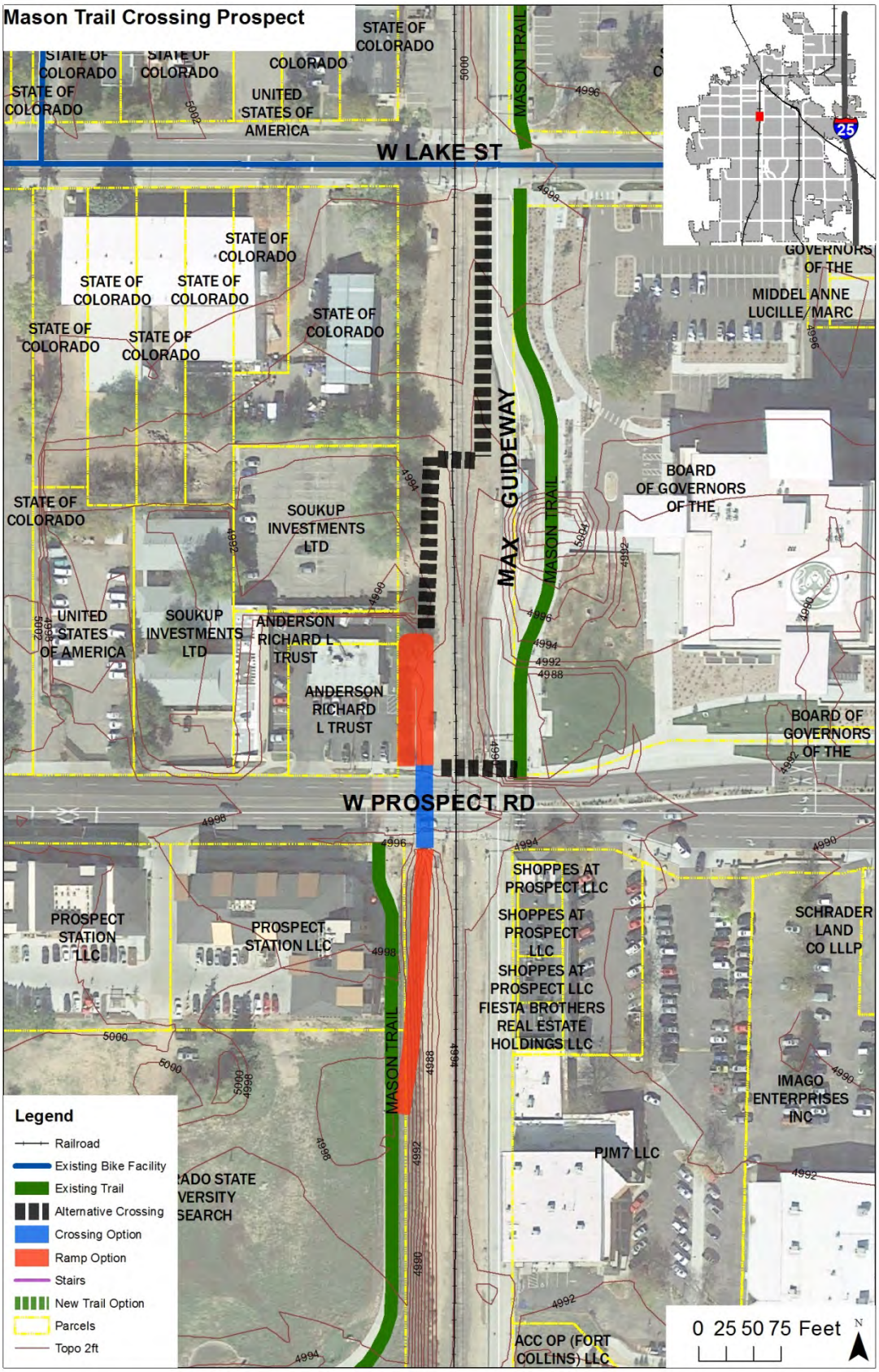


Figure 8: Mason Trail over Prospect Concept

Mason Trail at Horsetooth Rd

The Mason Trail is located along the west side of the railroad both north and south of Horsetooth Road. When continuing on the trail across Horsetooth Road, trail users cross five travel lanes at grade at the signalized crossing. An underpass in this location would reduce delay for Mason Trail users and vehicles traveling on Horsetooth Road.

Figure 9: Mason Trail at Horsethooth Rd Looking South

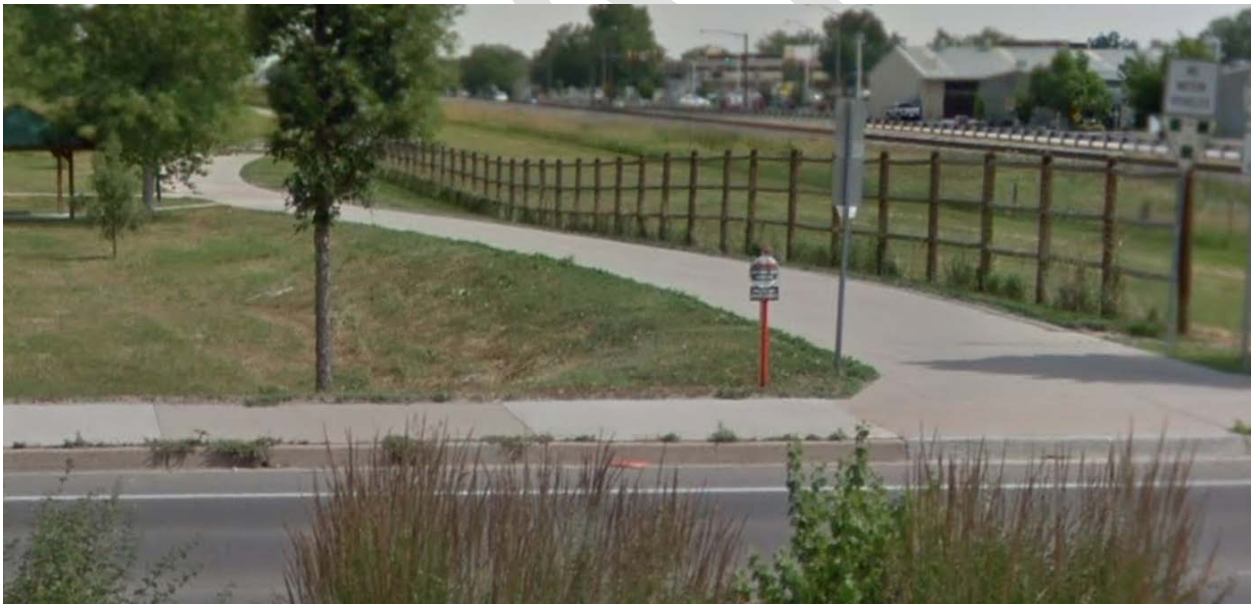


Figure 10: Mason Trail at Horsetooth Rd Looking North

The design concept explored for this location includes an overpass over Horsetooth Road on the west side of the ditch away from the railroad and utility conflicts present at the existing at grade crossing location. The ramp on the north extends down from the bridge to the ditch where it crosses and then continues to descent until it meets the Mason Trail. On the south side of Horsetooth Road, the ramp extends down between the surface parking lot and utility until it joins the existing Mason Trail.

