HELENA TO GREAT FALLS RAILROAD REACTIVATION FEASIBILITY STUDY

Author :
Hai-Han Sun

2) Helena to Great Falls Railroad Reactivation Feasibility Study

Details

The Helena to Great Falls railroad has been embargoed due to various structural and logistical issues. This project aims to assess the current state of the railroad and determine the feasibility of its repair and reactivation. The primary objectives include identifying existing issues with the track, locating wash-outs, and evaluating the necessity for remediation. Additionally, the project will assess the number of tunnels requiring upgrades and estimate the costs involved in reactivating the railroad. Finally, the project will explore potential financial partnerships that could support the reactivation efforts. By applying classroom knowledge in civil engineering and project management, learners will gain practical experience in infrastructure assessment and strategic planning.

Montana official asks BNSF to reopen Great Falls-Helena line | Trains Magazine

Road closures continue along I-15 between Great Falls and Helena

Deliverables

The project will deliver a comprehensive report detailing the findings of the track assessment, including identified issues, wash-out locations, and necessary remediation actions. Additionally, the report will include an analysis of tunnel upgrade requirements and a cost estimation for the reactivation process. Finally, the project will propose potential financial partnership models to support the reactivation efforts.

1 ABSTRACT

The Helena to Great Falls railroad has encountered significant structural and logistical challenges. This project focuses on evaluating the railroad's current condition and determining the feasibility of its repair and reactivation. First, we will identify existing track issues, locate washouts, and assess the remediation required. Second, we will evaluate the tunnels needing upgrades and estimate the costs of reactivating the line. Lastly, we aim to explore potential financial partnerships to support the reactivation efforts.

2 BACKGROUND

In 1,886, on January 25, James Jerome Hill, president of the St. Paul, Minneapolis & Manitoba Railway (StPM&M), established the Montana Central Railway. There are several reasons why they decided to build a north-south railroad through central Montana to connect Great Falls with Helena and Butte. First, Butte was a booming mining town that needed to get its metals to market. Second, gold and silver had been discovered near Helena, and coal companies in Canada were eager to get their fuel to Montana's smelters. Third, Hill and his friend, Paris Gibson, founded the town of Great Falls on the Great Falls of the Missouri River in 1883 and promoted it as a site for developing cheap hydroelectricity and heavy industry. They provided low power, sewage, and water rates to attract commerce and industry to the city. [i]

On September 18, 1889, James J. Hill renamed the Minneapolis and St. Cloud Railway to the Great Northern Railway. On February 1, 1890, he transferred ownership of the St. Paul, Minneapolis & Manitoba (StPM&M), Montana Central, and other rail systems he owned to the Great Northern Railway. Over time, most of these systems were integrated into the Great Northern. By 1907, the Montana Central was officially dissolved and fully incorporated into the Great Northern Railway. On October 31, 1987, Dennis Washington started a lease of Southern Montana main line, Montana Rail Link (MRL). However, they have confliction in Burlington Northern and the United Transportation Union because they were using track belonging to BNSF.

From Railroads Link Montana to the Nation (1881-1915) [ii], the railroads revolutionized transportation, economy, and society between 1,881 and 1,815. Trains decreased travel time and increased safety for people traveling to Montana. Also, mining, ranching, and agriculture connected Montana to the national and international markets to grow the economy. Gold, silver, and copper production thrived due to railroad construction. Large-scale cattle and sheep ranching can access distant markets, and the coal industry expanded to fuel locomotives, further boosting industrialization.

From the perspective of social and cultural changes, trains brought consumer goods, mail-order houses, and fresh food, improving daily life and helping establish towns such as Billings, Livingston, and Havre. These towns became economic hubs to support local businesses and labor unions. Immigrants from China, Japan, and Europe had job opportunities to construct the railroad.

In communication and tourism with railroad construction, telegraph lines along railroads improved communication, leading to the establishment of Yellowstone National Park (1872) and Glacier National Park (1910), connecting rail networks to reach communities for entertainment, traveling circuses, and political campaigns.

However, there were some conflicts and controversies between farmers and workers. Farmers protested high transportation costs, while industrialists benefited from favorable rates. Railroad corporations held substantial power over Montana's economy through land grants and political influence, and train robberies and worker exploitation were common issues.

Consequently, railroads played a crucial role in Montana's transportation system. Even though they brought prosperity, growth, and modernization, they also contributed to the loss of Native American lands and shifts in social dynamics in 1915.

