OMB Number: 4040-0004
Expiration Date: 12/31/2022

Application for Federal Assistance SF-424

* 1. Type of Submission:
- [ ] Preapplication
- [x] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received: 05/18/2020

4. Applicant Identifier:

5a. Federal Entity Identifier:

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: City of Billings

* b. Employer/Taxpayer Identification Number (EIN/TIN): 81-6001237

* c. Organizational DUNS: 5560665740000

d. Address:

* Street1: 2825 3rd Avenue North, 4th Floor
Street2:
* City: Billings
County/Parish: Yellowstone
* State: MT: Montana
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 59101-1961

e. Organizational Unit:

Department Name: Planning & Community Services

Division Name: Planning

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:
* First Name: Lora
Middle Name:
* Last Name: Mattox
Suffix:

Title: Transportation Planner

Organizational Affiliation: Planning Division - City of Billings

* Telephone Number: 4062478247
Fax Number: 4066578327

* Email: mattoxl@billingsmt.gov

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

C: City or Township Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Department of Transportation

11. Catalog of Federal Domestic Assistance Number:

20.933

CFDA Title:

National Infrastructure Investments

*** 12. Funding Opportunity Number:**

DTOS59-20-RA-BUILD

* Title:

FY 2020 National Infrastructure Investments

13. Competition Identification Number:

BUILD2-FY20

Title:

FY20 BUILD GRANT

14. Areas Affected by Project (Cities, Counties, States, etc.):

1239-Affected Areas Map.png | Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Construction of the Northwest Billings Connector-Marathon Trail Project

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: MT-001 * b. Program/Project: MT-001

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 09/30/2020 * b. End Date: 03/31/2022

18. Estimated Funding ($):

* a. Federal	16,779,769.00
* b. Applicant	7,000,000.00
* c. State	0.00
* d. Local	0.00
* e. Other	85,000.00
* f. Program Income	0.00
* g. TOTAL	23,864,769.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☒ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: * First Name: Lora

Middle Name:

* Last Name: Mattox

Suffix:

* Title: Transportation Planner

* Telephone Number: 4062478622 Fax Number: 4066578327

* Email: mattoxl@billingsmt.gov

* Signature of Authorized Representative: Lora Mattox * Date Signed: 05/18/2020

The following attachment is not included in this view since it is not a read-only PDF file.

The agency will receive all application forms and attachments without any data loss.

SF424_2_1-1239-Affected Areas Map.png

ATTACHMENTS FORM

Instructions: On this form, you will attach the various files that make up your grant application. Please consult with the appropriate Agency Guidelines for more information about each needed file. Please remember that any files you attach must be in the document format and named as specified in the Guidelines.

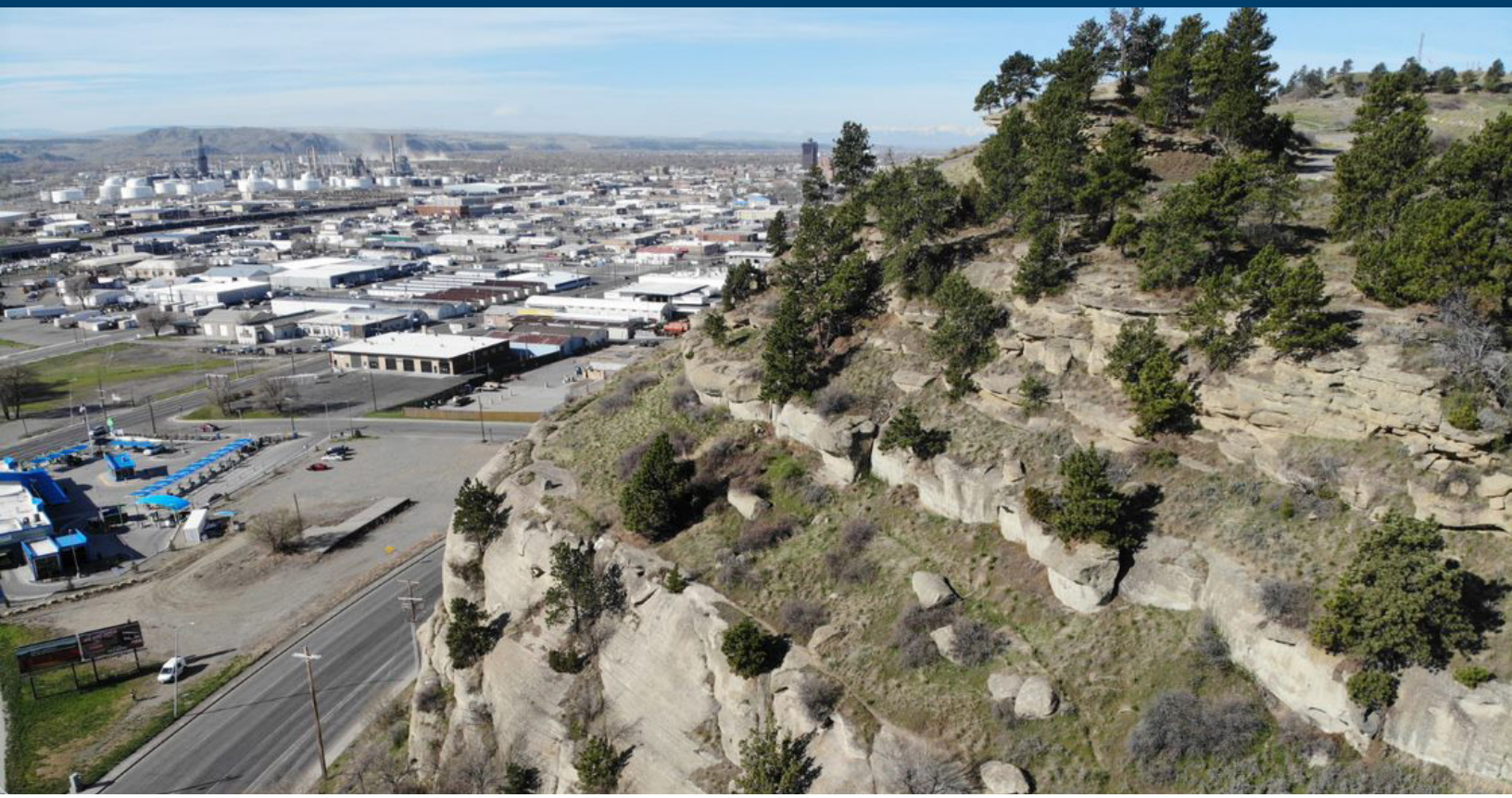
Important: Please attach your files in the proper sequence. See the appropriate Agency Guidelines for details.

1) Please attach Attachment 1	1234-2020 Billings_BUILD Gran	Add Attachment	Delete Attachment	View Attachment
2) Please attach Attachment 2	1235-BillingsBCAMemo.pdf	Add Attachment	Delete Attachment	View Attachment
3) Please attach Attachment 3	1236-Copy of Billings BCA Wor	Add Attachment	Delete Attachment	View Attachment
4) Please attach Attachment 4	1237-Copy of 2020buildinfofor	Add Attachment	Delete Attachment	View Attachment
5) Please attach Attachment 5	1238-Project_Location.jpg	Add Attachment	Delete Attachment	View Attachment
6) Please attach Attachment 6		Add Attachment	Delete Attachment	View Attachment
7) Please attach Attachment 7		Add Attachment	Delete Attachment	View Attachment
8) Please attach Attachment 8		Add Attachment	Delete Attachment	View Attachment
9) Please attach Attachment 9		Add Attachment	Delete Attachment	View Attachment
10) Please attach Attachment 10		Add Attachment	Delete Attachment	View Attachment
11) Please attach Attachment 11		Add Attachment	Delete Attachment	View Attachment
12) Please attach Attachment 12		Add Attachment	Delete Attachment	View Attachment
13) Please attach Attachment 13		Add Attachment	Delete Attachment	View Attachment
14) Please attach Attachment 14		Add Attachment	Delete Attachment	View Attachment
15) Please attach Attachment 15		Add Attachment	Delete Attachment	View Attachment

Northwest Billings Connector and Marathon Trail

Billings, MT

2020 Build Grant Application



Project Name: **Northwest Billings Connector and Marathon Trail**
Project Type : Road-Bicycle - Pedestrian
Total Project Cost : $23.9M
2020 BUILD Funds Requested $16.8M

Contact Information:
Lora Mattox, AICP, Transportation Planner
Billings, Montana
(406) 247-8522
mattoxl@billingsmt.gov
825 3rd Avenue, 4th Floor, Billings MT 59101-1961

Supporting Information can be found at: https://www.srfconsulting.com/billings-build-grant

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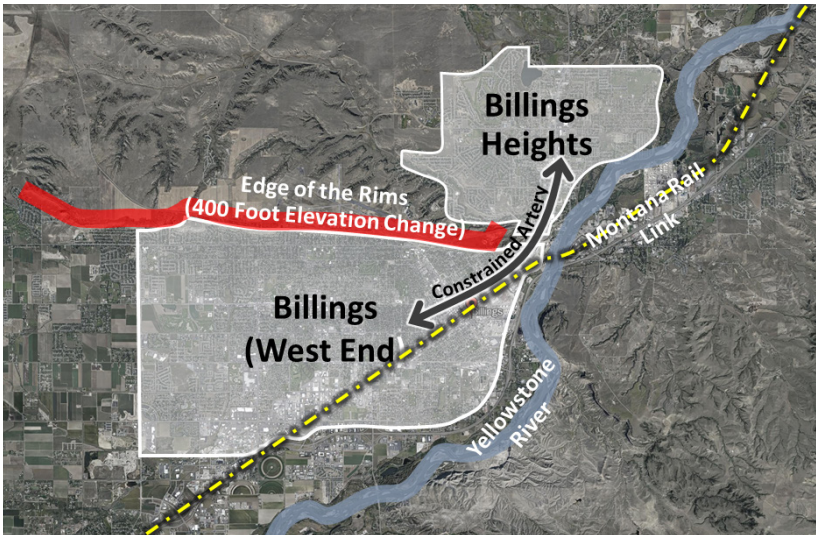
I. Project Description

The City of Billings is submitting this 2020 RURAL BUILD grant request for $16.8 million to construct the Northwest Billings Connector and Marathon Trail "Project", a multimodal project that would expand travel opportunities beyond a congested corridor in Billings, Montana. The Project opens alternative transportation routes which enhance safety and travel time within the corridor, while also providing for economic development opportunities and added outdoor recreation.

The geography of Billings is why this project is important. Billings sits in a valley between the western bank of the Yellowstone River and the 400-foot-tall sandstone formations known locally as the "Rims" (Figure 1). These natural features, as well as the path of the Great Northern Railroad (now Montana Rail Link), constrain travel to and from the increasingly busy area of Billings Heights ("Heights") and downtown Billings ("West End"). There is a mix of pedestrian, bicycle, auto, transit, and heavy commercial vehicle traffic traveling between the Heights and West End. Figure 2 shows the constrained artery created by these features.

Figure 1. The Rims

Figure 2. Constraints on Travel in Billings, Montana



This mix of travel within the constrained artery results in conflict points that negatively impact safety, economic competitiveness, and quality of life. In addition, the concentrated travel within the project area impacts the state of good repair, lifecycle costs, and environmental sustainability. The Project will redistribute traffic by building two project components:

- The Northwest Billings Connector, a five-mile stretch of two-lane rural section roadway accompanied by a separated multi-use trail. It will create a new connection between the Heights and West End.
- The Skyline and Stagecoach segments of the Marathon Trail, a partially completed 26-mile bicycle and pedestrian loop around the city connecting residents to the trail and park system in the Billings area. Adding these two new segments will create an additional network of multimodal transportation options into and through the West End.

Figure 3. Project Components

Proposed Improvements

Billings' setting between two distinct natural features creates a series of challenges that the city, Yellowstone County, Montana Department of Transportation (MDT), and Billings TrailNet have actively sought to resolve. Figure 4 depicts the array of transportation challenges created by this situation, all of which will be addressed by the proposed Project. Each of the challenges are addressed in detail within the Selection Criteria section of this grant application.

Figure 4. Transportation Challenges

As noted above, the Project is composed of two components: Northwest Billings Connector ("Connector") and Marathon Trail.

The Connector is a five-mile stretch of two-lane rural section roadway accompanied by a detached multi-use trail. It will create a new connection between the Heights and West End, with an eastern terminus of Alkali Creek Road/Skyway Drive and a western terminus at the roundabout at Highway 3/Zimmerman Trail. As a multimodal corridor, the Connector will include a 10-foot separated multi-use trail for the five-mile length of the corridor.

Marathon Trail is a partly completed 26-mile bicycle and pedestrian loop around the city connecting residents to the trail and park system in the Billings area. The result is an additional network of multimodal transportation options in between the Heights and West End. The Marathon Trail elements proposed for this Project consist of the Skyline Trail and Stagecoach Trail.

Skyline Trail is a multi-use trail that will extend from the intersection of Highway 3/Zimmerman Trail through Airport Road along the south side of Highway 3. The paved, 10-foot trail would replace an unimproved/primitive trail that is presently in place. Trailheads would be provided near Zimmerman Trail and at the eastern terminus. Paved parking and restroom facilities would be included at the trailhead west of Zimmerman Trail. The restroom facilities have already been built through a public-private partnership with Philips 66. The length of the proposed trail is approximately 2.9 miles.

Stagecoach Trail: Extending south from the junction with Highway 3, an eight-foot paved trail is proposed along the eastern

side of the Zimmerman Trail roadway. The section would run approximately 0.9 miles in length.

Project History

The Project is a culmination of 15 years of active partnership between the City of Billings, Yellowstone County, MDT, and TrailNet. Multiple planning studies, preliminary and final design documents and construction projects have occurred with $13 million being invested in the project components. “MDT has also undertaken five other major projects to improve travel in the congested artery, at a cost totaling more than $80 million. All project components are included in the 2018 Billings MPO long-range transportation plan.

Formal planning for the Connector began in 2005, and the first one-mile segment (Skyway Drive, connecting Wicks Lane and Alkali Creek Road) was completed in 2014 at a cost of $2.1 million. The Marathon Trail concept emerged as Billings built its trail network over time. The 19 existing Marathon segments total 16.5 miles; if the proposed Skyline and Stagecoach elements are built, the only remaining segments in need of funding will be the 2.1 mile Riverfront Trail and the 3.7 mile Zoo Montana Trail. The City of Billings partnered with the Billings MPO to plan these last four segments in the Yellowstone Riverfront Trail Feasibility Study (2012), the Zoo Montana to Riverfront Park Feasibility Study (2014) the Hwy 3 Corridor Study (2015), and the Rims to Valley feasibility study (2016).