Mason Trail at Horsetooth Road Assumptions

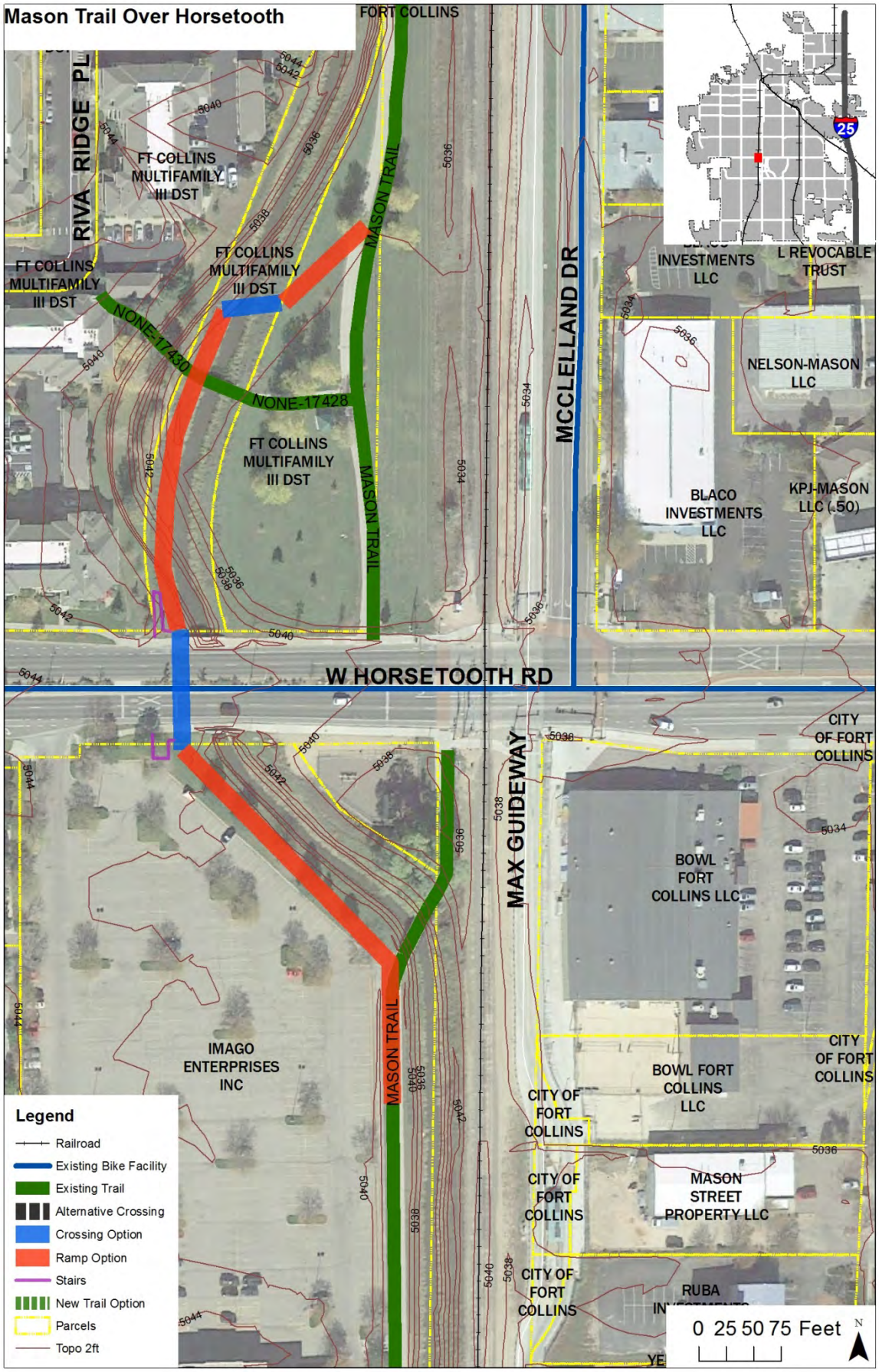
- Assumes ramp and stairway access only (i.e. no elevators)
- Assume pre-fab steel box truss structure types across Horsetooth Road and Ditch
- Assume 20 feet vertical clearance over Horsetooth Road
- Structure excavation is computed in accordance with the CDOT M&S standard specifications.
- Retaining walls are required along the elevated portions of the trail approaches both north and south the Horsetooth Pedestrian Bridge
- Ramp lengths are based on 5% grade
- Pedestrian bridge lengths over Horsetooth Road and the Ditch are 110 ft and 60 ft; respectively
- Ramp between bridge over Horsetooth and bridge over creek - 300 feet
- Ramps up to bridge over creek - 100ft each
- South Ramp up to Pedestrian bridge over Horsetooth - 400 feet

Mason Trail at Horsetooth Rd Challenges

- Right of way coordination along the west side both north and south of Prospect Road could be problematic

Mason Trail at Horsetooth Rd Concept level cost detail

- See cost estimate sheet for a preliminary cost estimate


Mason Trail Over Horsetooth
FORT COLLINS
RIVA RIDGE PL
FT COLLINS MULTIFAMILY III DST
FT COLLINS MULTIFAMILY III DST
FT COLLINS MULTIFAMILY III DST
FT COLLINS MULTIFAMILY III DST
MASON TRAIL
MASON TRAIL
MASON TRAIL
NONE-17430
NONE-17428
MCCLELLAND DR
INVESTMENTS LLC
L REVOCABLE TRUST
NELSON-MASON LLC
BLACO INVESTMENTS LLC
KPJ-MASON LLC (.50)
W HORSETOOTH RD
MAX GUIDEWAY
CITY OF FORT COLLINS
BOWL FORT COLLINS LLC
BOWL FORT COLLINS LLC
CITY OF FORT COLLINS
CITY OF FORT COLLINS
CITY OF FORT COLLINS
MASON STREET PROPERTY LLC
CITY OF FORT COLLINS
RUBA
IMAGO ENTERPRISES INC
Legend
Railroad
Existing Bike Facility
Existing Trail
Alternative Crossing
Crossing Option
Ramp Option
Stairs
New Trail Option
Parcels
Topo 2ft
0 25 50 75 Feet
N

Mason Trail at Drake

The Mason Trail runs along the west side of the railroad both north and south of Drake Road. When continuing on the trail across Drake Road, trail users cross five travel lanes at grade at the signalized crossing. An underpass in this location would reduce delay for trail users and vehicles traveling on Drake Rd.