From the Montana Branch Line Study Phase II Other At-Risk Lines [iii], even though the Great Falls and Helena railroad is no traffic at this time, there's a chance that it will reopen and operate by a short line operator. The railroad moved between 1 and 5 million gross ton miles (GTM) or 3 to 5 trains per day through 1997. Between 1997 and 2000, the BNSF realized an increase in the north/south in general and began routing almost twice as much traffic via Laurel instead of Helena, they closed the railway to Helena by 2003, and MRL began to get five-day a week service from Laurel to Great Falls. If the line were opened, the MRL stated it would probably use the branch as a route through to Canada. The MRL, however, is satisfied with current operations.

On January 1, 2024, MRL was absorbed into BNSF, including MRL operations, technology and personnel. [iv]

Figure 1 showed the current status of the railway between Helena and Great Falls. We will discuss the following topics in the draft.

- Current state of the railroad and dilemmas of reactivation plan
- Primary transportation methods between Helena and Great Falls before rail reactivation
- Determine the feasibility of railroad's repair and reactivation
- Exist issues with the track, locate wash-outs, and evaluate the necessity of remediation
- Figure out the number of tunnels requiring upgrades and estimate the costs involved in reactivating the railroad
- Explore potential financial partnerships that could support the reactivation efforts

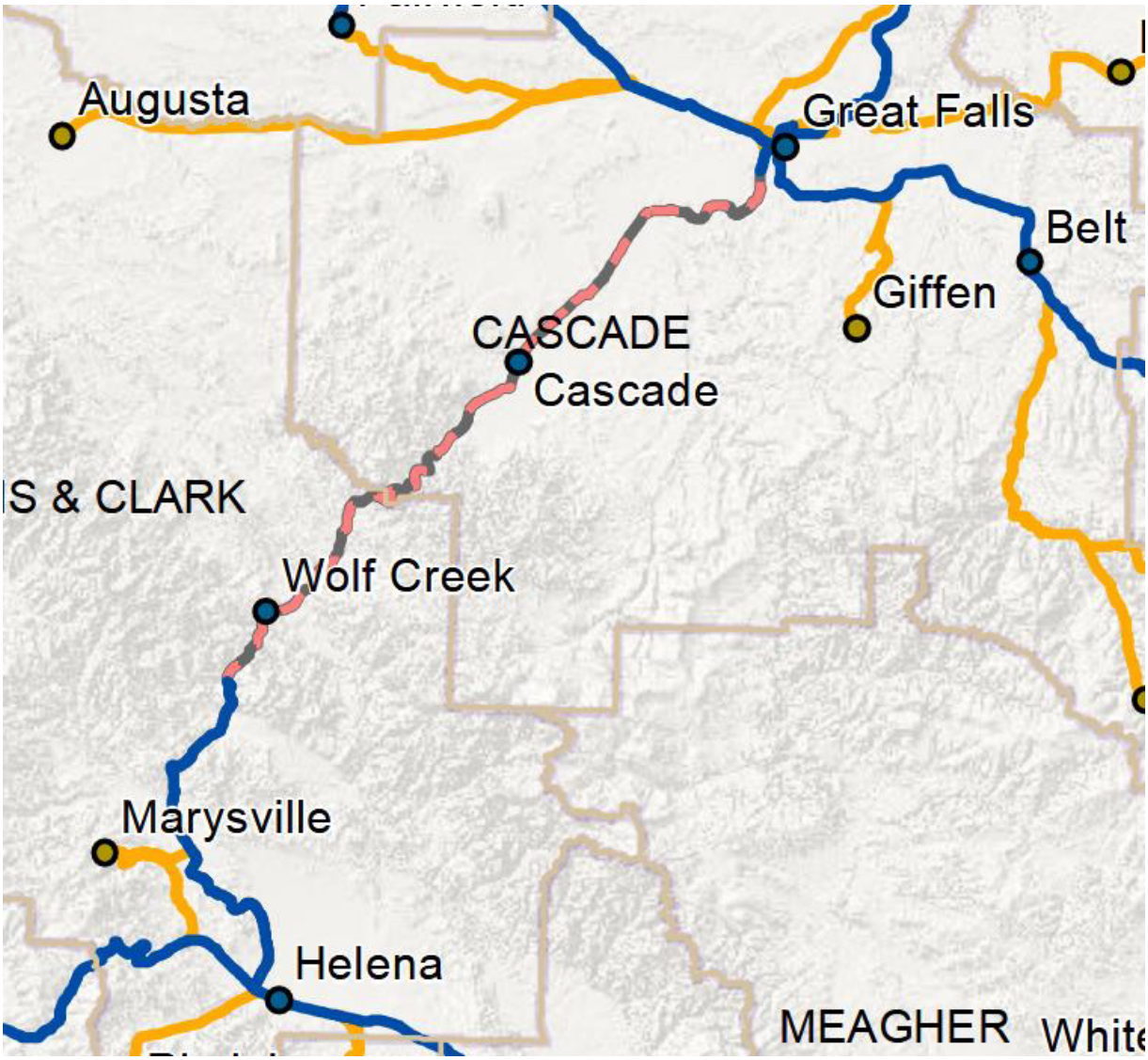

Figure 1: Helena to Great Falls rail from Railroads of Montana

3 INTRODUCTION

3.1 CURRENT STATE OF THE RAIL AND DILEMMAS OF REACTIVATION PLAN

3.1.1 Montana Official Asks BNSF To Reopen Great Falls-Helena Line

The railroad connecting Helena to Great Falls is vital for boosting Montana's economic activity. According to *Trains* website, Montana Agriculture Department Director Ron de Yong urged BNSF Railway officials to reopen the Great Falls-to-Helena line to address ongoing traffic and shipping delays. He noted that the oil, coal, and intermodal shipments surge has significantly hindered the railroad's ability to transport essential agricultural products like corn, soybeans, and wheat.

As farmers increasingly planted alternative crops on fallow wheat fields, demand for shipments rose. Although BNSF has attempted to alleviate the situation by adding more rail cars and double-tracking 60 miles of track between Minot, North Dakota, and Glasgow, Montana, the continuous oil production and transport growth has kept the problem persistent.

De Yong presented several compelling reasons to reopen the Great Falls-to-Helena route, emphasizing its potential to reduce congestion on the northern rail line:

- BNSF cannot double-track its scenic southern border route near Glacier National Park without blasting part of a mountainside due to physical and political constraints
- If a significant snow slide derails oil cars into the Middle Fork of the Flathead River, reopening the Helena-to-Great Falls route would provide a critical alternative. This rerouted path could move shipments from Shelby through Helena and westward via the Montana Rail Link (MRL) to Spokane
- The Golden Triangle area, north of Great Falls, is diversifying its agricultural output. The reopened route could facilitate the southbound shipment of its products, such as Montana's high-quality malting barley and pulse crops like peas and lentils, which are in demand by Colorado brewers and other markets

Reopening this rail line could be a strategic solution to Montana's shipping challenges, enhancing regional commerce and agricultural efficiency.

BNSF's regional public affairs director, Matt Jones, stated that the railroad does not plan to reestablish service between Helena and Great Falls. After thorough evaluation, the company determined that expanding capacity to accommodate increased train traffic on this route would not yield sufficient economic or operational benefits. The Great Falls to Helena line have been out of service since 2000, and restoring it would require significant investment to upgrade or replace infrastructure, including tracks, sidings, bridges, signals, and telecommunication systems. Additionally, surplus cars would need to be transferred along parts of the route. BNSF has instead maintained connections with Montana Rail Link (MRL) through alternative routes, including the Great Falls to Laurel line and the line through Sandpoint, Idaho.

3.1.2 Contract Confliction Between BNSF & NTEC For Coal's Requirements

From a news in NonStopLOCAL on June 27, 2023 [v], BNSF Railway had a contract confliction with the Navajo Transitional Energy Co. (NTEC). A federal board ordered the BNSF to transport at least 4.2 million tons of coal to NTEC for overseas use. The U.S. Surface Transportation Board said BNSF has an ability to fulfill the contract demand for shippers. NTEC has lost revenue with $165 million for the shortage of the coal destining for Japan and Korea. The board requested BNSF must move 23 trains of coal per month for NTEC, and another 6 trains per month when additional trains and crew are available. However, BNSF struggled to deliver products on time because the COVID-19 caused worker shortages to them. In the lawsuit between BNSF and coal company, they didn't meet a consensus on the coal's requirements, instead of 5.5 million tons of coal, BNSF only committed to deliver 3.1 million tons of coal. As a result, BNSF considered the costs associated with reopening the Great Falls to Helena line are not competitive compared to other investments to enhance capacity along the northern corridor.