Figure 5. Project History

In June 2019, the Downtown Billings Traffic Study was completed. The study focuses on alternatives for improving vehicle flow, parking, and non-motorized travel through downtown areas that include streets making up the constrained artery. Feasibility of implementing many of the concepts will be improved by reducing through traffic in downtown, which is a primary purpose of the Connector. This is discussed further in Section IV.

II. Project Location

Billings, Montana is a small city whose population of 109,431 locates it in the rural category of BUILD grants. The congestion addressed by the project impacts major routes in and out of Billings. US Route 87 and Montana Highway 3 both run through the constrained artery. Interstate 90 also follows the eastern edge of Billings. The Connector is close to Logan International Airport and will eventually support adjacent development. The project area includes one Opportunity Zone in downtown Billings.

Figure 6. Billings, Montana

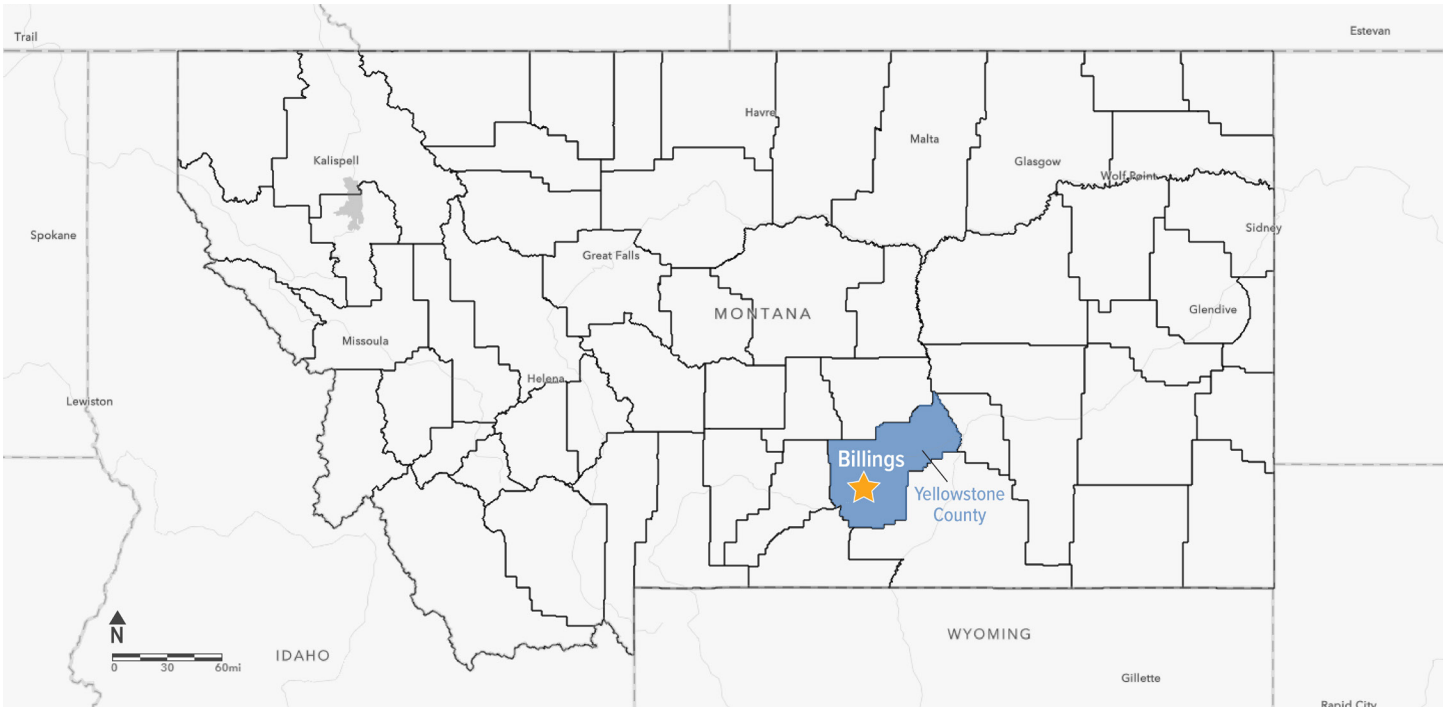


Figure 7. Regional Transportation Network

Geospatial Information:

The Connector will run from the intersection of Alkali Creek Road and Skyway Drive (45.828396, -108.537668) to Highway 3/ Zimmerman Trail (45.806548, -108.599870). The Skyline Trail will connect to the same Highway 3 intersection from the east, starting at Swords Park (45.800415, -108.519391). The Stagecoach Trail will run adjacent to the two-lane Zimmerman Trail roadway between Highway 3 and Rimrock Road (45.806236, -108.599605 to 45.798697, -108.601794).

III. Grant Funds, Sources and Uses of Project Funds

Project Budget

Total Project Cost: $23.9 million

BUILD Grant Request Amount: $16.8 million (80 percent of project cost)

This funding request is the final commitment needed to complete the Project. All funding identified below is available and is formally committed to this project.

The City of Billings is committed to contributing $7 million from gas tax revenue. TrailNet will contribute $85,000 toward construction of the Skyline Trail.

Figure 8. Project Funding Shares

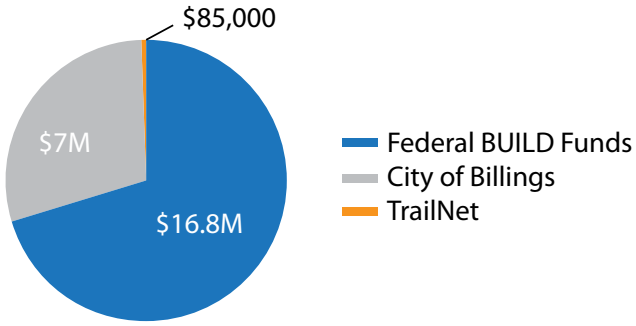


Table 1. BUILD Grant Project Costs and Proposed Funding Shares

BUILD Project Element	Total Cost (Design + Construction)	Federal BUILD Funds (80%)	Local Funds (20%)		Percent of Total Cost
			City of Billings	TrailNet	
Northwest Billings Connector	$14,620,385	$7,620,385	$7,000,000	-	61%
Stagecoach Trail	$5,123,004	$5,123,004	-	-	21%
Skyline Trail	$4,121,380	$4,036,380	-	$85,000	17%
Total Cost	$23,864,769	$16,779,769	$7,000,000	$85,000	100%

Funding Sources

Non-Federal Funding Sources

The City of Billings has allocated $7 million of gas tax revenue to the construction of the Connector. This amount is included in the Capital Improvement Plan adopted in December 2019. A resolution supporting the project was passed in April 2020. Billings TrailNet has additionally committed $85,000 toward the construction of the Skyline Trail. TrailNet fundraised this amount through individual and family donations. It has also received or been promised in-kind donations from local engineering, videography, architecture, design, and construction firms.

Other Federal Funding Sources

The current BUILD request does not include other federal funding sources.

Committed Investments Not Part of this BUILD Request

The City of Billings has already spent $2.1 million on the first phase of the Connector, a one-mile stretch of roadway and multimodal trail connecting West Wicks Lane to Alkali Creek Road. This road opened in 2014.

The intersection linking the Connector, Skyline, and Stagecoach project components includes a roundabout and a pedestrian underpass that were completed as part of a separate project in 2019. The pedestrian underpass was included with the expectation that it would support the Skyline Trail. For that project, the City of Billings invested $7 million to reconstruct the auto roadway Zimmerman Trail. In addition to the roundabout and the underpass, the project included wider lanes, new guardrails, and better lighting. Restroom facilities serving the Skyline Trail have also been constructed, thanks to a $60,000 donation from Phillips 66.

A short segment of Skyline Trail east of the new roundabout has been put out for bid for summer 2020 construction. Billings TrailNet is covering the estimated $372,000 cost of this 1044-foot segment using a combination of private donations and a $12,000 grant from the Recreational Trails Program.

BUILD Funding Need

The City of Billings has secured $7 million to invest in the Project, but the remaining $16.8 million in BUILD funds is required to move forward. If the BUILD grant were not awarded, the construction of the Project would be significantly delayed. All traffic between the Heights and West End would continue to travel through a constrained artery, and an opportunity to reduce congestion and crashes would be missed. The multimodal trails would not be built. The multimodal trails would not be built. Development plans of property owners along the Connector would be postponed indefinitely.

IV. Primary Selection Criteria

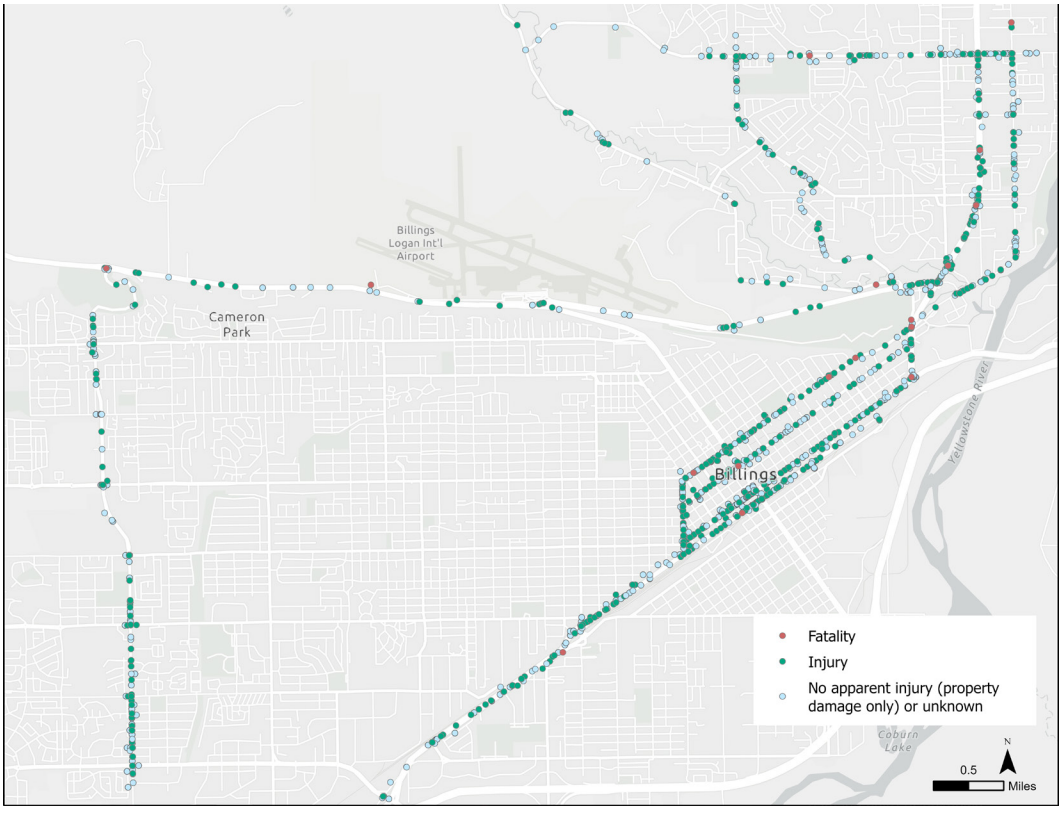
Safety

The constrained artery that provides connections between the Heights and West End sees a disproportionate crash rate compared to the city. Between 2014 and 2018 there were over 3,500 crashes in the constrained artery, ranging from 28 on Alkali Creek Road to as high as 1,681 on the continuous stretch formed by Main Street and 1st Avenue. Of the crashes, 17 were fatal and 30 percent involved injuries. Table 2. Constrained Artery Crash Summary (2014-2018) provides a summary of crashes by severity for the study period. Figure 9 shows a map of the same crashes.

Table 2. Constrained Artery Crash Summary (2014-2018)

Crash Severity/Type	All Crashes	Involving Bicycles	Involving Pedestrians
Fatal crash	17	1	4
No apparent Injury (property damage only crash)	2,359	11	13
Possible injury crash	818	19	35
Suspected Minor Injury	184	7	9
Suspected Serious Injury	52	4	8
Unknown	81		4
TOTAL	**3,511**	**42**	**73**

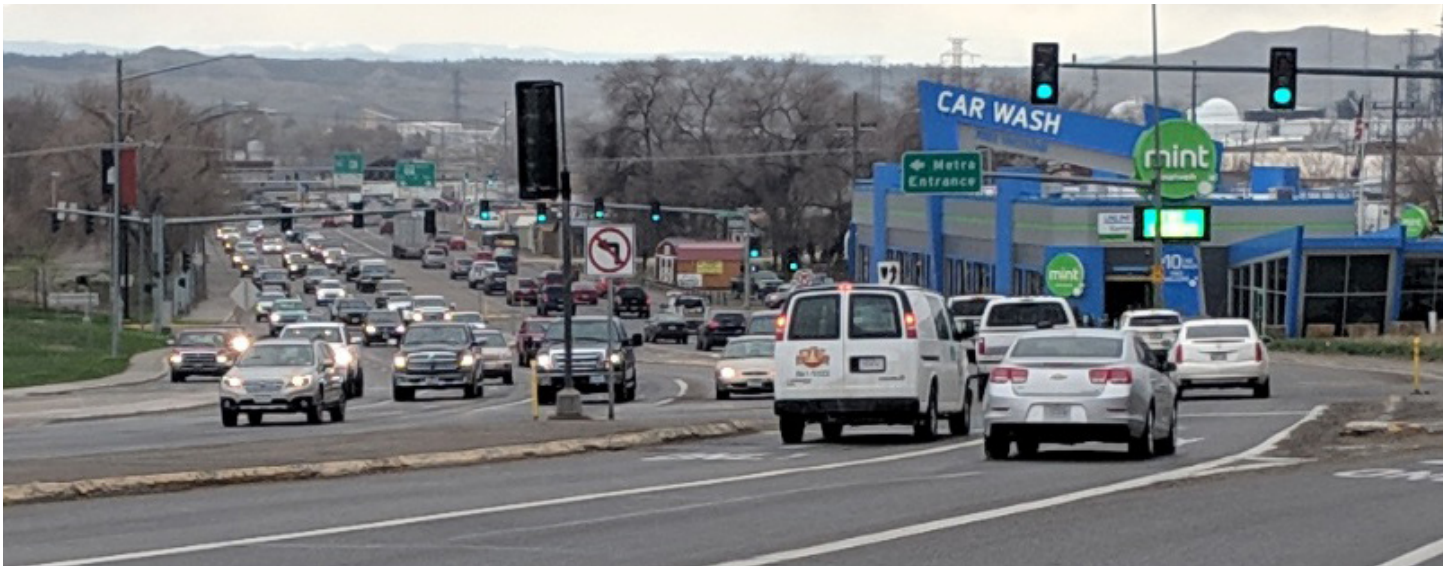
Figure 9. Crashes in Constrained Artery (2014-2018)



Montana Department of Transportation Crash Database

For the last 30 years, Main Street, the primary connector route in the artery, has been characterized as the "busiest street in Montana." According to the Montana Department of Transportation's 2018 Factbook, "the busiest spot on Montana roadways is Main Street in Billings between Airport Road and Hilltop Road where annual average daily traffic was 44,205 vehicles per day in 2017." This characteristic is a positive attribute when marketing adjacent development; however, the higher traffic volumes have also led to increased congestion and crashes in the corridor. The central artery includes one-quarter of the 20 highest crash intersections in the Billings area (2018 LRTP). Figure 10 illustrates the substantial traffic in the main arterial where 6th Avenue meets Main Street.