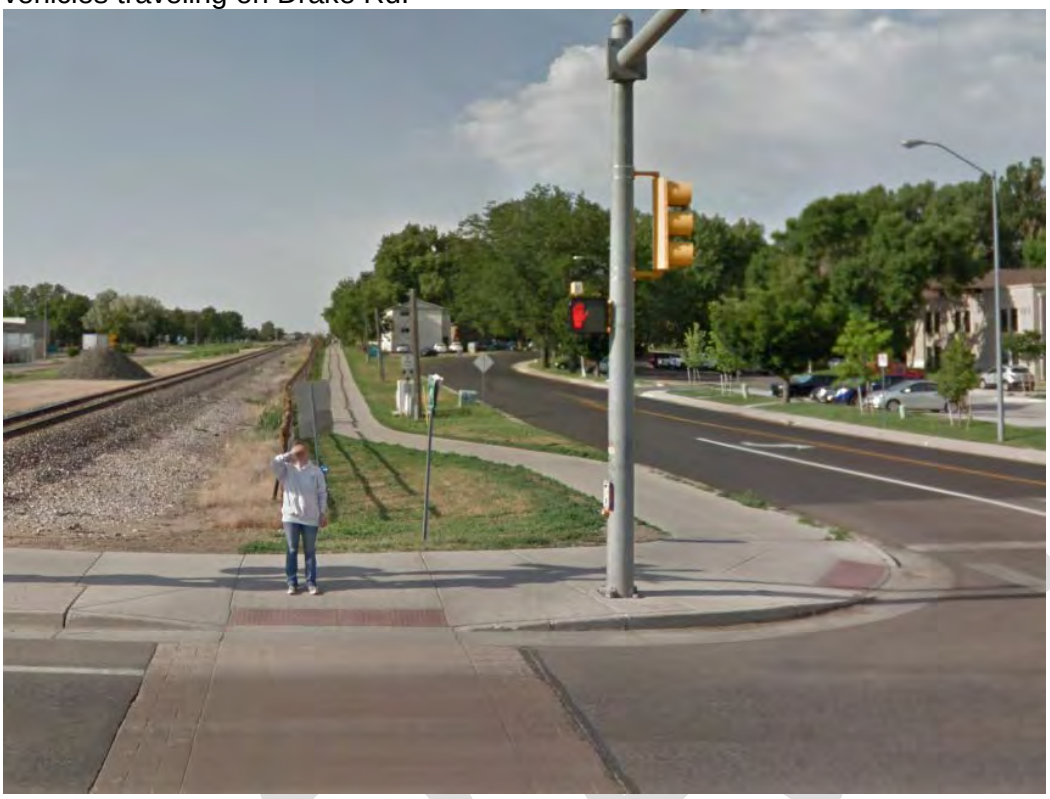


Figure 11: Mason Trail at Drake Looking South

Figure 12: Mason Trail at Drake Looking North

The tunnel concept developed for this location includes a tunnel adjacent to the railroad and ramps that run parallel to the railroad until they meet grade at the existing Mason Trail. Trail access points from Drake Road to the underpass are located immediately adjacent to the ramps on the west side to provide access to Drake Road.

Mason Trail at Drake Assumptions

- Assume 12 feet high by 16 feet wide by 130 feet long
- Assume 1 foot slab and wall thickness
- Assume 3-ft of cover (Roadway to Top of Structure)
- Assume 8" of PCCP pavement removal and replacement
- Structure excavation is computed in accordance with the CDOT M&S standard specifications.
- Retaining walls extend along a straight 5% grade between the bottom of the underpass to finished grade
- Assume north and south approaches are 320 feet and 360 feet; respectively

Mason Trail at Drake Challenges

- Available space on south side of Drake Road is ~30 feet between Redwing Road and the railroad right of way
- Tight constraint
- Right of way/easement requirements likely needed from railroad. Relocation of the railroad signal/communication house at the north side of Drake Road may have significant cost impacts
- Revisions to the roadside drainage along Drake Road are anticipated
- Retaining walls parallel to railroad tracks may require shoring, need to be designed to accommodate E80 railroad live load surcharge loading and will have significant cost impacts

Mason Trail at Drake Concept level cost detail

- See cost estimate sheet for a preliminary cost estimate

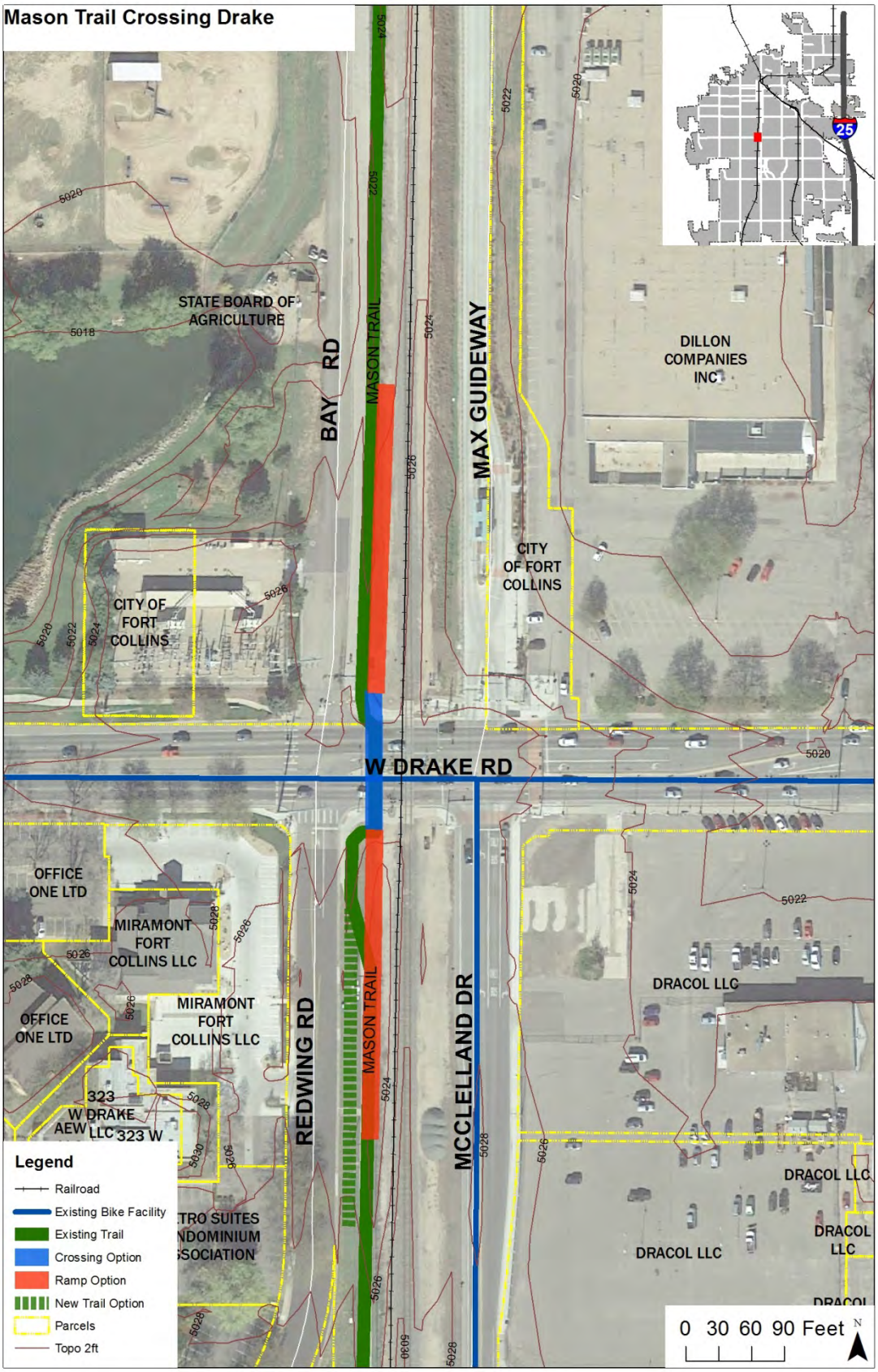


Figure 13: Mason Trail at Drake Rd

Caribou to Power Trail (RR Xing)