3.1.3 Rail expansion at Calumet refinery threatens access to Great Falls wastewater treatment plant

From a news posted on Jan 22, 2025 [vi], BNSF and Calumet planned to expand rail service at the Calumet refinery in Great Falls from one to three tracks. The expansion required closing a small rail crossing at Fourth Street Northeast. However, this method would influence the city's wastewater treatment plant, located north of Calumet and south of the Missouri River. If they tried to reroute access to the wastewater treatment plant, it would cost millions to the city. The government tried to figure out how they got funded for the plan.

Although the expansion will affect the wastewater treatment plant, expanding the rail line would bring value to Calumet with more capacity in its rail service and more efficient railcar switching for years. Calumet could compete with the West Bank Urban Renewal District, having become a victorious upriver commercial and public park development area.

The primary concern for the city is access to the treatment plant. Construction could block a significant stormwater outlet and the area located in a floodplain. If they built an access road from the west through the park, the access would be blocked by the bathroom building. Also, increasing the rail traffic in this area.

BNSF and Calumet planned to complete the rail expansion within 1 to 2 years. However, the city is figuring out solutions to its access problems. The estimated cost will be 2 million dollars to build a controlled gate at the Fourth Street crossing and 5 million dollars to construct a new road through West Bank Park. Combining both options would increase costs.

Calumet and its subsidiary, Montana Renewables, are the largest taxpayers in the city. However, they protested for taxes since 2017, preventing millions of dollars from being distributed to Great Falls and other public entities. Besides, they have privileged tax breaks from both the city and Cascade County and a $1.4 billion loan from the federal government to support an expansion of Montana Renewables. Although they had conflicts with many benefits from the city, they stimulated the economy in Montana with an oil refinery and biofuel production. The rail expansion had been decided before Montana Renewables came online.

Once the railroad is finished, the additional rail will reduce congestion in the refinery's railyard and reduce the number of daily switches needed to handle inbound and outbound traffic. The expansion at West Bank Park, where the playground sits, will reduce to one line before it becomes more expansive, and the expansion out of the Calumet refinery would expand from one to three rail lines.

West Bank Park belongs to the West Bank Urban Renewal Tax Increment Financing District, which includes commercial developments. The district's market values steadily increased, and the tax increment captured in the fund even doubled its debt service obligations. However, the fund is insufficient to cover all potential construction costs through West Bank Park.

Even though Commissioner Susan Wolff made a forward-looking plan, she did not further explain the future development of the refinery, the riverside park, the growing commercial corridor, or a combination of them.

3.1.4 Greater Helena Area Long Range Transportation Plan (LRTP) – 2014 Update

From the 2014 LRTP goals in Helena [vii], they planned several goals to maintain and improve the transportation system, estimate the safe and secure issues to the transportation system, support economic and environmental benefits to the community, and promote a financially sustainable transportation plan to further the transportation decision-making process.

The LRTP planned improvements such as rail infrastructure, focusing on railroad crossings and safety measures. Several railroad-related projects were identified, but most remain incomplete. Some important projects include:

- Benton Avenue Railroad Grade Separation
- Montana Avenue Railroad Grade Separation
- Henderson Street Railroad Crossing

The MDT compared the benefits and drawbacks of the railroad construction plan, such as the overpass and underpass options for Benton Avenue, and decided which option would be suitable for this crossing. Further information can be found in 3.1.6.

According to the record, trucks moved freight on Interstate 15 between Helena and Great Falls in 2012. The Great Falls-Helena rail line was out of service due to damage along the route. Further freight move and change plans on Interstate 15 can be found in 3.2.3.

Rail service in 2012 occupied seven percent of all freight in terms of dollars of freight. Figure 2 shows that of freight moved by rail in 2012, trucks (55%) and pipelines (29%) carried most of the goods. Rail only covered seven percent of total freight values in Montana. Figure 3 will show locations, types, active or passive, AADT in 2013, and notes of railroad crossings. The at-grade rail on Alfalfa Rd, Hill Dr, and Silver Creek must be repaired before the GF-Helena rail line is reactivated.