Figure 10. Southbound View of Main Street and 6th Avenue



Source: SRF Consulting Group, Inc.

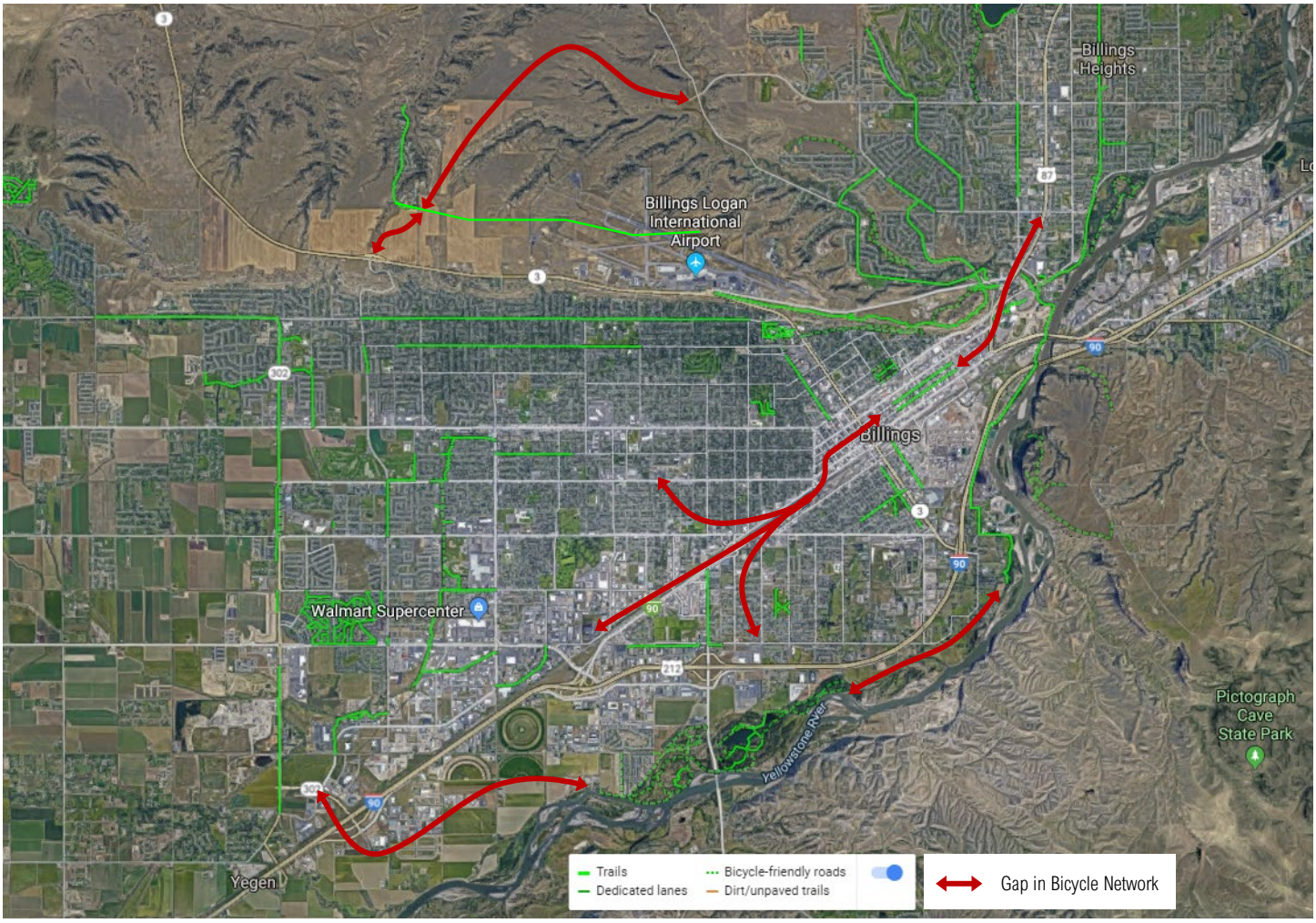
Sidewalks have been constructed on the Main Street corridor. However, limited right-of-way in the constrained artery limits the feasibility of off-setting sidewalks from the curb, which puts pedestrians next to four to six lanes of high-volume auto and truck traffic. Additionally, none of the corridors making up the central artery include bicycle facilities, which results in bicyclists in mixed flow with autos and trucks.

Conditions for people walking and bicycling have deteriorated over time, as automobile travel demand in the central artery has led to expansions of the three primary routes to four and five lanes. To create the required auto travel lanes, facilities to accommodate pedestrians and bicycle travel have been minimized. Additionally, between downtown and Main Street, marked crosswalk spacing along the routes making up the constrained artery is generally three blocks, which exposes pedestrians to conflicts with vehicle traffic. This condition creates the following safety and operating concerns:

- Increased potential for crashes involving bicyclists and vehicles: Mixing vehicles and bicyclists in the same lane increases the exposure for vehicle/bicycle crashes (2019 BUILD Grant Feasibility Study).
- Increased pedestrian exposure: With a constrained number of streets to spread demand, those routes that can be accommodated are generally four to six lanes. Wider street widths increase the travel time required for pedestrians to cross, which increases the exposure pedestrians have to turning or through traffic. As with bicycle-vehicle crashes, pedestrian-vehicle crashes have a higher potential for a severe outcome.
- Added side friction impacting safety and operations: The presence of bicycles in the shared vehicle lane increases side friction that reduces the carrying capacity of the shared lane, which negatively impacts traffic operations. Moderate levels of bicycle volume in a mixed flow lane can cause travel delay.
- Completing Marathon Trail will provide continuous off-street or low-volume on-street route alternatives to the constrained central artery. Removing at least a portion of the current and/or forecasted bicycle travel from the constrained artery will improve safety for bicyclists and occupants of motorized vehicles. The Project would significantly improve the safety of pedestrians and cyclists enjoying the vistas and park land on top of the Rims by replacing an unimproved/primitive trail with a paved trail. Additionally, if the Connector and other network improvements remove enough volume from the constrained central artery, there is an opportunity to incorporate pedestrian and bicyclist safety features outlined in the Downtown Transportation Study, including removing travel lanes, incorporating marked bicycle lanes, etc.

Although there are some dedicated bike lane sections and bike-friendly roads in the area, bicycle infrastructure in Billings is patchy, with major gaps in the constrained artery (Figure 11). A lack of bicycle infrastructure on the existing road network and the discontinuous multi-use trails results in mixing bicycle and vehicle travel on high volume, higher speed routes. Additionally, the resulting unfavorable bicycle environment can discourage regular use of bicycles, which is counter to goals outlined in the LRTP of promoting active transportation in Billings. With current conditions, only the most confident bicyclists or those who rely on bicycling as their primary mode of transportation bicycle between the Heights and downtown. This unfairly puts Billings' most vulnerable residents in danger.

Figure 11. Major Gaps in Bicycle Infrastructure



Source: City of Billings and Billings TrailNet

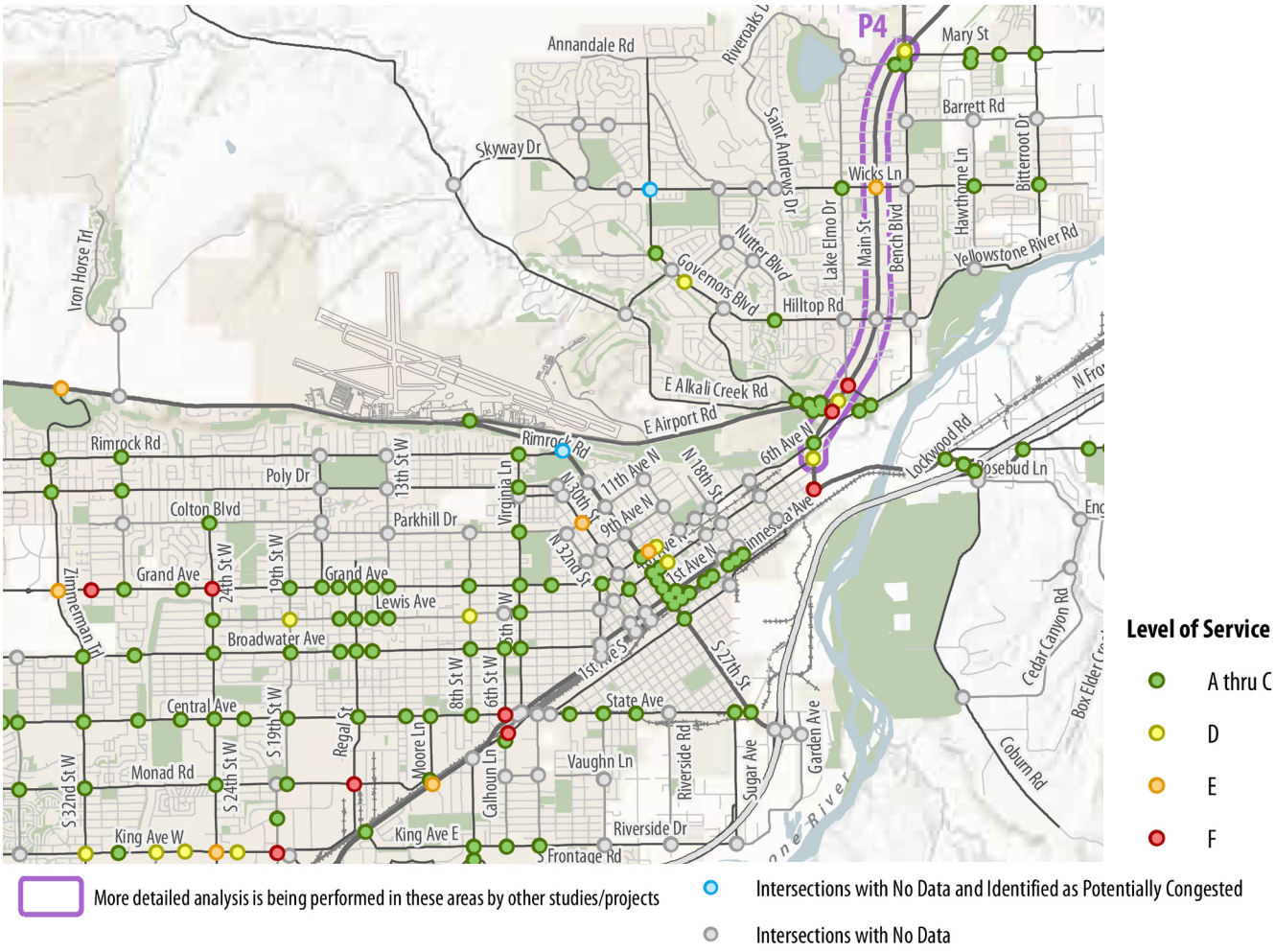
Transit users are also exposed to safety hazards in the constrained artery. A review of Metropolitan Transit System (MET) routes illustrates the impacts of the limited connection opportunities between the Heights and West End. Of the 17 MET routes, six travel through the constrained artery shared by the range of other modes. (A full interactive map is available on the MET website.) By removing through traffic from the constrained artery, the Northwest Billings Connector improves conditions for MET riders by reducing vehicle-pedestrian conflicts riders are exposed to in their walk to/from their bus stop.

Source: KULR-8 TV report on KULR8.com

Source: The Billings Gazette

The combination of volume and increased density of signalized intersections results in elevated congestion in areas where expanding current roadway is difficult due to limited building setback. Pinching travel into the limited number of corridors results in traffic delays and longer travel and/or commute times. As shown in Figure 12, peak period traffic operations through the constrained artery represent level-of-service (LOS) F at three critical intersections, LOS E at one intersection, and LOS D at four intersections.

Figure 12. Levels of Service at Billings Intersections (2017)



Source: Billings LRTP (2018)

Of the intersections in the Billings metropolitan area that approach or exceed the minimum threshold of level-of-service D, approximately 40 percent are along routes that make up the constrained artery (LRTP). The Project will improve the traffic congestion, reduce the mixed mode traffic on roadways, and contribute to overall transportation safety for all travelers.

One additional aspect of a safe transportation network is transportation security planning. It is necessary to mitigate the impacts of potential hazards like storms, floods, earthquakes, landslides or transportation/mobile incidents. With the exception of I-90, routes making up the constrained artery provide the only connections between the Heights and West End. As these routes are typically congested during most weekday peak periods, their utility as evacuation routes is compromised. Lack of multiple connections and parallel routes puts residents and properties at risk of evacuation route unavailability in the event of a disaster. It also limits access to medical care, as the only area hospitals are in downtown Billings.

The role transportation provides in addressing disasters was evidenced on Father's Day 2010 and the days that followed a tornado striking in the area of the MetraPark and traveling north into the Heights. In 2010, Main Street was the only road across Alkali Creek/Earl Guss Park providing access to the Heights for emergency vehicles and first responders. Reducing congestion in the constrained artery and adding the Connector would benefit emergency vehicle access and evacuation routes.

State of Good Repair

Traffic demand and vehicle mix (truck/car ratio) influence the deterioration rate and future condition of the roadway infrastructure. Higher traffic volumes, particularly trucks, can dramatically increase pavement deterioration rates. Accelerated deterioration caused by increased traffic volumes affects the funding level needed to maintain the system and can affect future rehabilitation strategy selection. Constructing the Connector provides an alternate route for vehicles and bicycles traveling between the Heights and West End, which will slow traffic growth in the artery. Slowing traffic growth will aid in preserving the condition of the routes.

The Billings Public Works Department, working with MDT, tracks pavement condition for arterial and selected collector routes throughout the city. Current conditions for selected roads in the congested artery are shown in Table 3.