Bicycle and pedestrian access to the Power Trail from the neighborhoods in southern Fort Collins are limited to existing intersection crossings on the east side of the railroad. Creating a new grade separated crossing over the railroad at a location between major intersections would increase accessibility for residents and would also link together east/west on street bike routes on Caribou Drive which is located about a half mile north of Harmony Road and half a mile south of Horsetooth Road.

Figure 14: View from Caribou Dr Looking West Towards Railroad

The underpass concept explored with this concept includes a ramp on the east side of the railroad in between the buildings and a ramp on the west side of the railroad immediately extending north until it meets the Power Trail at grade.

Caribou to Power Trail (RR Xing) Assumptions:

- Assume 12 foot high by 16 foot wide by 76 foot long
- Assume 1 foot slab and wall thickness
- Assume 6-ft of cover (RR to Top of Structure)
- Assume west and east approaches are 360 feet and 320 feet; respectively
- Structure excavation is computed in accordance with the CDOT M&S standard specifications

Caribou to Power Trail (RR Xing) Challenges:

- West retaining walls parallel to railroad tracks may require shoring, need to be designed to accommodate E80 railroad live load surcharge loading and will have significant cost impacts
- Limited right of way along the east trail approach may require non-conventional retaining wall and will likely increase project costs
- Right of way/easement requirements likely needed from railroad

Caribou to Power Trail (RR Xing) Concept level cost detail

- See cost estimate sheet for a preliminary cost estimate

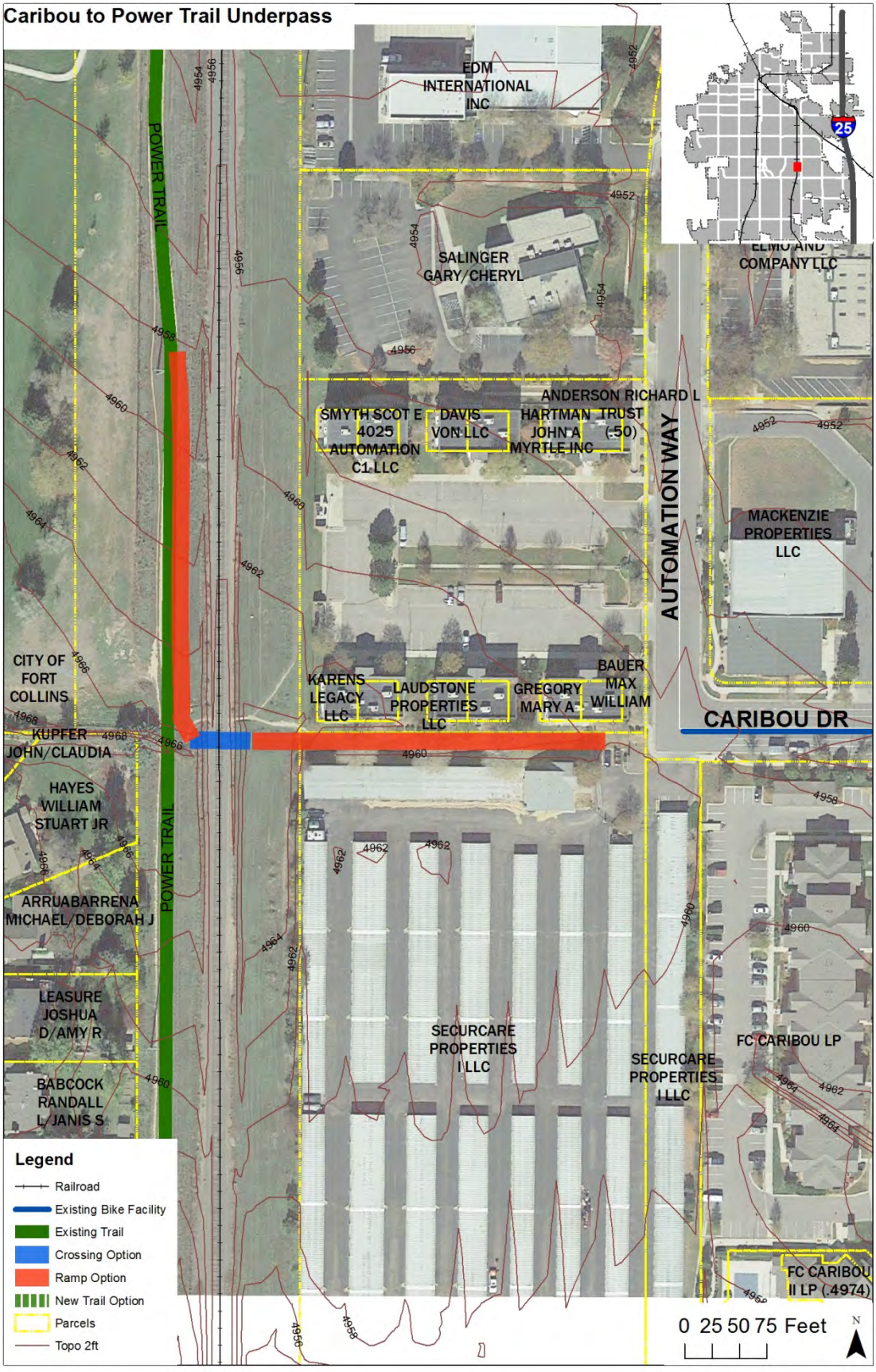


Figure 15: Caribou to Power Trail Crossing

Power Trail Connection over UPRR

The UPRR presents a significant barrier to access of the Fort Collins trail system. The area east of the RR and south of Harmony Road does not have safe access to Fort Collins recreational trail access. In addition, this crossing would be the only bike/ped crossing of the railroad in a 2-mile stretch. Several unprotected "social crossings" of the tracks, with steep embankments, are evident in this area and indicate the need for a safer crossing. Additional development currently underway in the area will only add to this crossing pressure.