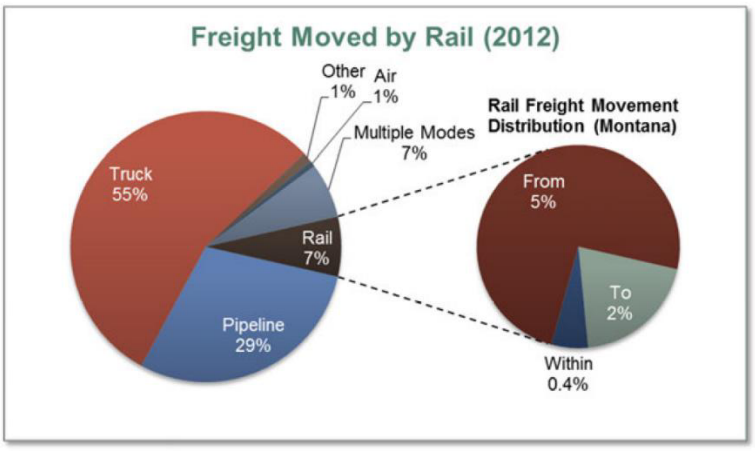

Figure 2: Freight Moved by Rail (2012)

ID #	Location	Type	Active/Passive	2013 Roadway AADT	Notes
MRL Line from Laurel, MT to Sandpoint, ID					
1	S. Mitchell Gulch Rd	At-grade	Passive	Not available	
2	McClellan Creek Rd	At-grade	Passive	Not available	
3	MT 518	At-grade	Active	2,140	
4	S. Montana Ave	At-grade	Active	Not available	
5	HWY 282	At-grade	Active	Not available	Multiple crossings
6	HWY 282	At-grade	Passive	Not available	Montana City spur
7	US 12	Grade-separated	N/A	20,730	Overpass
8	Carter Dr	At-grade	Active	4,500	
9	Carter Dr	At-grade	Passive	4,500	Spur Line
10	I-15	Grade-separated	N/A	23,720	Overpass
11	N. Roberts St	At-grade	Active	2,840	Multiple crossings
12	N. Montana Ave	At-grade	Active	13,900	Multiple crossings
13	National Ave	At-grade	Active	Not available	Multiple crossings
14	Last Chance Gulch	Grade-separated	N/A	17,920	Overpass
15	Benton Ave	At-grade	Active	9,840	
16	Henderson St	Grade-separated	N/A	7,600	Underpass
17	Joslyn St	At-grade	Active	2,790	
18	Head Ln	At-grade	Active	310	
19	Birdseye Rd	At-grade	Passive	2,310	Spur
20	Birdseye Rd	At-grade	Active	1,510	
BNSF Line to Great Falls (inactive)					
21	Alfalfa Rd	At-grade	Passive	Not available	
22	Franklin Mine Rd	At-grade	Passive	690	
23	Hill Dr	At-grade	Passive	Not available	
24	Norris Rd	At-grade	Passive	420	
25	John G Mine Rd	At-grade	Passive	280	
26	Silver Creek	At-grade	Passive	Not available	
27	Lincoln Rd	At-grade	Active (no gate)	2,020	
28	Chevallier Dr	At-grade	Passive	50	

Figure 3: Railroad Crossings

However, the data provided by the Freight Analysis Framework estimates that the rail will only have six percent of the freight by value in Montana, less than the percentage of the freight in 2012. Since the rail traffic volume and frequency in Helena will impact the road traffic, the city will consider their economic factors and plans for infrastructure improvements, focusing on the road traffic and highway infrastructure. Figure 4 shows their estimation of freight moved

by rail in 2,040.