Table 3. Constrained Artery Road Conditions

Roadway	From	To	Pavement Condition Index	Condition
Main Street				
	Wicks Road	US 87	82	Satisfactory
1st Avenue				
	9th Street	11th Street	65	Fair
	11th Street	13th Street	58	Fair
	13th Street	18th Street	44	Poor
	18th Street	22nd Street	84	Satisfactory
	22nd Street	27th Street	77	Satisfactory
4th Avenue				
	27th Street	18th Street	56	Fair
	18th Street	15th Street	55	Fair
	15th Street	13th Street	65	Fair
6th Avenue	Exposition	18th Street	77	Satisfactory
	18th Street	N 22nd Street	89	Good
	N 22 Street	N 27th Street	31	Very Poor

Condition Legend:

Fail (0 – 10);
Serious (11=25);
Very Poor (26-40);
Poor (41-55)
Fair (56-70);
Satisfactory (71-85);
Good (86-100)

For most of the segments making up the constrained artery, pavement condition is not the most critical issue, as the condition falls into Satisfactory or Good condition categories. Segments of 6th Avenue at the south of downtown are rated as very poor and the segment of 1st Avenue from North 13th Street to North 18th Street is rated as poor. The city is programming projects for 1st Avenue in approximately five years and 6th Avenue within four to six years.

Traffic volume on routes comprising the congested artery are forecasted to increase at approximately one percent per year through at least 2040. If the proposed improvement is not constructed, routes comprising the congested artery will continue to carry most of the local traffic between the Heights and the West End, which will continue to strain the existing system. The added volume will focus greater damage on the connecting routes and operations and maintenance costs increase and the life expectancy of each road decreases, requiring more frequent capital improvements.

Lifecycle Costs

Table 4. Life Cycle Costs

Project Component	Total Cost
Northwest Billings Connector	$2,740,000
Marathon Loop Addition	$616,000
Total	$3,356,000

The City will be responsible for maintaining the Project infrastructure. The Marathon Trail segments are already in City right-of-way, and the City is in the process of acquiring right-of-way for the Connector.

The City has a Capital Improvements Program (CIP) it uses to manage public infrastructure and maintain an appropriate state of good repair. The Connector will add approximately five miles to the street network maintained by the city. The increment represents less than a one percent increase in the mileage the city maintains and will not add substantially to the city's financial responsibilities.

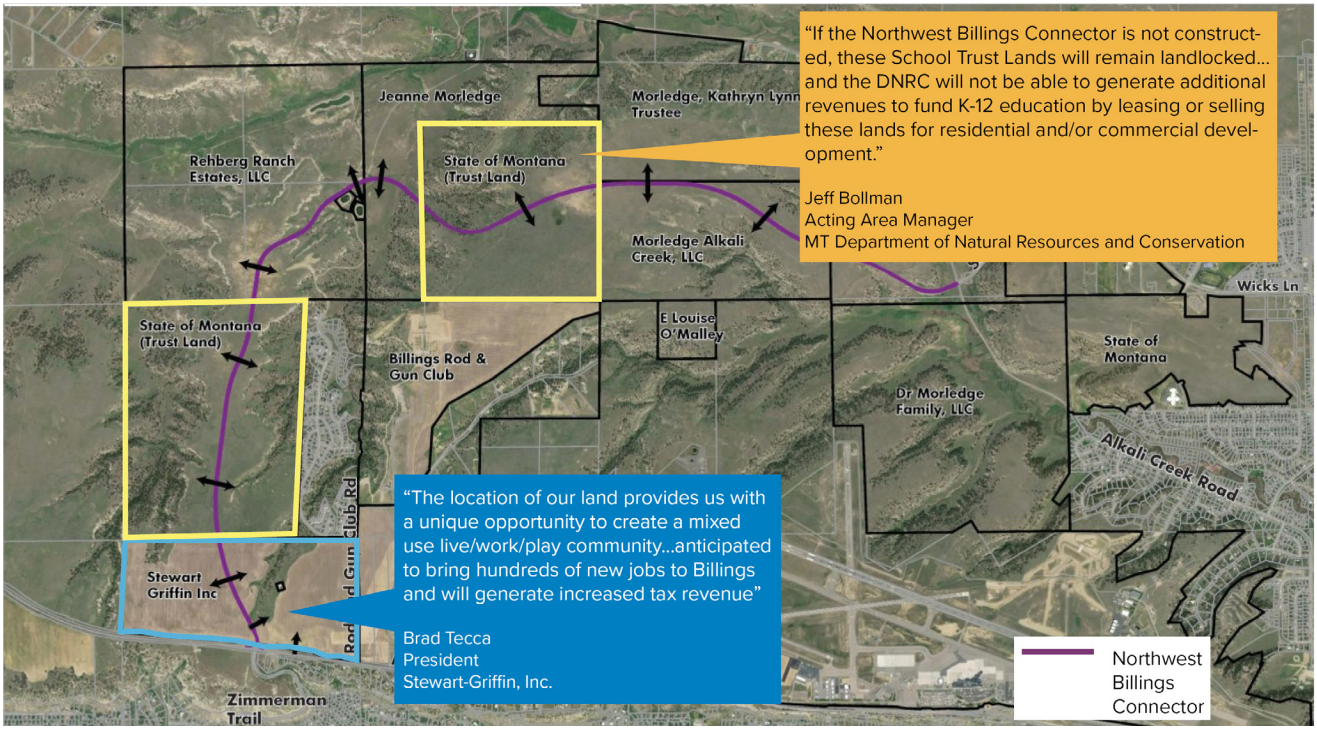
Adding the miles associated with the Skyline Trail and Stagecoach Trail elements increases the city's trail mileage by

approximately 3.8 miles, which represents about five percent of its current mileage responsibility. The city has capacity in the maintenance budget to complete annual and periodic capital improvement maintenance.

Economic Competitiveness

In addition to enhancing transportation conditions for current travelers, the project provides access to residential and commercial development opportunities that expand the Billings economy. As a vital source of efficient transportation, the Connector has strong support from property owners along its proposed route (see letters of support). Figure 13 shows the current ownership of parcels along the connector, along with a sample of the statements of support this project has received.

Figure 13. Constrained Artery Road Conditions



The Connector will provide travel time savings for travelers between the Heights and West End. Adding the Connector reduces travel time in the constrained artery by approximately 930 hours per day, which is a reduction of 6.2 percent of the cumulative travel time through the corridor (see the full benefit-cost analysis for more details). The Connector will be used by commuters living in the Heights and working or shopping in West End, West End residents accessing retail centers in the Heights, and regional traffic coming to/from and through Billings.

Increasing Economic Opportunities

Construction of the Northwest Billings Connector provides improved access to destinations northwest of downtown which promotes new development closer to the center city rather than the western fringe of the city. This will allow the city growth to be more geographically compact, keeping downtown in the center of the city, while preserving irrigated farmland to the west of the city. Table 4 shows the anticipated growth pattern in northwest Billings around the proposed connector. The area adjacent to the airport represents approximately 6.4 percent of the anticipated employment growth and 10.6 percent of residential growth through 2040.

Table 4. Anticipated Population, Housing and Employment Growth (2017-2040) in Northwest and Southwest Billings

Subarea of the Billings Metro	Population Change (2017-2040)		Housing Change (2017-2040)		Employment Change (2017-2040)	
	Total	Share in Billings	Total	Share in Billings	Total	Share in Billings
Northwest Billings (Adjacent to Connector)	5,551	15%	2,327	13%	1,827	7%
Southwest Billings	27,987	75%	14,146	78%	9,159	34%
Billings	37,479		18,182		26,690	

Source: Billings MPO, 2018

Supporting growth in the airport area facilitates more compact growth in the metro area and is documented in the 2016 City

of Billings Growth Policy. The locations of residential and employment growth proposed through 2040 and estimates of average travel time from downtown (the center city) support the need for the project. Forecasted expansion areas adjacent to the airport are closer – in geographic and practical terms – to the center city than other anticipated expansion areas west of Shiloh Road and south of I-90. Figure 15 shows that of the areas with the highest forecasted employment growth, only the land surrounding the airport is within ten minutes' drive of downtown. Figure 14 shows a similar pattern for population growth: the areas with the highest anticipated population are generally 15 minutes or more from downtown, with the exception of the neighborhoods near the airport and adjacent to the proposed Connector. The forecasted growth near the Connector is dependent on its construction, as it would provide the access route necessary for development.

Figure 14. Travel Times from Downtown – Population

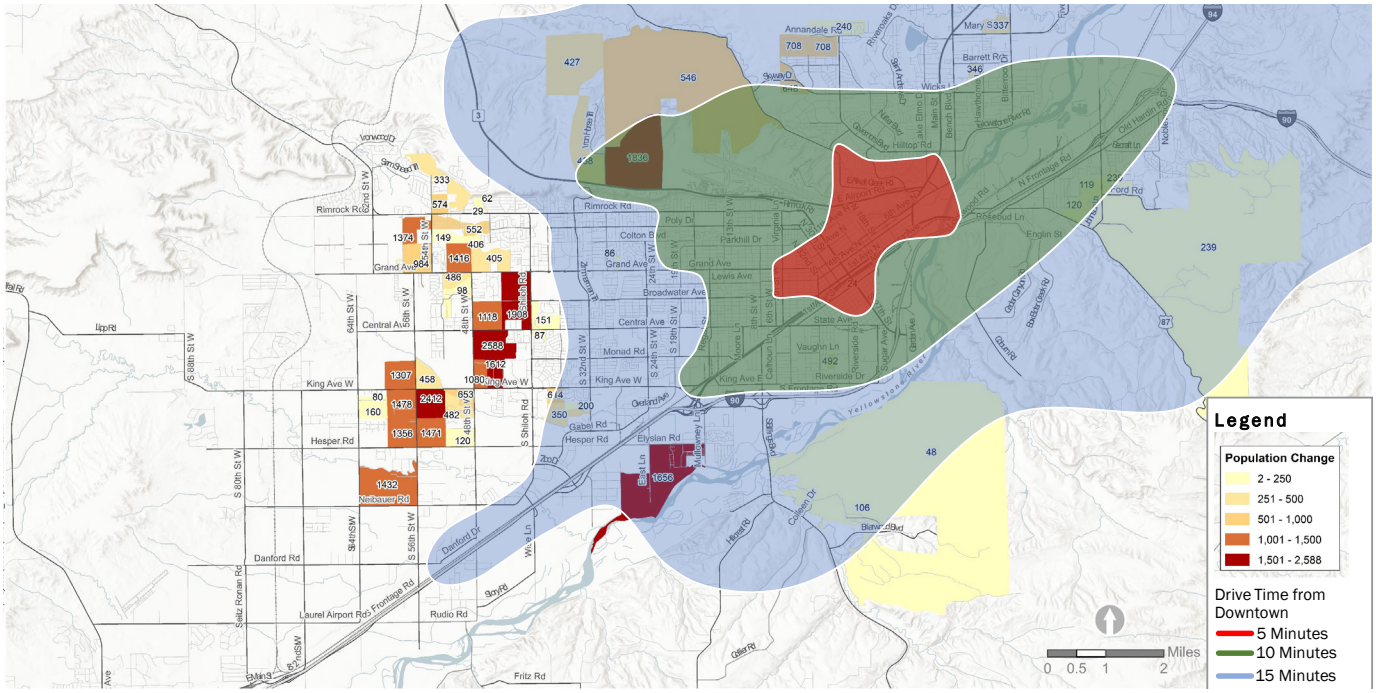
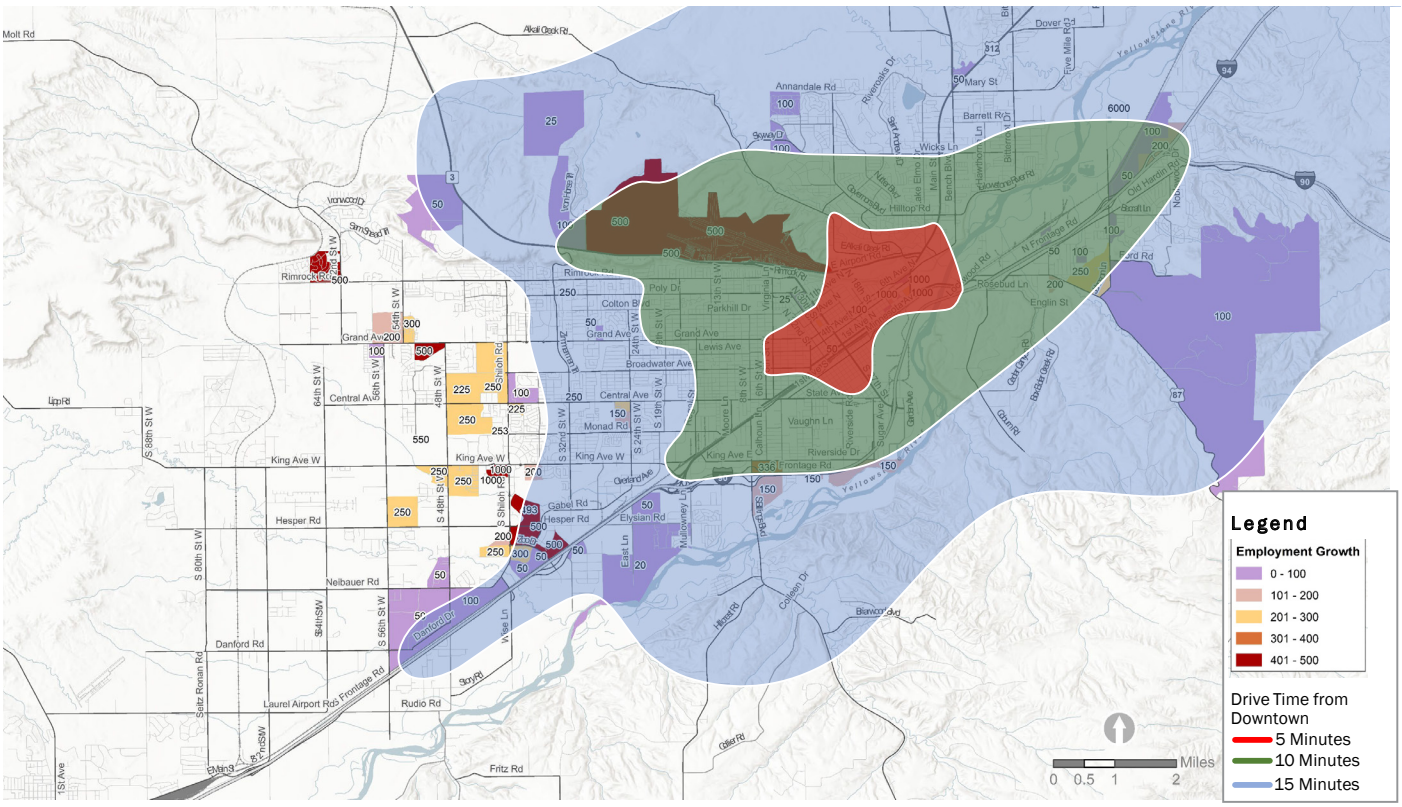


Figure 15. Travel Times from Downtown - Employment



Additionally, using estimates of the increment of employment adjacent to the Connector, Big Sky Economic Development used their Economic model, Jobs EQ, to estimate total output associated with future growth. The Jobs EQ model is validated for Yellowstone County and is used to estimate output for individual and groups of new development proposals in the metro area. Future growth in areas directly adjacent to the proposed Connector route would add approximately 700 new employees in areas directly adjacent to the proposed Northwest Billings Connector routes, which Big Sky Economic Development estimated would generate approximately $59.5 million per year in new economic output across the industrial, retail and service sectors.