A detailed feasibility study for several crossings of the UPRR around this location to access the Power Trail from the east side of the railroad was completed by Michael Baker International on April 29, 2016. Several locations and structure types were studied in the two-mile corridor west of Timberline Road to find a solution that provides the best combination of user convenience and least impact on the surrounds. The three general locations studied for possible grade separated crossings of the UPRR included:

- Keenland Underpass – at the Keenland Drive/Battlecreek Drive intersection
- Siphon Overpass – at the Mail Creek Ditch siphon crossings of the UPRR
- South Overpass – two sites north of Trilby Road

Based on the result of the study, the City would like to proceed with Siphon Overpass due to the central location between Harmony Road and Trilby Road (1 mile from each), likelihood of reducing illegal at grade crossings of UPRR, and alignment with the Trail Master Plan to the east along Mail Creek Ditch. Five concepts were developed at this location, but for the purposes of this evaluation, Siphon Overpass Concept 3 was selected as the most viable concept that could re-utilize an existing 160 foot bridge that was removed from a different location.

Power Trail Connection over UPRR Assumptions:

- Assumes ramp and stairway access only (i.e. no elevators)
- Assumes rehabilitation and relocation of the Mulberry Pedestrian Bridge.
- Stairway assumes a rise height of 7-inch
- Assumed a lower bridge cost (according to email, there is potentially an existing bridge 'saved' for this)
- Assume a required 25 feet of vertical clearance over UPRR tracks
- Assume structure dimensions of 16 feet x160 feet
- Assume a ramp width of 16 feet and a length of 129 feet to the west and 158 feet to the east
- Use Siphon option 3 from feasibility study

Power Trail Connection over UPRR Challenges:

- Potential visual impacts to existing homes and future development to the east
- Coordination with ditch company
- Overhead transmission lines may present construction and permanent challenges
- Right of way/easement requirements likely needed from railroad

Power Trail Connection over UPRR Concept level cost detail

- See cost estimate sheet for a preliminary cost estimate

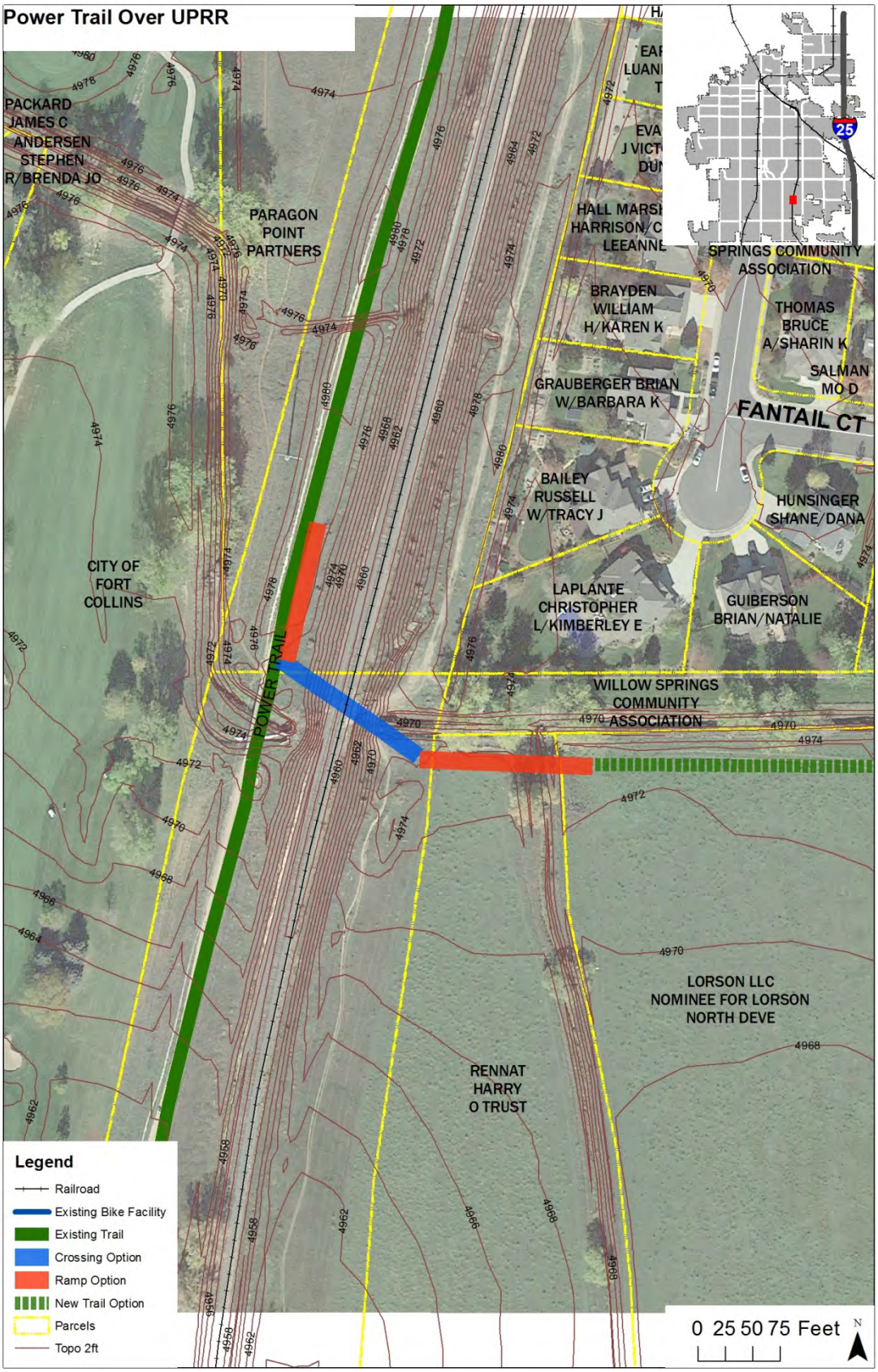


Figure 16: UPRR Connection to Power Trail

6. Next Steps

This prioritization study resulted in an organized prioritized list that can be used by the City moving forward as decisions are made about funding new capital investments. Immediate next steps to be undertaken by the city include:

- Focus on designing and funding the top six locations identified in this study. Discuss options to advance the options with City leadership, including City Council.
- Present all 25 concepts and the prioritization process to the public as part of the Transportation Master Plan (TMP) public process. Feedback received at this level can be added back to the prioritization tool to further refine the prioritization. This process could move popular projects that are prioritized lower towards the top of the list.
- In addition or potentially in lieu of presenting all options, present the top level concepts that were explored in this report to gather additional feedback. This type of feedback could inform City staff as to which option should be next in line for public investment.
- In the long term, explore the additional 19 bicycle and pedestrian grade separated crossing locations at a deeper concept level in a similar way the top six were explored in this report.