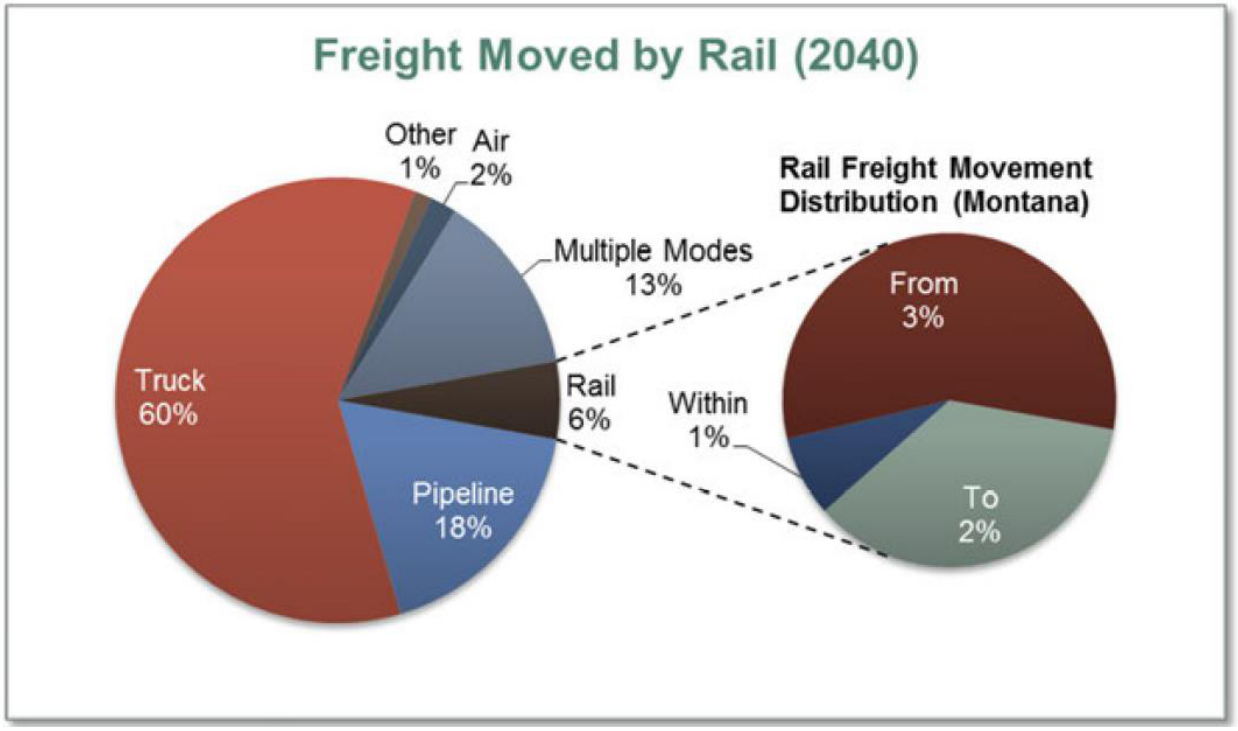

Figure 4: Freight Moved by Rail (2040)

3.1.5 Great Falls Area Long Range Transportation Plan (LRTP) – 2018 Update

From the Great Falls Area LRTP [viii], the government aimed to facilitate the development of LRTP and complete the community's vision for the future transportation system with the Montana Department of Transportation (MDT). Five principles follow goals and objectives:

- Create an intelligent transportation system through land use and transportation planning to facilitate travel desire and make travel more convenient for travelers and citizens.
- Enhance economic vitality through transportation improvement to bring more opportunities to regional industries and establish a freight hub for local, regional, and national industries.
- Minimize transportation costs and increase mobility for the community.
- Consider sustainability and impacts on natural and cultural resources during transportation planning.
- Increase safety for the transportation system to reduce crashes, injuries, and fatalities.

3.1.5.1 Goals and Objectives in the transportation system

After considering these principles, they planned seven goals and objectives for the transportation system.

The first goal is to maintain the existing transportation system. The transportation system must consider whether available funding is sufficient for the necessary roadway maintenance. The government considered the following objectives:

- Roadway systems: optimize the usefulness, minimize life-cycle costs, monitor the performance of crucial facilities, and collaborate with local and regional partners to check critical deficiencies
- Transportation system: Follow transportation project selection criteria to identify and prioritize maintenance activities; Infrastructure improvements, maintenance, and system preservation activities to relieve pressures on the existing transportation system instead of expanding the current system; Reuse or redevelop the existing transportation facilities

The second goal is to improve a balanced transportation system's efficiency, performance, and connectivity. This goal aims to increase the efficiency system to take less time in travel and improve congested traffic. When making route decisions, the connectivity is based on traffic, road conditions, and citizens' perspectives. The government considered the following objectives:

- Roadway network: Increase safety and efficiency in minor and principal arterials and the interstate; Develop improvements in intersection and roadway capacity; Identify and reduce freight train impacts on roadways and further eliminate deficiencies to the freight train
- Increase connections by increasing pedestrian, bicycle, and transit connections.
- Facilitate travel options for physically challenged populations in the Great Falls area.
- Reduce traffic in residential areas.

The third goal is to promote consistency between land use and transportation plans to enhance mobility and accessibility. The goal was to decrease vehicle miles of travel, build alternative travel options, prepare for decreasing the number of persons per household in the future, and integrate transportation plans with local land. The government considered the following objectives:

- Develop the transportation system with land use planning, which follows consistent access management and corridor preservation standards.
- Prepare a new development plan to satisfy development patterns in the community.
- Minimize environmental impacts while applying the transportation plans.