Moreover, implementation of the Connector will support development in areas that will slow growth in vehicle miles of travel (VMT) and vehicle hours of travel (VHT), relative to conditions without the Connector. Figure 16 shows that the immediate impact of building the Connector would be to lower daily traffic in already-developed parts of the city, including the Heights and downtown Billings. Figure 17 shows that this effect will continue into 2040, according to forecasts by Kittelson Associates for the Billings MPO.

Figure 16: Current (2017) Forecasted Daily Traffic – With and Without Northwest Billings Connector

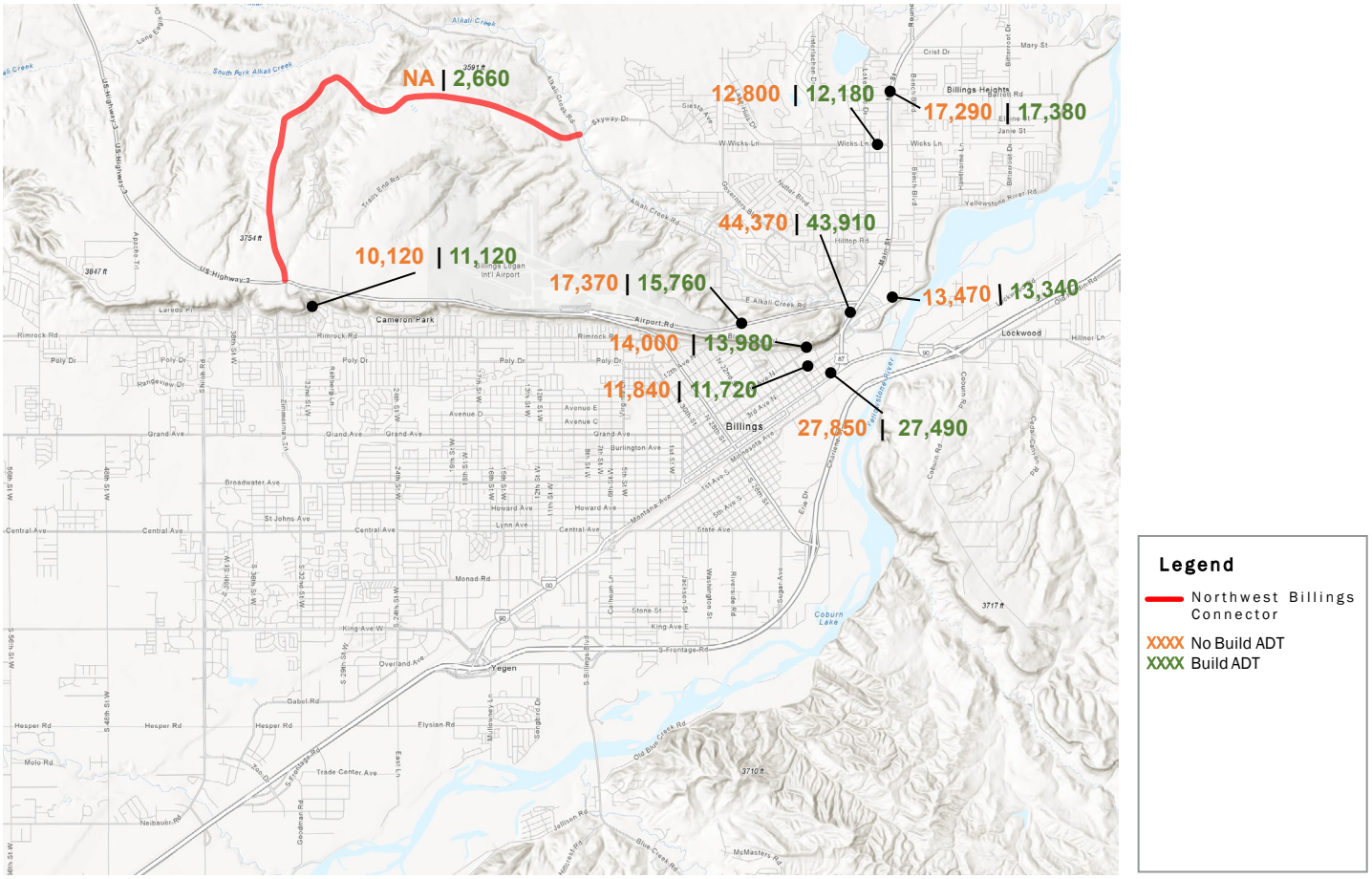
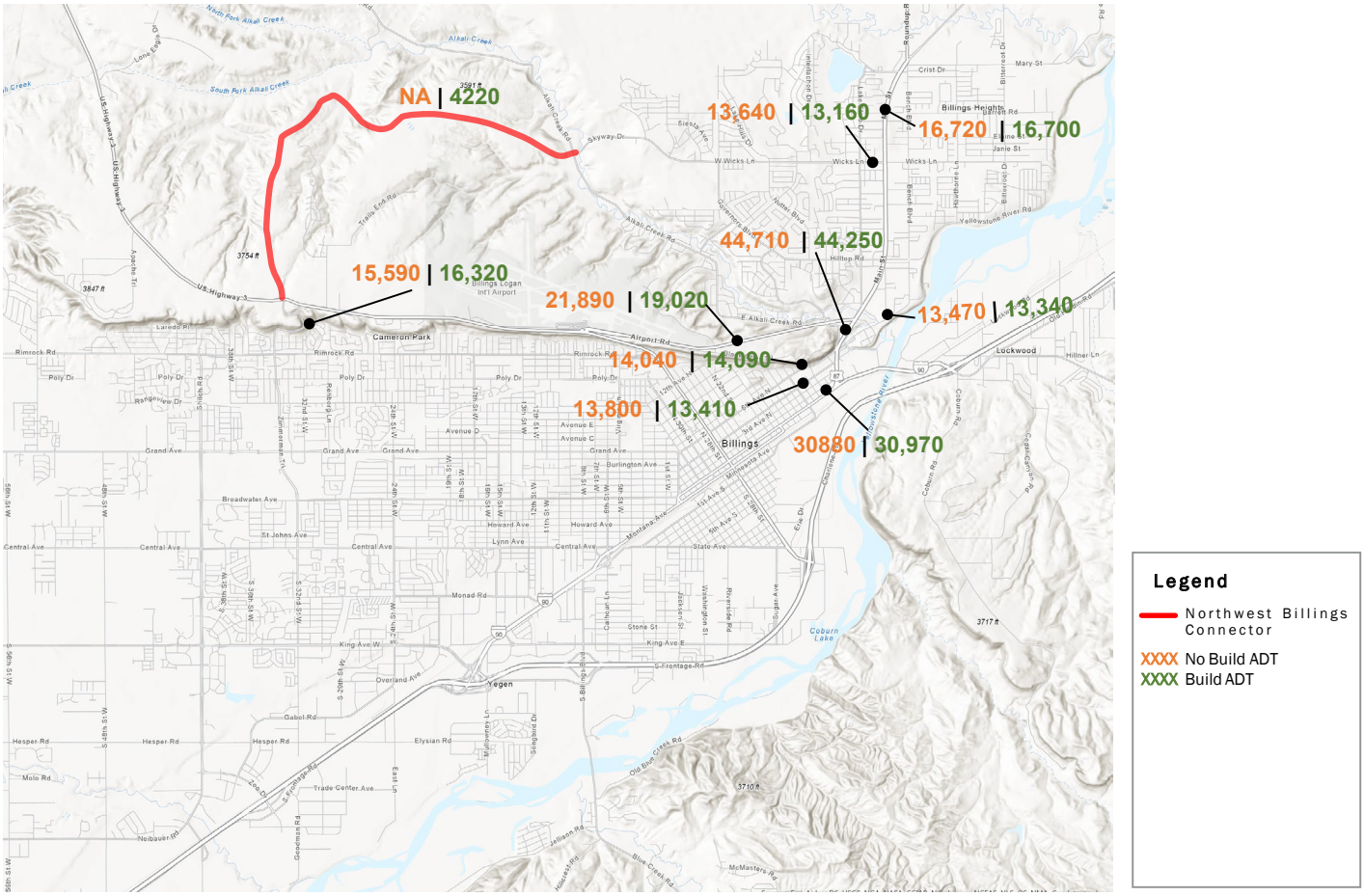


Figure 17: 2040 Forecasted Daily Traffic – With and Without Northwest Billings Connector



Within the five constrained artery roadways analyzed in the benefit-cost analysis for this project, annual forecasted VMT would be approximately 219 million in 2040 in the no-build scenario, but only 214 million in the build scenario. VHT would be lower in the build scenario by more than 170,000 in 2042. Slowing VMT and VHT growth while supporting new development provides more economical development and lower environmental impact from vehicle emissions.

Development resulting from the Connector is anticipated to produce industrial sector jobs in energy and manufacturing. These jobs are proven to have strong multiplier effects and represent a key competitive advantage for Billings, Montana and the United States in the global economy. In addition to the benefits monetized herein, the significance of the project as a source of economic vitality is evidenced by the support of stakeholders such as the Big Sky Economic Development Corporation and the Billings Chamber of Commerce.

Construction of Marathon Trail will support development and economic opportunities through:

- Connecting development areas and current employment areas with bicycle and pedestrian facilities. The travelsheds of the Marathon Trail include residential areas and employment opportunities that are close enough to each other to promote bicycle commuting.
- Reducing crash costs by providing an alternative to the constrained artery where motorized vehicles and bicycles are mixed in a shared lane with higher speeds.
- Providing a new recreation marketing opportunity.

The Marathon Trail vista and off-road route will create a unique experience for run/walk and bicycle events, and local organizations will capitalize on marketing opportunities. Estimates of potential local income, both public and private sector, were researched as part of the 2019 BUILD Grant Feasibility Study. Listed below are key assumptions for estimating local economic income from events that attract participants and their support teams:

- Approximately 32 percent of participants in events such as marathons are from out of the region.
- Approximately 83 percent of the out-of-town participants stay overnight as part of the event travel.
- The remaining 17 percent are “day travelers.”

The total per group spending per participant for overnight stay participants is approximately $665. For day travelers, the total

estimate group spending per participant is less around $82. Larger events would also generate local employment. Indirect effects include improved tourism tax revenue. Based on research of other similar sized community events, the direct, indirect and induced impacts of an event is approximately $350 per participant. Given Billings' proximity to Yellowstone National Park and other world-class outdoor recreational opportunities, the larger events could encourage traveling participants to stay and spend money in the greater region.

Opportunity Zone

The downtown Opportunity Zone, shown in Figure 18, and the investment benefits for public and private development has created the catalyst for One Big Sky development plan. With the Opportunity Zone designation in the core of the city, community leaders from the city and Big Sky Economic Development Corporation to team with a private investors to "redefine redefine an urban landscape to support major economic development and overcome the massive jobs dilemma facing the city and the state". One Big Sky is a destination concept that relies on private investment and anchoring institutions, including health care, education and tourism, to drive downtown visitation and new jobs and, correspondingly, economic growth and a stronger tax base.

Market research conducted by independent national experts found that Billings to be at a crossroads. Imminent challenges on the horizon include an aging workforce, a stagnant economy, and related negative impacts on tax revenues. A key outcome of the market research is for the state's largest city to be competitive in attracting and retaining a strong workforce, increasing visitation and growing new and existing businesses there needs to be substantial strengthening of the urban core. Why the urban core? Tax revenue in the core is two to 10 times more per square foot than in the West End or Heights.

Today, urban dwellers outnumber rural dwellers worldwide for the first time in history. Companies are increasingly recognizing the importance of being where the talent wants to be – in cities. Shifting sites closer to transit hubs and urban areas brings corporations closer to top talent, universities, and other business partners. In Billings, downtown is the location providing the most intense mix of density, multi-use development and transit service. Missing from the characteristics supporting redevelopment are adequate funding to support addressing the gap between what we have and what is desired for growth and a multimodal transportation network that complements the opportunities. Creating the Opportunity Zone has brought about interest and funding to redevelopment much of the downtown portion of the Opportunity Zone.

The proposed One Big Sky concept was developed to benefit the urban core at three levels:

- Micro: investment in strategic anchors affects the core downtown by directly improving public infrastructure and building catalytic private development projects.
- Macro: investment in Billings affects the peripheral suburban areas of Billings by creating jobs.
- Regional: Investing in Montana's largest and most urban city benefits the state by creating a center hub for next-generation employment, knowledge and commerce.

Details regarding the market analysis for investment into downtown Billings are provided in Appendix A here of the One Big Sky Development Plan. Key elements of that plan are provided in the anchor framework and in the development phase use levels.