Appendix A Cost Estimate Details

Summary of Estimated Project Worksheets			
Concept/Location	**Type**	**Subtotal of Construction Costs**	**Total Program Cost**
Power Trail Underpass at Harmony	Underpass	$ 5,499,006	$ 7,123,758
Caribou to Power Trail RR Underpass	Underpass	$ 4,004,872	$ 5,256,090
Mason Trail Underpass at Prospect	Underpass	$ 4,954,421	$ 6,318,027
Mason Trail Underpass at Drake	Underpass	$ 5,787,958	$ 7,234,948
Mason Trail Overpass at Horsetooth	Underpass	$ 3,957,760	$ 5,072,200
Power Trail Connection over UPRR	Bridge	$ 1,394,275	$ 1,900,843

Estimated Project Worksheet
Harmony & Power Trail Underpass

	UNITS	QUANTITY	UNIT COST	TOTAL COST	
Clearing & Grubbing	SY	2175	$5.00	$10,874	
Structure Excavation (and backfill)	CY	5476	$50.00	$273,778	
Embankment Material	CY	135	$25.00	$3,384	
Underpass Structure	SF	3600	$250.00	$900,000	
Trail Section (6 inch)	SY	10283	$25.00	$257,067	
Retaining Walls	SF	7200	$75.00	$540,000	
Roadway Pavement Removal	SY	383	$10.00	$3,827	
HMA Pavement	TON		$125.00	$0	
PCCP Pavement	SY	352	$75.00	$26,367	
Guardrailing	LF	40	$50.00	$2,000	
Temporary RR Signals	EA	1	$100,000.00	$100,000	
	% RANGE		**% USED**	**COST**	
Project Construction Bid Items	Project Dependent		N/A	**$2,117,297**	(A)
Contingencies	(10% - 30%) of (A)		30%	$635,189	(B)
Urban Design	(6-10%) of (A+B) Default = 5%		15%	$317,595	
ITS/Lighting	(6-10%) of (A+B) Default = 6%		3%	$82,575	(C)
Utility Relocation	(3-10%)of (A+B) Default = 6%		20%	$550,497	(D)
Drainage/Erosion Control/SWMP	(1-5%) of (A+B) Default = 5%		10.0%	$275,249	(E)
Construction Signing and Traffic Control (Railroad Coordination)	5 to 25% of (A+B) Default = 20%		20%	$550,497	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7%	$294,791	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			**$4,823,690**	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2%	$96,474	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12%	$578,843	(J)
Subtotal of Construction Cost	(H+I+J)			**$5,499,006**	(K)
ROW Requirements		**SF**	**UNIT COST**		
		10000	$ 25.00	$250,000	
Designer Fee	(10%) of (K)		10%	$549,901	
Constr Mmgt/Inspection	(10 to 25%) of (K)		15%	$824,851	
Total Program Cost				**$7,123,758**	

Str. Length	200	ft
Span	16	ft
Wall Thickness	1	ft
Total Width	18	ft
Height	12	ft
Top Slab	1	ft
Cover	3	ft
Total Height	16	ft
Approach A	364	ft
Approach B	368	ft

Retaining Walls		
Approx. Length	240	ft
Area	1800	sf/wall
PCCP Pavement	8	in
Roadway	113	ft

$500 may have been based on total project cost

A		
Top Elevation	4970	
Culvert Trail Elevatio	4954	
End Elevation	4966	
Approach A	240	ft
B		
Top Elevation	4970	
Culvert Trail Elevatio	4954	
End Elevation	4966	
Approach B	240	ft

$ 1,527.50 per square foot

4852

Assumptions:

Assume 12 ft high by 16 ft wide by 200 ft long
Assume 1 ft slab and wall thickness
Assume 3-ft of cover (Roadway to Top of Structure)
Assume 8" of PCCP Pavement
Treat median as another lane for pavement calcs
Structure excavation is equal to total width of CBC +1.5' on either side+length of the approaches
Of the 3 ft of cover, 2' is embankment material - only used on either side of roadway
Retaining walls are treated as triangles along a straight 5% grade between the bottom of the underpass to the same elevation as the roadway
Assume north and south appraches are 240 ft and 240 ft; respectively.
Assumes 4850 linear feet of trailway required to connect with existing trails

*include excavation and backfill

Estimated Project Worksheet
Caribou to Power Trail RR Underpass

	UNITS	QUANTITY	UNIT COST	TOTAL COST	
Clearing & Grubbing	SY	1577	$5.00	$7,887	
Structure Excavation	CY	4839	$50.00	$241,967	
Embankment Material	CY	296	$25.00	$7,389	
Underpass Structure	SF	1368	$350.00	$478,800	
Trail Section (6 inch)	SY	1202	$50.00	$60,089	
Retaining Walls	SF	9860	$100.00	$986,000	
Roadway Pavement Removal	SY	152	$10.00	$1,520	
HMA Pavement	TON		$125.00	$0	
PCCP Pavement	SY		$75.00	$0	
Guardrailing	LF		$50.00	$0	
	% RANGE		% USED	COST	
Project Construction Bid Items	Project Dependent		N/A	**$1,783,652**	(A)
Contingencies	(10% - 30%) of (A)		30%	$535,096	(B)
Urban Design	(6-10%) of (A+B) Default = 5%		5%	$89,183	
ITS/Lighting	(6-10%) of (A+B) Default = 6%		2%	$46,375	(C)
Utility Relocation	(3-10%)of (A+B) Default = 6%		6%	$139,125	(D)
Drainage/Erosion Control/SWMP	(1-5%) of (A+B) Default = 5%		10%	$231,875	(E)
Construction Signing and Traffic Control (Railroad Coordination)	5 to 25% of (A+B) Default = 20%		20%	$463,750	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7%	$223,991	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			**$3,513,045**	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2%	$70,261	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12%	$421,565	(J)
Subtotal of Construction Cost	(H+I+J)			**$4,004,872**	(K)
ROW Requirements (Easment)	SF		UNIT COST		
	5000		$ 50.00	$250,000	
Designer Fee	(10%) of (K)		10%	$400,487	
Constr Mmgt/Inspection	(10 to 25%) of (K)		15%	$600,731	
Total Program Cost				**$5,256,090**	

Str. Length	76	ft
Span	16	ft
Wall Thickness	1	ft
Total Width	18	ft
Height	10	ft
Top Slab	1	ft
Cover	6	ft
Total Height	17	ft
Retaining Walls		
Average Length	290	ft
Area	2465	sf/wall
PCCP Pavement	8	in
Roadway	0	ft
A		
Top Elevation	4960	
Culvert Trail Elevatio	4943	
End Elevation	4959	
Approach A	320	ft
B		
Top Elevation	4962	
Culvert Trail Elevatio	4945	
End Elevation	4959	
Approach B	280	ft

$ 2,927.54 per square foot

Assumptions:

Assume 10 ft high by 16 ft wide by 76 ft long. Unit cost for underpass increased for tight ROW constrain
Assume 1 ft slab and wall thickness
Assume 6-ft of cover (RR to Top of Structure)
Assume west and east approaches are 360 ft and 320 ft long; respectively.
Structure excavation is equal to total width of CBC +1.5' on either side
Assume retaining wall can be 10 ft shorter than the average approach due to sloping nearby ground
ROW requirements warranted from RR to Caribou Drive. Obtaining additional easements from RR could be difficult.