The fourth goal is to provide a safe and secure transportation system. Methods to reduce crashes, improve emergency responders, provide evacuation routes, and develop educational programs that help travelers understand safety concerns in various travel modes. The government considered the following objectives:

- Make efforts to reduce the rates of fatalities and crashes in all transportation facilities
- Make effective emergency responses by identifying barriers
- Develop educational programs for all modes of transportation
- Ensure the security of the freight transportation system with operators and agencies

The fifth goal is to support the economic vitality of the community. Link economic vitality contributes to the economic success of a community. The government considered the following objectives:

- Optimize the transportation system to satisfy the needs of the Great Falls Area
- Attract and retain businesses, young professionals, families, and older adults through transportation improvement
- Facilitate transportation methods for goods and freight trains to commercial and industrial centers

The sixth goal is to protect and enhance environmental sustainability, provide opportunities for active lifestyles, and conserve natural and cultural resources. Follow the FAST Act planning factors from HUD, EPA, and USDOT point to consider the quality of life concerns in LRTP. The goal should also be to preserve natural, historical, and cultural resources. The government considered the following objectives:

- Encourage sustainability plans to reduce fuel consumption, vehicle miles of travel, and air pollution
- Consider transportation plans with land use management, natural resources, environmental protection, conservation, and historic preservation.
- Collaborate with stakeholders and the public while making plans.
- Combine transportation planning activities with local and regional land use planning activities.

The last one is to maximize the cost-effectiveness of transportation. Reduce the time spent traveling and fuel consumption, and optimize the usage of public funds for infrastructure improvements. The government considered the following objectives:

- Identify available funding mechanisms used in similar cities
- Develop cooperation with public, private, and non-profit organizations
- Balance the cost of transportation, available funding, and expected expenditures

3.1.5.2 Transportation improvement and analysis method in Great Falls

Road systems in metropolitan used level of service (LOS) to measure the amount of vehicle delay at intersections. The scale of the LOS presented the amount of traffic and full range of operating conditions. Although 50 intersections have been included in the LOS analysis, new data only received in three locations from the I-15 Gore Hill to Emerson Junction Corridor Study article. (See 3.1.6)

Heavy industry plays a significant role in the Great Falls Area. Oil and gas extraction materials and equipment that are used in aerospace and wind energy companies. The Great Falls created a “Goods Movement Network” plan to improve transportation systems, including truck, rail, and air transportation movement networks. In addition, Interstate 15 (I-15) and Great Falls International Airport facilitate trade between Great Falls and northern Montana and the South of Great Falls to Mexico corridor, strengthening its position in the global economy.

The “Good Movement Network” connects commercial districts, residential neighborhoods, and parks to increase the region’s economy and population growth and combine goods movement with the transportation system and local land uses.

Truck routes in the Great Falls Area mainly travel on I-15 to access markets outside the region. Rail lines in Great Falls are integrated into the nation's freight rail system, extending from south to northwest. Great Falls is located on the 100-mile BNSF main line that links Shelby and Great Falls. A spur line that crosses the Missouri River and circles north and west to the Malting Plant supports industrial facilities accessing significant goods movement. Airlines also played an important role in the cargo industry. The Great Falls International Airport occupies 2,100 acres and has a 531,000-square-foot cargo apron area and 72,000 square feet of cargo warehouse space to distribute cargo from FedEx in the warehouse space.

Road systems in metropolitan areas use level of service (LOS) to measure the amount of vehicle delay at intersections. The scale of the LOS presented the amount of traffic and a full range of operating conditions. Although 50 intersections have been included in the LOS analysis, new data was only received from the I-15 Gore Hill to Emerson Junction Corridor Study article in three locations. (See 3.1.6)

3.1.6 Additional Reasons for Reactivating the Great Falls-Helena Railroad

The railroad from Helena to Great Falls will pass through several towns, including Sieben, Wolf Creek, Craig, Mid Canon, Hardy, Cascade, Riverdale, Ulm, and arrive in Great Falls. From the I-15 Gore Hill to Emerson Junction Corridor Planning Study [ix], MDT has solved some of problems on the transportation system, but some problems on transportation system and environmental considerations caused the railroad reactivation plan would be arduous to resume service, including severe weather problems on Highway I-15 and I-315.