Figure 18: Opportunity Zone

	PHASE 1									
	ENTERTAINMENT DISTRICT		CIVIC & WELLNESS DISTRICT		EDUCATION & INNOVATION DISTRICT		LIFESTYLE DISTRICT		PHASE 1 TOTAL	
USE	**TOTAL GROSS SF**	**UNITS**	**TOTAL GROSS SF**	**UNITS**	**TOTAL GROSS SF**	**UNITS**	**TOTAL GROSS SF**	**UNITS**	**TOTAL GROSS SF**	**UNITS**
Convention / Event Center	150,000	-	-	-	-	-	-	-	150,000	-
Hotel	175,000	175	95,000	95	-	-	-	-	270,000	270
Commercial / Office	40,000	-	230,000	-	-	-	-	-	270,000	-
Residential	65,000	50	520,000	356	200,000	133	519,000	415	1,304,000	954
Retail	136,000	-	203,000	-	40,000	-	61,000	-	440,000	-
Education / Innovation	-	-	-	-	50,000	-	-	-	50,000	-
Health / Wellness	-	-	390,000	-	-	-	-	-	390,000	-
Parking	315,000	788	1,142,000	2,856	-	-	-	-	1,457,000	3,644
TOTAL	**566,000**		**1,438,000**		**290,000**		**580,000**		**2,874,000**	

	FUTURE PHASE(S)									
	ENTERTAINMENT DISTRICT		CIVIC & WELLNESS DISTRICT		EDUCATION & INNOVATION DISTRICT		LIFESTYLE DISTRICT		FUTURE PHASE TOTAL	
USE										
Convention / Event Center	-	-	-	-	-	-	-	-	-	-
Hotel	165,000	150	-	-	-	-	-	-	165,000	150
Commercial / Office	64,000	-	-	-	-	-	70,500	-	134,500	-
Residential	167,500	134	285,000	203	400,000	266	440,500	352	1,293,000	955
Retail	72,800	-	175,000	-	-	-	90,000	-	337,800	-
Education / Innovation	-	-	50,000	-	885,000	-	-	-	935,000	-
Health / Wellness	-	-	675,000	-	-	-	-	-	675,000	-
Parking	-	-	153,200	383	200,000	500	100,000	275	453,200	1,158
TOTAL	**469,300**		**1,185,000**		**1,285,000**		**601,000**		**3,540,300**	

The Northwest Billings Connector project supports the opportunity to enhance the multimodal opportunities in downtown by providing an alternate route for a portion of through traffic that today uses roads in the constrained artery. Currently, approximately 40 percent of the traffic using the constrained artery across downtown is through traffic, which adds to conflicts with pedestrian use, bicycle use, parking activities in downtown. Through traffic adds to intersection and segment conflicts without providing a benefit to downtown (because by definition, this traffic does not stop in downtown to patronize businesses). The Northwest Billings Connector provides a complementary alternate route for through traffic currently traveling through the downtown Opportunity Zone that will reduce vehicular traffic, which will enhance the pedestrian environment associated with vibrancy and activity that enhances the development concept for the Opportunity Zone.

Environmental Sustainability

The project will reduce energy use and air pollution by mitigating congestion and encouraging active transportation. Start-and-stop traffic produces significantly higher emissions than continuous vehicle traffic[1]. By diverting traffic to a more efficient roadway, the Connector will improve LOS in a congested corridor and reduce the environmental impacts of the trips that are made.

Improving multimodal connections in the area helps promote active transportation options for residents. The addition of multi-use trail segments and the conversion of an unimproved/primitive trail to a paved route have the potential to promote mode shift from automobile to active modes of transportation, reducing local dependence on oil.

The median commute time in most parts of Billings is between 12 and 17 minutes (LRTP). At the lower end of that range, auto commutes can feasibly be replaced with bike trips if facilities are available. Residents of Billings already bike and walk at higher than the national average, with a commute mode share of one percent biking and three percent walking in the 2017 American Community Survey. Multimodal facilities are popular in Billings. Between 2010 and 2015, the daily average number of users rose 21 percent from 2,287 to 2,617 (LRTP). The already-built segments of the Marathon Trail average between 65 and 209 users a day (City of Billings Trail Counts 2019). In a 2017 survey conducted by TrailNet, 96 percent of respondents answered that they would use the Skyline Trail if it were built.

The project would avoid adverse impacts to air and water quality, wetlands, or endangered species. An abbreviated environmental screening was completed as part of the Connector corridor study to aid in screening the range of alternate corridors. Coordination with Montana FHWA representatives resulted in the expectation that a Categorical Exclusion would be the likely appropriate environmental review level for the Connector and remaining Marathon Trail elements.

Quality of Life

When all three project components are counted, they collectively add 8.8 miles of multi-use trail in Billings, which expands transportation mode choices for residents and visitors. Addition of the Connector is forecasted to reduce daily and peak hour traffic in the congested artery of Main Street and 1st Avenue and parallel routes through central Billings. The proposed project will improve access to jobs and residential development that is planned for areas adjacent to Logan International Airport. These areas are closer to the central city and do not result in conversion of agricultural land as would many other future development areas.

"One of the first things I discuss with Physician candidates are the outdoor opportunities and green spaces in Billings. Our candidates and their family members are typically avid runners, cyclists, and/or nature enthusiasts. It's critical to tie those interests into the recruitment process-relocation requires attraction to the entire community."
Alexis Urbaniak, RiverStone Health Recruiter

Transportation Choices

Billings has a network of parks and recreational trails that cover most parts of the city; however, there are only a few bicycle and pedestrian facilities in the central artery. The gaps in the bicycle and pedestrian network discourage use of active modes for all trip purposes. Even with the conflicts that exist in the constrained artery, bicycle use in the corridors is relatively consistent with other locations in the community, which demonstrates that desire/demand between the Heights and West End is high.

It is important to understand that any bicycle and pedestrian infrastructure with limited connectivity and access can greatly affect the use and benefit of the existing infrastructure. This works against the goal of the LRTP of promoting a healthy lifestyle and better mobility options for all visitors and residents. The two major medical centers for the Billings region are both located downtown, meaning that residents of the Heights must travel through the constrained artery to access the medical centers for general services and in emergency situations where time is of the essence.

The project is likely to have a longer-term positive impact on the community's livability by promoting an active lifestyle for transportation needs and improving access to facilities and amenities. As a result, the project helps in creating an environment enticing to a workforce looking for a livable community that promotes a healthy lifestyle. Moreover, a safe and connected multimodal network which provides direct access to outdoor recreation without automobile use provides a better quality of life to residents as well as visitors in the Billings area.

[1]Zhang, Kai and Stuart Batterman. "Air pollution and health risks due to vehicle traffic." Science of the Total Environment, 15 April 2013, pp 307-316. https://doi.org/10.1016/j.scitotenv.2013.01.074

V. Secondary Selection Criteria

Innovation

Innovative Technology

The Connector will provide a new right-of-way which supports concurrent installation of fiber optic cable to promote extension of high-speed internet service to unserved rural areas of Billings. Reliable, high-speed internet supported by fiber optic cable is limited to the areas shown in Figures 19 and 20. Figure 19 shows the areas where CenturyLink provides fiber access, and Figure 20 shows the corridors where its competitor Vision Net has laid fiber. Large areas of northwest Billings are still without fiber-based service.

Figure 19. CenturyLink Fiber Coverage

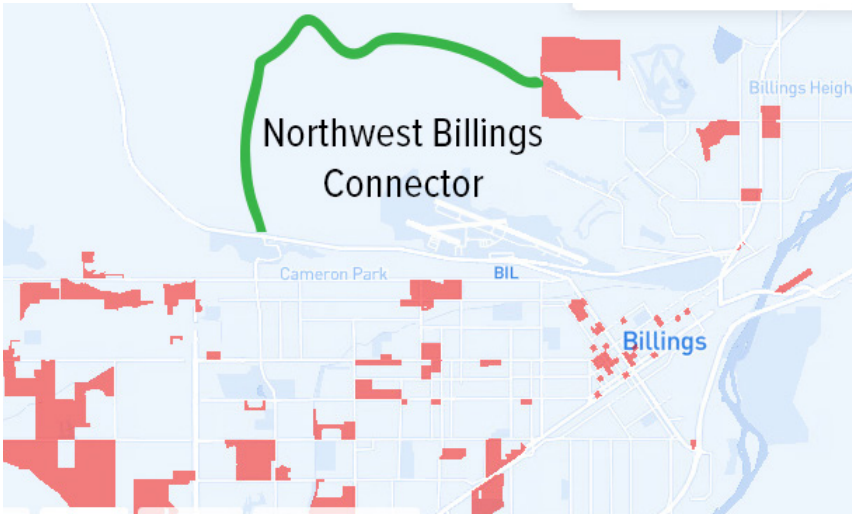
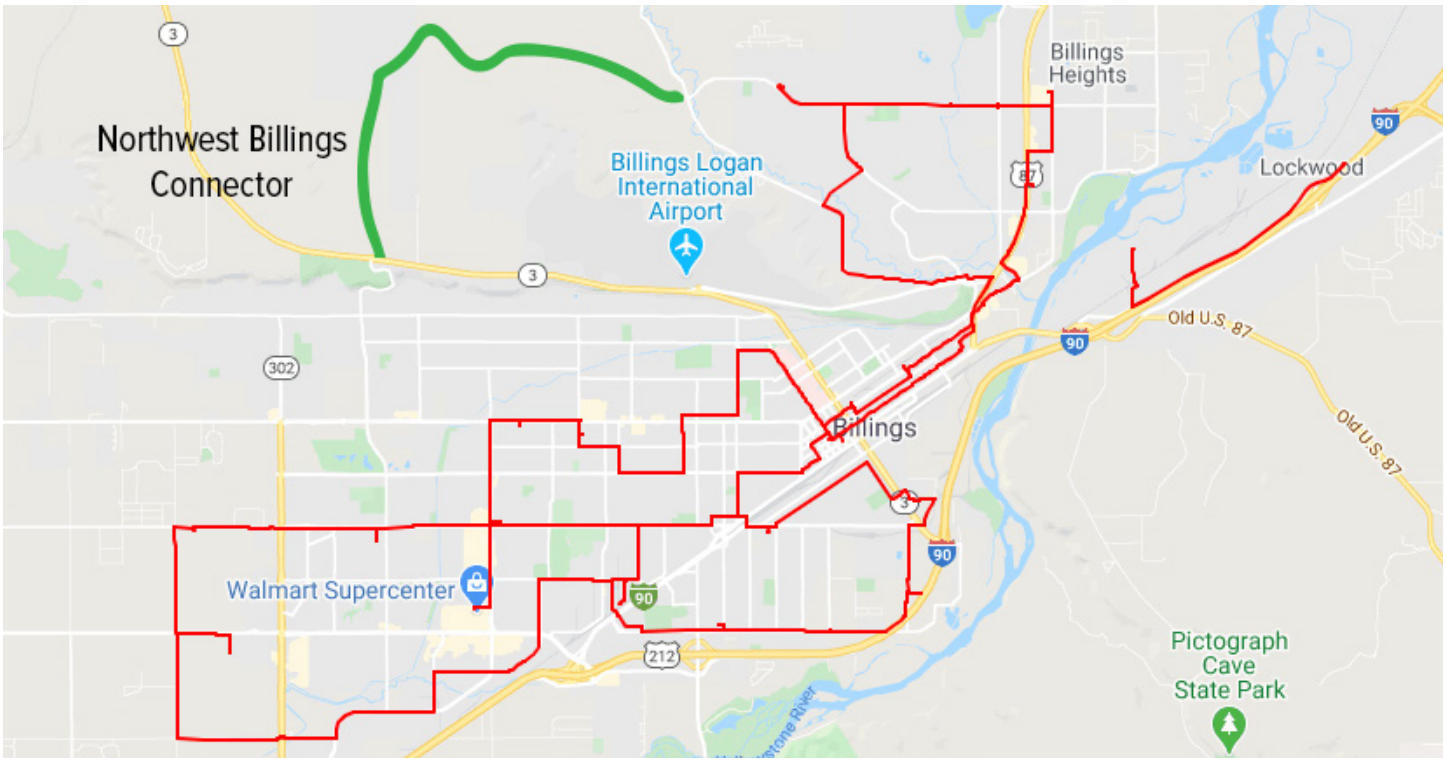


Figure 20. Vision Net Fiber Coverage



Installation of fiber optic cable in the Connector corridor will also enable enhanced traffic observation and management in real-time. This accommodates peak hour travel time improvements along the Connector route to increase the level of diversion from the constrained artery.

"Fiber is key infrastructure that enables existing businesses to grow and helps to attract new business to our communities." – Steve Arveschoug, executive director of Big Sky Economic Development in the Billings Gazette – July 2019

The City of Billings will also consider using innovative concrete pavement grind texture for the Northwest Billings Connector to restore pavement friction and decrease tire pavement noise. Quieter pavements improve the experience of bike riders and pedestrians along the road as well as for residents close to the roadway. As the new roadway is likely to induce more residential and commercial development in the area, quieter pavement will contribute to opportunities to eliminate the expense of adding a sound barrier, which can cost up to $3 million per mile.

In the final design phase, design elements to reduce runoff that would reduce the potential for hydroplaning will be incorporated as appropriate. About a quarter of the crashes in the City of Billings occurred in wet pavement conditions including the crashes in the constrained artery.

The City of Billings will expand the current comprehensive and accessible wayfinding systems used throughout the network to the Marathon Trail segments included as part of the project. The intent is to combine signage, maps, colors and symbols to help the trail users connect with their destinations directly or via another mode of transportation. In addition, the city of Billings initiated a community-wide signage/wayfinding study in June 2019 which will highlight multi-modal signage opportunities to connect people with places in the Billings area.

Innovative Project Delivery

The City of Billings will propose applying the Critical Path Method (CPM) scheduling to minimize down periods during construction and maximize workflow. The CPM method identifies the relationships between project activities and calculates the minimum completion time for the project. The City of Billings will consider applying this process to coordinate construction activities between the components of the current project as well as other rehabilitation projects in the area, thus, minimizing inefficiencies and delays. The City of Billings will develop a project plan to identify critical activities to meet on-time completion and to be able to analyze and respond to changes or delays in the project schedule.

Innovative Financing

The City of Billings is partnering with TrailNet, a non-profit grass-roots organization supporting urban trails in and around Billings community. Financial support or local match provided by TrailNet also increases the local civic support and encouragement likely to help the project.

Partnership

The City of Billings is the project sponsor of this BUILD grant application. Billings has received and administered numerous federal grants in previous years, including aid through the American Recovery and Reinvestment Act of 2009 that funded the development of the Swords Park II Trail. Billings is a regular recipient of Community Development Block Grants, Federal Aviation Administration funding, and grants for emergency services.

The city has worked closely with the Billings MPO, Chamber of Commerce, and TrailNet to develop this Project through the feasibility phase. Billings MPO used a combination of its own revenue and federal Metropolitan Planning formula funds on the 2006 and 2019 Inner Belt Loop studies, the Highway 3 Corridor Study, and the Rimrocks to Valley Bike/Ped Feasibility Study (a total cost of $248,800). The City of Billings' other partners include Big Sky Economic Development (BSED), the Bike/Pedestrian Advisory Committee (BPAC), Yellowstone County, and Healthy by Design.

TrailNet has fundraised the past and future costs of the Skyline Trail, covering close to $200,000 in design work and committing an additional $85,000 to construction. Restroom facilities for the trail will be provided through a public-private partnership with Philips 66.

This process was aided by strong support from property owners and grassroots TrailNet supporters. Letters of support from federal and state representatives and local supporters are linked here.