Estimated Project Worksheet
Prospect & Mason Trail Underpass

	UNITS	QUANTITY	UNIT COST	TOTAL COST	
Clearing & Grubbing	SY	1482	$5.00	$7,409	
Structure Excavation	CY	4293	$50.00	$214,667	
Embankment Material	CY	23	$25.00	$584	
Underpass Structure	SF	1350	$350.00	$472,500	
Trail Section (6 inch)	SY	1129	$25.00	$28,223	
Retaining Walls	SF	8640	$100.00	$864,000	
Roadway Pavement Removal	SY	218	$10.00	$2,178	
HMA Pavement	TON		$125.00	$0	
PCCP Pavement	SY	187	$75.00	$14,000	
Guardrailing	LF	40	$50.00	$2,000	
Relocate RR Signal House	EA	1	$250,000.00	$250,000	
	% RANGE		% USED	COST	
Project Construction Bid Items	Project Dependent		N/A	**$1,855,561**	(A)
Contingencies	(10% - 30%) of (A)		30%	$556,668	(B)
Urban Design	(6-10%) of (A+B) Default = 5%		20%	$371,112	
ITS/Lighting	(6-10%) of (A+B) Default = 6%		4%	$96,489	(C)
Utility Relocation	(3-10%)of (A+B) Default = 6%		20%	$482,446	(D)
Drainage/Erosion Control/SWMP	(1-5%) of (A+B) Default = 5%		10%	$241,223	(E)
Construction Signing and Traffic Control (Railroad Coordination)	5 to 25% of (A+B) Default = 20%		20%	$482,446	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7%	$260,038	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			**$4,345,984**	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2%	$86,920	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12%	$521,518	(J)
Subtotal of Construction Cost	(H+I+J)			**$4,954,421**	(K)
ROW Requirements	SF		UNIT COST		
	5000		$ 25.00	$125,000	
Designer Fee	(10%) of (K)		10%	$495,442	
Constr Mmgt/Inspection	(10 to 25%) of (K)		15%	$743,163	
Total Program Cost				**$6,318,027**	

*might be higher

*going through an intersection? Does this justify a higher traffic control?

$ 3,669.94 per square foot

Str. Length	75	ft	*10 to 15 ft clearance on either side
Span	16	ft	graphics are 50 scale
Wall Thickness	1	ft	
Total Width	18	ft	
Height	12	ft	
Top Slab	1	ft	
Cover	3	ft	
Total Height	16	ft	
Retaining Walls			
Approx. Length	270	ft	
Area	2160	sf/wall	
PCCP Pavement	8	in	
Roadway	60	ft	
North			
Top Elevation	4997		
Culvert Trail Elevation	4981		Roadway Elev - Total Hgt
End Elevation	4994		
Approach A	260	ft	
South			
Top Elevation	4997		
Culvert Trail Elevation	4981		Roadway Elev - Total Hgt
End Elevation	4996		
Approach B	300	ft	*this one is really long, not sure if there is any way to decrease the length

Assumptions:

Assume 12 ft high by 16 ft wide by 75 ft long. (Beneath Prospect, West of Mason)
Assume 1 ft slab and wall thickness
Assume 3-ft of cover (Roadway to Top of Structure)
Assume 8" of PCCP Pavement
Structure excavation is equal to total width of CBC +1.5' on either side
Assume structure extends 10' past either side of roadway & sidewalks
Assume retaining wall can be 10' shorter than the average approach due to sloping nearby ground
Retaining walls are treated as triangles along a straight 5% grade between the bottom of the underpass to the same elevation as the roadway
Assume north and south approaches are 260 ft and 300 ft; respectively.
Obtaining additional easements from RR could be difficult.

Estimated Project Worksheet
Drake & Mason Trail Underpass

	UNITS	QUANTITY	UNIT COST	TOTAL COST	
Clearing & Grubbing	SY	1610	$5.00	$8,050	
Structure Excavation (and backfill)	CY	5102	$50.00	$255,112	
Embankment Material	CY	78	$25.00	$1,945	
Underpass Structure	SF	2340	$350.00	$819,000	
Trail Section (6 inch)	SY	1227	$25.00	$30,667	
Retaining Walls	SF	8400	$100.00	$840,000	
Roadway Pavement Removal	SY	311	$10.00	$3,112	
HMA Pavement	TON		$125.00	$0	
PCCP Pavement	SY	249	$75.00	$18,667	
Guardrailing	LF	40	$50.00	$2,000	
Relocate RR Signal House	EA	1	$250,000.00	$250,000	
	% RANGE		**% USED**	**COST**	
Project Construction Bid Items	Project Dependent		N/A	**$2,228,553**	(A)
Contingencies	(10% - 30%) of (A)		30%	$668,566	(B)
Urban Design	(6-10%) of (A+B) Default = 5%		15%	$334,283	
ITS/Lighting	(6-10%) of (A+B) Default = 6%		3%	$86,914	(C)
Utility Relocation	(3-10%)of (A+B) Default = 6%		20%	$579,424	(D)
Drainage/Erosion Control/SWMP	(1-5%) of (A+B) Default = 5%		10%	$289,712	(E)
Construction Signing and Traffic Control (Railroad Coordination)	5 to 25% of (A+B) Default = 20%		20%	$579,424	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7%	$310,281	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			**$5,077,156**	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2%	$101,543	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12%	$609,259	(J)
Subtotal of Construction Cost	(H+I+J)			**$5,787,958**	(K)
ROW Requirements		**SF**	**UNIT COST**		
		0	$ 25.00	$0	
Designer Fee	(10%) of (K)		10%	$578,796	
Constr Mmgt/Inspection	(10 to 25%) of (K)		15%	$868,194	
Total Program Cost				**$7,234,948**	

Str. Length	130	ft	
Span	16	ft	
Wall Thickness	1	ft	
Total Width	18	ft	
Height	12	ft	
Top Slab	1	ft	
Cover	3	ft	
Total Height	16	ft	
Approach A	280	ft	
Approach B	280	ft	
Retaining Walls			
Approx. Length	280	ft	
Area	2100	sf/wall	
PCCP Pavement	8	in	
Roadway	80	ft	

$500 may have been based on total project cost

A			
Top Elevation	5024		
Culvert Trail Elevatio	5008		Roadway Elev - Total Hgt
End Elevation	5024		
Approach A	320	ft	
B			
Top Elevation	5024		
Culvert Trail Elevatio	5008		Roadway Elev - Total Hgt
End Elevation	5026		
Approach B	360	ft	

$ 2,473.49 per square foot 4852

*include excavation and backfill

Assumptions:

Assume 12 ft high by 16 ft wide by 130 ft long
Assume 1 ft slab and wall thickness
Assume 3-ft of cover (Roadway to Top of Structure)
Assume 8" of PCCP Pavement
Treat median as another lane for pavement calcs
Structure excavation is equal to total width of CBC +1.5' on either side+length of the approaches
Of the 3 ft of cover, 2' is embankment material - only used on either side of roadway
Retaining walls are treated as triangles along a straight 5% grade between the bottom of the underpass to the same elevation as the roadway. Walls adjacent to RR tracks need to accommodate E80 LL surcharge.
Assume north and south appraches are 320 ft and 360 feet; respectively.
Obtaining additional easements from RR could be difficult.

Mason Over Horsetooth
Overpass Alternative

	UNITS	QUANTITY	UNIT COST	TOTAL COST	
Clearing & Grubbing	SY	2027	$5.00	$10,134	
Structure Excavation	CY		$50.00	$0	
Embankment Material	CY		$25.00	$0	
Overpass Structure/Bridges	SF	2880	$250.00	$720,000	
Trail Section (6 inch)	SY	1200	$50.00	$60,000	
Ramp Retaining Walls	SF	16800	$75.00	$1,260,000	
Stairway	SF	1032	$200.00	$206,400	
Retaining Walls	SF		$50.00	$0	
Guardrailing	LF		$50.00	$0	
	% RANGE		% USED	COST	
Project Construction Bid Items	Project Dependent		N/A	**$2,256,534**	(A)
Contingencies	(10% - 30%) of (A)		30%	$676,960	(B)
Urban Design	(6-10%) of (A+B) Default = 5%		5%	$112,827	
ITS/Lighting	(6-10%) of (A+B) Default = 6%		5%	$146,675	(C)
Utility Relocation	(3-10%)of (A+B) Default = 6%		3%	$88,005	(D)
Drainage/Erosion Control/SWMP	(1-5%) of (A+B) Default = 5%		1%	$29,335	(E)
Construction Signing and Traffic Control	5 to 25% of (A+B) Default = 20%		1%	$29,335	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7%	$225,879	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			**$3,565,549**	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		1%	$35,655	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		10%	$356,555	(J)
Subtotal of Construction Cost	(H+I+J)			**$3,957,760**	(K)
ROW Requirements		SF	UNIT COST		
		5000	$ 25.00	$125,000	
Designer Fee	(15%) of (K)		10%	$395,776	
Constr Mmgt/Inspection	(10 to 25%) of (K)		15%	$593,664	
Total Program Cost				**$5,072,200**	

Str. Lengths (Horsetooth)	120	ft	
Str. Lengths (Ditch)	60	ft	
Trail Width	14	ft	
Str. Thickness	1	ft	
Total Width	16	ft	
Ramp A Length	400	ft	South ramp (Trial to Horsetooth)
Ramp A Width	12	ft	
Ramp B Length	300	ft	North ramp (Horsetooth to Ditch)
Ramp B Width	12	ft	
Ramp C Length	100	ft	South Ditch Ramp
Ramp C Width	12	ft	
Ramp D Length	100	ft	North Ditch Ramp
Ramp D Width	12	ft	
Stairway			
Grade Delta	20	ft	17' for roadways and 24 for RR
Stairway Width	12	ft	
Landing Area	144	sf	
Treads Required	31	each	
Retaining walls	16800	sf	

Project Bid Items	44.5%
Construction Bid Iter	25.8%
F/A	7.7%
Other	22.0%

Assumptions:

Assumes ramp access only (i.e. no elevators)

Assume pre-fab steel box truss structure type over Horsetooth and Ditch.

Assume 20 ft vertical clearance

Retaining walls are treated as triangles along a straight 5% grade between the bridge and ground

Ramp length is based on 5% grade

Ped Bridge Lengths over Horsetooth and Dith are 120 ft and 60 ft; respectively.

Ramp between bridge over Horsetooth and bridge over creek - 300 ft

Ramps up to bridge over creek - 100 ft each

South Ramp up to Pedestrian bridge over Horsetooth - 400 ft

Estimated Project Worksheet
Power Trail over UPRR Overpass

	UNITS	QUANTITY	UNIT COST	TOTAL COST	
Clearing & Grubbing	SY	944	$5.00	$4,719	
Structure Excavation	CY		$50.00	$0	
Embankment Material	CY		$25.00	$0	
Overpass Structure	SF	2560	$100.00	$256,000	
Trail Section (6 inch)	SY	759	$50.00	$37,956	
Ramp Retaining Walls	SF	4147	$75.00	$311,025	
Stairway	SF	408	$200.00	$81,600	
Retaining Walls	SF		$50.00	$0	
Guardrailing	LF		$50.00	$0	
Culvert over Ditch					
	% RANGE		% USED	COST	
Project Construction Bid Items	Project Dependent		N/A	**$691,300**	(A)
Contingencies	(10% - 30%) of (A)		30%	$207,390	(B)
Urban Design	(6-10%) of (A+B) Default = 5%		10%	$69,130	
ITS/Lighting	(6-10%) of (A+B) Default = 6%		10%	$89,869	(C)
Utility Relocation	(3-10%)of (A+B) Default = 6%		3%	$26,961	(D)
Drainage/Erosion Control/SWMP	(1-5%) of (A+B) Default = 5%		2%	$17,974	(E)
Construction Signing and Traffic Control (Railroad Coordination)	5 to 25% of (A+B) Default = 20%		5%	$44,935	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7%	$75,490	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			**$1,223,048**	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2%	$24,461	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12%	$146,766	(J)
Subtotal of Construction Cost	(H+I+J)			**$1,394,275**	(K)
ROW Requirements	SF		UNIT COST		
	3160		$ 50.00	$158,000	
Designer Fee	(10%) of (K)		10%	$139,427	
Constr Mmgt/Inspection	(10 to 25%) of (K)		15%	$209,141	
Total Program Cost				**$1,900,843**	

*Use Siphon 3

Str. Length	160	ft
Trail Width	14	ft
Str. Thickness	1	ft
Total Width	16	ft

*assume use they have bridge

Height	12	ft
Top Slab	1	ft
Cover	3	ft
Total Height	16	ft

Ramp A Length	129	ft	
Ramp A Width	16	ft	
Ramp B Length	158	ft	*due to berms on either side of railway,
Ramp B Width	16	ft	may be able to reduce ramp lengths

Stairway

Grade Delta	10.5	ft	
Stairway Width	12	ft	
Landing Area	0	sf	rise of less than 12', therefore
Treads Required	17	each	no landing required.

Retaining Walls

Approx. Length	287	ft
Area	4147	sf

Required Vert Clr	25
RR Elevation	4960
Bridge Base East	4974
Bridge Base East	4975
East Ramp	11
West Ramp	10

assumed a 158 ft long (ramp) * average width of 20 ft

Assumptions:

Assumes ramp and stairway access only (i.e. no elevators)
Assumes rehabilitation and relocation of the Mulberrry Pedestrian Bridge.
Stairway assumes a rise height of 7-inch
Assumed a lower bridge cost (according to email, there is potentially an existing bridge 'saved' for this)
Assume a required 25 ft of clearance - berm on either side provides about 14 ft on either side
Assume structure dimensions of 16 ftx160 ft
Assume a ramp width of 16 ft and a length of 129 ft to the west and 158 ft to the east
Use Siphon Option 3 from Fort Collins' Feasibility Study
Obtaining additional easements from RR could be difficult.

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