VI. Environmental Risk Review

There has been substantial public engagement performed during design and review of the Project. The 2005 Connector study was prepared following meetings with property owners, neighborhoods, and other members of the public. Further

public engagement, including two public meetings, took place during the updated 2020 study.

The Rimrocks to Valley Bike/Pedestrian Feasibility Study, which led to the Stagecoach Trail design, was the product of monthly project oversight committee meetings; two neighborhood meetings adjacent to the proposed trail routes; a presentation to the Rimrock Neighborhoods Task Force; two public meetings; and review and approval by a technical advisory committee, the Yellowstone County Board of Planning, the Yellowstone County Commission, Billings City Council, and Policy Coordinating Committee. The public meetings affirmed that this trail route is a priority and offered guidance on which amenities and construction materials would be welcome.

The Highway 3 Feasibility Study, which included the concept that would become the Skyline Trail, followed a similar public process. Participants in the two public meetings expressed support for bike facilities the entire length of the Highway 3 corridor and identified their preferences around parking locations and policy, trailhead amenities, and other design decisions.

The Marathon Trail elements of the project are substantially within current ROW of Highway 3 and Zimmerman Trail. Thus, no additional ROW is required for these portions of the project. For the Northwest Connector current landowners where ROW is required have been informed throughout the process of completing two corridor studies and have provided letters of support for the project.

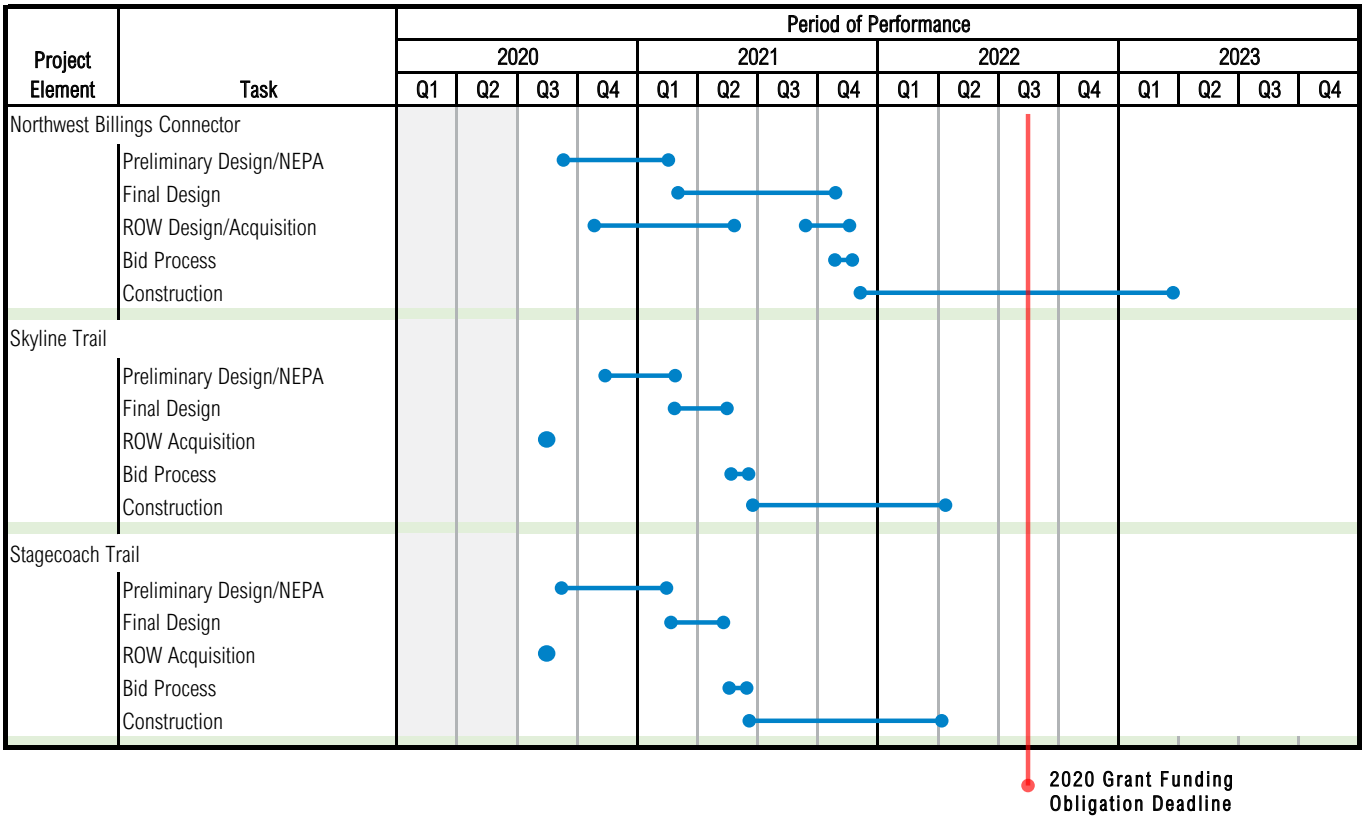
There are no significant environmental impacts associated with the Project. The city is coordinating project development with the appropriate resource agencies and MDT and a Categorical Exclusion is the anticipated environmental action. The Project is noncontroversial and supported by Project partners.

Technical Feasibility

The City of Billings has extensive experience planning, designing, constructing, and maintaining arterial routes consistent with the Connector element and trails similar to the Marathon Trail elements. The city has completed corridor studies of the Connector, Skyline Trail and Stagecoach Trail elements and through these studies concluded the proposed routes and concepts to be feasible.

Project Schedule

The project schedule demonstrates that grant funds can be obligated in advance of the BUILD deadline of September 30, 2022. The City of Billings anticipates that construction of the Marathon Trail segments will begin by October 1, 2021 and finish by May 30, 2022. The Connector will be ready to begin construction by April 2022 and will be completed by September 29, 2023.



Required Approvals and Permits

Environmental Approvals

The NEPA review of the project will formally begin in the first quarter of 2021. An abbreviated environmental screening was completed as part of the Connector corridor study to aid in screening the range of alternate corridors. No cultural or archaeological sites were located within the corridor area. Right-of-way will be required for the corridor. The recommended right-of-way for the corridor is 100 feet, centered on the alignment. The proposed alignment would not require acquisition of structures. Coordination with Montana FHWA representatives resulted in the expectation that a Categorical Exclusion would be the likely appropriate environmental review level for the Connector and remaining Marathon Trail elements. For this reason, a NEPA determination is expected by June 30, 2021.

State and Local Approvals

There is a broad base of state and local support for the project, as shown by the letters of support submitted for this application. Upon award of BUILD funds, the State Transportation Improvement Program and the City of Billings Capital Improvement Program will each be amended to incorporate the project.

Risks and Mitigation Strategies

Outside of the project's known funding gap, the most likely events to affect project readiness are 1) a determination that the Project has a significant impact on the surrounding environment; 2) a delay in ROW acquisition; and 3) loss of local stakeholder support. As noted above, these are low level risks given the environmental, design, and public engagement work completed to date. Going forward, Billings will continue to manage these risks through timely pursuit of a categorical exclusion, disciplined adherence to a project scope that involves minimal encroachment on the surrounding community, efficient and effective ROW acquisition, and continued use of the municipal consent process. Billings will also manage project delivery risks through robust public engagement and coordination with its partners in planning and delivery, including TrailNet and MDT.

VII. Benefit Cost Analysis

The objective of a benefit-cost analysis (BCA) is to bring all of the direct effects of a transportation investment into a common measure (dollars), and to allow for the fact that benefits accrue over a long period of time while costs are incurred primarily in the initial years. The primary elements that can be monetized are travel time, changes in vehicle operating costs, vehicle crashes, environmental impacts, remaining capital value and maintenance costs. Additionally, some quality of life benefits can also be quantified and monetized to be included in the primary elements. The results of the BCA are briefly summarized below. A detailed technical memorandum of the analysis is available to view at the grant application website.

No Build Alternative

The No Build Alternative included not constructing the Northwest Billings Connector and the Marathon Trail. However, all other currently programmed transportation improvements part of the 2018 Billings Long Range Transportation Plan were included as part of the transportation network.

Build Alternative

The proposed project adds Northwest Billings Connector, a 2-lane undivided roadway (with detached bicycle and pedestrian infrastructure) and marathon trail to the transportation network. The Build Alternative also included the currently programmed improvements to the regional transportation system that were assumed in the No Build Alternative.

BCA Methodology

The main components used for the BCA were as follows:

- Travel time/delay (vehicle hours traveled – VHT)
- Operating costs (vehicle miles traveled – VMT)
- Crashes by Severity
- Environmental and air quality impacts
- Initial capital costs (These costs will be broken into different categories in accordance with service life and will be applied evenly over the duration of the construction period.)

- Remaining Capital Value: The remaining capital value (value of improvement beyond the analysis period) is considered a benefit and will be added to other user benefits.
- Maintenance costs
- Monetized quality of life benefits (created by providing active transportation alternatives to car use)

Project Costs

Year 2019 project cost for the BUILD Transportation Discretionary Grant components of the overall project is estimated at $23.9 million. The 2018 project cost discounted at a rate of 7 percent is approximately $18.5 million.

BCA Results

The benefit-cost analysis provides an indication of the economic desirability of a scenario, but results must be weighed by decision-makers along with the assessment of other effects and impacts, such as providing access and connectivity to a very economically depressed region. Projects are considered cost-effective if the benefit-cost ratio is greater than 1.0. The larger the ratio number, the greater the benefits per unit cost. Results of the benefit-cost analysis are included in Table 5.

Table 5. Benefit Cost Analysis Summary

Benefits	$58.4 M
Costs	$18.5 M
B/C Ratio	3.15

VIII. Supporting Documents

Links to supporting documents are included throughout this narrative. All supporting documents and the BUILD grant application narrative are available to view at the following webpage: https://www.srfconsulting.com/billings-build-grant/.

SRF Consulting Group, Inc. | Engineers Planners Designers

Memorandum

To: Lora Mattox, AICP, Transportation Planner

From: Nick Semeja, PE, Senior Engineer

Date: May 15, 2020

Subject: Northwest Billings Connector and Marathon Trail – 2020 BUILD Program Application Benefit-Cost Analysis Memorandum

Introduction

This memorandum summarizes the assumptions, methodology and results developed for the benefit-cost analysis of the No Build and Build Alternatives evaluated as part of the Northwest Billings Connector and Marathon Trail – 2020 BUILD Program Application. The objective of a benefit-cost analysis (BCA) is to bring all of the direct effects of a transportation investment into a common measure (dollars), and to allow for the fact that benefits accrue over a long period of time while costs are incurred primarily in the initial years. The primary elements that can be monetized are travel time, changes in vehicle operating costs, vehicle crashes, environmental impacts, capital costs and remaining capital value, and maintenance costs. Additionally, quality of life benefits can also be quantified and monetized with the other benefit categories listed above. The benefit-cost analysis can provide an indication of the economic desirability of an alternative, but decision-makers must weigh the results against other considerations, effects, and impacts of the project.

The primary components to be addressed by the project are:

- Travel time, vehicle operations costs, safety, and environmental costs associated with trips affected by Northwest Billings Connector.
- Quality of life benefits, including recreational, mobility, health and reduced auto use, associated with Marathon Trail and bicycle infrastructure on Northwest Billings Connector.

Currently, the movement of people and goods from Billings Heights neighborhood to downtown and the West End requires the use of the constrained artery along Main Street or Highway 312. The constrained artery includes 6th Avenue, 4th Avenue, 1st Avenue, Airport Road and Alkali Creek Road. The study corridor or constrained artery is characterized by near-capacity daily traffic volumes, congestion during peak hours, travel delays, multimodal use of roadways, high levels of freight and heavy vehicle activity, and numerous safety concerns.

Description of Alternatives

For the purpose of this analysis, a No Build and Build Alternative were under consideration.

No Build Alternative

The No Build Alternative included not constructing the Northwest Billings Connector and the Marathon Trail. However, all other currently programmed transportation improvements part of the Billings Long Range Transportation Plan (2018) were included as part of the transportation network.

Build Alternative

The proposed project adds the Northwest Billings Connector, a new 2-lane undivided roadway (with detached bicycle and pedestrian infrastructure), and marathon trail to the transportation network, as shown in the image below. The Build Alternative also included the currently programmed improvements to the regional transportation system that were assumed in the No Build Alternative.

BCA Methodology

The following methodology and assumptions were used for the benefit-cost analysis:

Main Components

The main components include:

- Travel time/delay (vehicle hours traveled – VHT)
- Operating costs (vehicle miles traveled – VMT)
- Crashes by Severity
- Environmental and air quality impacts
- Quality of life benefits

- Initial capital costs (These costs will be broken into different categories in accordance with service life and were applied evenly over the duration of the construction period.)
- Remaining Capital Value: The remaining capital value (value of improvement beyond the analysis period) is considered a benefit and will be added to other user benefits.
- Operation and maintenance costs

Travel Demand Model

The analysis used the Billings MPO Regional Travel Demand Model (TDM) to compare the No Build and Build Alternatives. This TDM was developed in 2018 and has a forecast planning horizon of year 2040. The TDM is developed with transportation analysis zones (TAZs) that represent geographic groupings of population and employment. The TAZs were based on census blocks defined by the 2010 US Census. In addition to historical projections, local knowledge from the MPO was utilized to anticipate where growth in population and employment would increase or stagnate. The refined year 2040 population and employment dataset was then incorporated into the TDM to develop traffic volume forecasts. Using the TDM, tabulated data was prepared for the constrained artery traffic volumes (existing and forecast year) affected by the No Build and Build Alternatives.

Analysis Years

This analysis assumes that the No Build and Build Alternatives would be constructed over a two-year period from 2021 to 2022. Therefore, 2023 was assumed to be the first full year that benefits will be accrued from the project. The analysis focused on the estimated benefits for the twenty-year period from 2023 to 2043. The present value of all benefits and costs were calculated using 2018 as the year of current dollars.

Economic Assumptions

The value of time, vehicle operating costs, and cost of crashes were obtained from the Benefit Cost Analysis Guidance for Discretionary Grant Programs, dated January 2020[1]. Remaining capital value assumptions are recommended to be consistent with rates from Recommended remaining capital value factors[2] for use in benefit-cost analysis in SFY 2020, Minnesota Department of Transportation, Office of Transportation System Management, July 2019 (values were adjusted to reflect discount rate). The analysis used an assumed discount rate of seven percent.

Development of Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT)

Regional year 2017 and 2040 VMT and VHT from the Billings MPO Regional TDM were summarized for the No Build and Build Alternatives. To establish estimates for VMT and VHT on

[1] https://www.transportation.gov/sites/dot.gov/files/2020-01/benefit-cost-analysis-guidance-2020_0.pdf
[2] https://www.dot.state.mn.us/planning/program/appendix_a.html

routes in the constrained artery, a series of select link analyses were prepared using the Billing MPO regional TDM. The select link provides a unique origin-destination trip table and travel time skim for each of the corridors that comprise the constrained artery. Select links were prepared for four scenarios:

- 2017 (Existing) – Without the Northwest Billings Connector
- 2017 (Existing) – With the Northwest Billings Connector
- 2040 (Horizon) – Without the Northwest Billings Connector
- 2040 (Horizon) – With the Northwest Billings Connector

Select link analysis output[3] was obtained for 1st Avenue/Main Street, 6th Avenue, 4th Avenue, Airport Road, Alkali Creek Road, and the Northwest Billing Connector. Results from the With Connector and Without Connector tables were compared to estimate the VMT and VHT impacts of adding the Connector to the transportation network. The regional model captured travel time changes related to trip diversion. Benefits for the years between 2017 and 2040 were interpolated based on model results using an annual growth rate. VMT and VHT for years beyond 2040 were extrapolated based on the same growth rate. User cost savings due to reduction of VMT and VHT were calculated using costs per mile and per hour that account for vehicle occupancy and different vehicle types.

Vehicle Occupancy, Vehicle Types and Peak Hours

The composite cost per mile used in the BCA accounts for the percentage split of autos and trucks in the travel area. The composite cost per hour accounts for vehicle occupancy ratios, and the percent split of autos and trucks traveling in the area. Key assumptions for these areas include:

- The truck percentage based on year 2018 vehicle classification counts performed by Montana DOT.
- Vehicle occupancy consistent with values provided by Benefit Cost Analysis Guidance for Discretionary Grant Programs, dated January 2020. The analysis assumed occupancy of 1.67 people per automobile and 1.00 people per truck.

Safety Analysis

The Build Alternative improves the constrained artery by reducing congestion and improving safety for all modes. Construction of a new roadway is expected to generate safety benefits by transferring some of the daily traffic from the existing high-crash facilities to the new roadway. The analysis used existing three-year (2016-2018) crash data to develop crash rates for each corridor in the constrained artery. The No Build and Build Alternatives used existing crash rates and associated VMT for each corridor to estimate crashes in the constrained artery. Crashes were also estimated for the new

[3] Included in the BCA workbook.

Connector using average crash rates by severity for Montana 2-lane undivided facilities and the expected VMT diverting to the Connector. Crashes by severity for the Connector were added to the constrained artery crashes in the Build Alternative.

The safety benefit was quantified for years 2017 and 2040 and interpolated/extrapolated based on an annual growth rate to determine total safety benefits for the analysis period. Crash cost assumptions for the KABCO scale are consistent with values and methodologies published in the Benefit Cost Analysis Guidance for Discretionary Grant Programs, dated January 2020.

Environmental and Air Quality Impacts

Environmental impacts associated with vehicle emissions were estimated based on a change in VMT between the No Build and Build Alternatives. Emission rates per additional mile traveled for autos and trucks were obtained from the United States Environmental Protection Agency, Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks (October 2008). Total change in emissions is valued in accordance with the Benefit Cost Analysis Guidance for Discretionary Grant Programs, dated January 2020.

Maintenance Costs

Roadway maintenance costs, associated with maintaining the additional roadway infrastructure under the Build Alternative, needs to be considered as an additional cost to the Build Alternative. An annual maintenance cost per lane mile based on historical City of Billings data was used. This maintenance cost includes costs associated with striping, snow plowing, minor repairs, and shoulder maintenance. Other maintenance costs between the alternatives were assumed to be similar. The Public Works department provided an estimate of approximately $6,850 per lane mile per year for roadway maintenance and $3,500 per trail mile per year for trails.

Calculation of Remaining Capital Value

Because many components of the initial capital costs have service lives well beyond the 20-year analysis period, the remaining capital value was calculated for the Build Alternative. This value is expressed in terms of 2018 dollars and was added to other user benefits in accordance with USDOT guidance. In determining remaining capital value, the initial cost of the proposed alternative was separated into the following categories:

- Right of Way
- Major Structures
- Grading and Drainage
- Sub-Base and Base
- Surface
- Miscellaneous Costs – Includes mobilization, removals, utility relocation, traffic control, and program delivery. These are assumed to be sunk costs and assigned zero remaining capital value.

Factors not Quantified

Several factors are not quantified as part of the analysis because review of initial data indicates low potential to yield substantial benefit. These factors included the following:

- Trips lying outside the specified constrained artery may accrue benefits that are not considered.
- Operating cost savings from improved vehicle efficiency due to increased average vehicle speeds in Build Alternative.
- The methodology does not specifically monetize any transit benefits.

Monetizing Qualitative Benefits

Since the project includes multi-use trails and bicycle and pedestrian infrastructure, it is important to quantify the qualitative benefits of the improvements. The methodology used in this section has been previously used in Minnesota and was approved by Minnesota Department of Transportation. The following methodology and assumptions are recommended.

Main Components

The main components include:

- Bicyclists' mobility
- Bicyclists' health
- Bicyclists' recreation
- Reduced auto-use
- Walkers' health and recreation

Demand Model

Biking and walking demand were calculated using the methodology developed by NCHRP Report 552 (2006)[4] for Build Alternative in comparison with No Build Alternative. The models and methodologies were complemented with engineering judgment, locally developed demand models and knowledge to identify the most likely value within the possible range.

Population Near Project Area

GIS buffer analysis using TAZ-level data provided by the Billings MPO was used for estimating the population within 0.25-mile, 0.25-0.5 mile and 0.5-1 mile distance from the bicycle infrastructure.

[4] National Cooperative Highway Research Program (NCHRP), Report 552: Guidelines for Analysis of Investments in Bicycle Facilities, 2006.

Relevant Billings Population Characteristics

The characteristics were obtained from 2013-2017 American Community Survey and the 2017 Billings Area Bikeway and Trails Master Plan.

Cycling Demand - New and Existing Bicyclists

The first step to determine bicycle demand is to estimate the population residing near the assumed facilities. Bicycle demand and benefit calculations were based on a methodology described in the National Cooperative Highway Research Program's (NCHRP) Report 552: Guidelines for Analysis of Investments in Bicycle Facilities (2006). A buffer analysis was performed around the project area using TAZ level population data provided by Billings MPO. Buffers were created at the quarter-mile, half-mile, and one-mile distances from the project. The population residing within these distances of the project was the population assumed to use the new facilities at propensities that vary with distance. Of the population residing in the buffers, the number of commuters for all modes was estimated and the city-level share of bicycle commuters (one percent) was used. The NCHRP report supplied multipliers to estimate new commuters and existing and new total riders based on the number of existing commuters. For the existing total riders, the report suggests three different models to calculate low, moderate and high estimates of riders due to large variability in bicycle usage in different cities and even larger differences between different neighborhoods within a city. The study allows applying local knowledge and judgement to choose a most likely point estimate within the range of demand levels estimated by those three models. The judgement criteria included design detail of the facility, land use, how suggested facility fits into a larger system, existing counts, etc. For the current project, moderate estimate of total daily cyclists and a 50 percent existing rate was assumed for benefit estimation. Existing rate is the share of daily cyclists in the project area that can be assumed to be existing bicyclists and not induced by new infrastructure.

Walking Demand

NCHRP Report 552 states that building new walk facilities is not likely to tangibly increase walking demand as opposed to bicycling for a couple of reasons including: walking is much more common than bicycling and walking facilities are much more widespread than bike facilities. No new daily walkers were assumed for the Build Alternative.

Mobility Benefits

To estimate the value bicyclists place on mobility, the NCHRP recommends applying the value of time to the additional travel time bicycle commuters are willing to travel out of their way to get to the facilities. Researchers defined five facility types as:

A) Off-road facilities,
B) In-traffic facilities with bike lane and no on-street parking,
C) In-traffic facilities with a bike lane and on-street parking,
D) In-traffic facilities with no bike lane and no on-street parking, and
E) In-traffic facilities with no bike lane but with on-street parking

These facility types were used to conduct a stated preference survey. The resultant logit model suggests that bicyclists were willing to travel an additional 21.6 minutes to use an off-street facility instead of a street with no facility and no on-street parking. Table 1 summarizes some of NCHRP's suggested mobility benefits that are relevant to the project.

Table 1. Mobility benefits of different bicycle facility improvements

Base facility	Improved facility	Minutes
B	A	5.2
D	A	21.6
E	A	30.5
E	C	16.4

Marathon Trail and Northwest Billings Connector project area's existing conditions are assumed to be a 'D' facility type and the build scenario is assumed as category A.

After multiplying by the value of time ($16.60/hour)[5], the values were applied to new and existing commuters to calculate the mobility benefit. An adjustment factor was added to the NCHRP method to account for the existing facilities in the proximity of the segment of interest. The mobility yielded a total benefit of $12.1M (undiscounted) over the 20-year evaluation period. Mobility benefits of weekend travel were not included in this estimate.

Health Cost Savings

Exercise helps to keep people healthy, thereby reducing their annual health costs. Based on an examination of ten studies, the NCHRP estimates that the daily physical activity of new bicyclist, either commuter or recreational, saves each of them $128 per year. Over the first twenty years after project implementation, it was estimated that these savings totaled over $765k (undiscounted).

Recreation Benefits

Examining the value people place on different recreational activities, the NCHRP estimates that one hour of bicycle recreation is worth $10. The BCA assumed that a "typical" day of bicycling included one hour of activity. Applying this value to the new daily recreational riders yielded a total benefit of $8.5M (undiscounted) over the evaluation period. Nine months of the year was assumed to be appropriate for recreational bicycling.

Reduced Auto Congestion Benefits

As the new bicycle facilities encourage a mode shift to bicycle commuting from automobile commuting, it was assumed that the region would see benefits related to reduced congestion. These benefits include lower travel times through improved traffic flow, reduced emissions, and operational savings for bicyclists. The NCHRP estimated that the benefit derived per commuter is

[5] Benefit Cost Analysis Guidance for Discretionary Grant Programs, dated January 2020

$0.13 per mile for city centers and $0.08 for suburban areas. Given the project location, land use, congestion and air pollution level, an average of these two values, 10.5 cents, was used. Also, NCHRP suggests to use the average trip length, which was estimated to be 1.5 miles from the Billings Bikeway & Trails Master Plan. However, the NCHRP methodology is based on this unstated assumption that the facility under study is longer than the average trip length because otherwise more and more benefit can be calculated for a given bike facility only by dividing it into shorter segments. Hence, the lesser value between average trip length (1.5 miles) and project length (14.6 miles) was used for the calculation of reduced auto benefit. The project generated roughly $147k (undiscounted) in benefits over the study period. This is a conservative estimate.

Pedestrian Benefits

According to the *NCHRP Report 552* guidelines, pedestrians' benefits from new walking facilities can be categorized under health and recreation and can be quantified and monetized in a way like bicycle facilities. To be conservative in the benefit quantification, no new walkers (and consequently no pedestrian benefits) were assumed in the BCA.

Factors Not Quantified

Several factors are not quantified as part of this methodology because review of initial data indicates low potential to yield substantial cost or benefit. These factors include the following:

- Operations costs due to being part of a currently functioning trail network and roadway facility.
- Trips lying outside the specified subarea may accrue benefits that were not accounted for.
- No safety benefit is assumed for the suggested facilities mainly because there is no consensus in the literature that bicycle facilities can necessarily decrease the total number of bicycle crashes and in some cases off-street facilities have been found to be riskier than bike lanes[6].
- Child cyclists: the official documentation in NCHRP Report 552 (2006) does not cover this category of facility beneficiaries.

[6] NCHRP Report 552: Guidelines for Analysis and Investments in Bicycle Facilities (2006), p 34.
Jensen, S.U., "Bicycle Tracks and Lanes: a Before-After Study", Transportation Research Board 87th Annual Meeting. Washington, D.C., 2008.
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Intersections: Informational Guide, Report No. FHWA-HRT-04-091, USDOT, FHWA, August 2004.
Federal Highway Administration (FHWA), "Separated Bike Lane Planning and Design Guide: Appendix", US Department of Transportation, FHWA, May 2015. p A-5
http://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-8-47, Table 3

BCA RESULTS

The benefit-cost analysis provides an indication of the economic desirability of a scenario, but results must be weighed by decision-makers along with the assessment of other effects and impacts. Projects are considered cost-effective if the benefit-cost ratio is greater than 1.0. The larger the ratio number, the greater the benefits per unit cost. Results of the benefit-cost analysis are included in Table 1 below. See the complete benefit-cost analysis workbook for details.

Table 1 - Results

	Initial Capital Cost (2018 Dollars)	Benefits (2018 Dollars)	Benefit-Cost Ratio (7% Discount Rate)	Net Present Value (7% Discount Rate)
No Build vs. Build	$18.5 million	$58.4 million	3.15	$39.9 million

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The following attachment is not included in this view since it is not a read-only PDF file.

The agency will receive all application forms and attachments without any data loss.

AttachmentForm_1_2-ATT3-1236-Copy of Billings BCA Workbook.xlsx

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The agency will receive all application forms and attachments without any data loss.

AttachmentForm_1_2-ATT4-1237-Copy of 2020buildinfoform.xlsx

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AttachmentForm_1_2-ATT5-1238-Project_Location.jpg

OMB Number: 4040-0008
Expiration Date: 02/28/2022

BUDGET INFORMATION - Construction Programs

NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.

COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Columns a-b)
1. Administrative and legal expenses	$	$	$
2. Land, structures, rights-of-way, appraisals, etc.	$	$	$
3. Relocation expenses and payments	$	$	$
4. Architectural and engineering fees	$	$	$
5. Other architectural and engineering fees	$	$	$
6. Project inspection fees	$	$	$
7. Site work	$	$	$
8. Demolition and removal	$	$	$
9. Construction	$ 23,864,769.00	$	$ 23,864,769.00
10. Equipment	$	$	$
11. Miscellaneous	$	$	$
12. SUBTOTAL *(sum of lines 1-11)*	$ 23,864,769.00	$	$ 23,864,769.00
13. Contingencies	$	$	$
14. SUBTOTAL	$ 23,864,769.00	$	$ 23,864,769.00
15. Project (program) income	$	$	$
16. TOTAL PROJECT COSTS *(subtract #15 from #14)*	$ 23,864,769.00	$	$ 23,864,769.00

FEDERAL FUNDING

17. Federal assistance requested, calculate as follows: (Consult Federal agency for Federal percentage share.) Enter the resulting Federal share.	Enter eligible costs from line 16c Multiply X 71 %	$ 16,943,985.99