- The Interstate crosses the railroad at two points within the study area
- Prime farmland, if irrigated, and farmlands of statewide significance are present in the study area
- I-15 spans the Sun River
- The Missouri River/Warden Bridge is recognized as a historic property

3.1.7 Montana Rail Grade Separation Study

The Montana Department of Transportation (MDT) conducted the 2016 Montana Rail Grade Separation Study to evaluate at-grade and grade-separated railroad crossings [x]. The study aimed to assist transportation decision-makers in allocating funding for highway-rail grade crossings by developing a benefit-cost analysis (BCA) for various improvement options.

The primary objectives included:

- Assessing high-volume at-grade and grade-separated crossings based on train and vehicular traffic.
- Identifying potential improvement strategies.
- Conducting BCAs to determine the feasibility of these improvements.

The proposed crossing enhancements aim to improve safety, freight and passenger mobility, and overall traffic operations.

3.1.7.1 At-Grade Crossings Evaluation

To assess at-grade crossings, the study considered Average Annual Daily Traffic (AADT) and Average Daily Train Traffic (ADTT) to identify locations with the highest combined traffic volumes. The total crossing value (R) was calculated using the following formula:

$$R = AADT * AATT$$

Crossings were ranked in descending order based on R values, with higher values indicating greater traffic volume.

After the calculation of for at-grade crossing in Montana, the article selected five highway-rail crossings in Helena. Each crossing will be evaluated by three weighted screening criteria: MDT Priority Index (60%), Roadway Functional Classification (30%), Average Train Speed (10%). Details can be found in 3.1.1.1 (MDT, 2016). Based on the result of composite score, the highest score to the lowest was Montana Avenue (82), Benton Avenue (67), Carter Drive (42), Roberts Street (38), and Joslyn Street (37). After an evaluation of at-grade crossings, the article proposed the final at-grade crossings allowing to determine feasible grade separate in Helena. In Helena, Benton Avenue, Carter Drive, and Montana Avenue were considered to propose grade separation solution. Table 1 showed the feasible grade separation solution for each location in Helena.

City	Location	Feasible Grade Separation Solution
Helena	Benton Avenue	Overpass and Underpass
Helena	Carter Drive	Underpass
Helena	Montana Avenue	Underpass

Table 1: Feasible Grade Separation Solution for at-grade crossings in Helena

3.1.7.2 Grade-Separated Crossings Evaluation

The study used AADT and Minimum Vertical Clearance for grade-separated crossings to determine a composite score (R). These criteria were used as follows:

$$R = C1 + C2$$

Where;

C1 = rank score from Criterion 1, AADT

C2 = rank score from Criterion 2, Minimum Vertical Clearance

AADT Ranking: Crossings with higher AADT received lower rank scores, prioritizing heavily used crossings.

Minimum Vertical Clearance Ranking: Crossings were ranked in ascending order, with lower clearances receiving higher priority. Vertical clearance data was sourced from the MDT Bridge Management System (July 2,015).

After ranking AADT and Minimum Vertical Clearance separately, a composite score was determined and listed in ascending order to prioritize grade-separated crossings in Great Falls and Helena.

After the calculation of for at-grade crossing in Montana, the article selected five highway-rail crossings in Helena and Great Falls. In Helena, the highway-rail crossing at Henderson Street required to be improved. In Great Falls, River Drive S, 6th Street N, and 1st Avenue N were required to be reconstructed.

The crossings in Helena and Great Falls followed six weighted screening criteria: AADT (20%), Vertical Clearance (20%), Horizontal Clearance (20%), Functional Classification (20%), Substructure Rating (10%), and Percent Commercial Traffic (10%). Details can be found in 3.1.2.1 (MDT, 2016).

3.1.7.3 Railroad-Highway Crossings in Benton Avenue, Helena

In Benton Avenue, Helena, daily vehicle volumes were over 8,800 AADT in 2014. In 2034, the volumes are expected to be over 11,200. Thirty-five trains traveled through this crossing daily, which required improved traffic, roadway conditions, and safety hazards. The MDT considered underpass and overpass option shifts to resolve the traffic blocked by the train. Table 2 shows underpass and overpass options for solving traffic congestion by trains.

	Underpass	Overpass
Cons	A sloped access road is needed to reach the Batch Fields northeast of the crossing Require a double track shoofly	Increase the effects on the residential neighborhood situated northwest of the intersection Require relocation of approximately five residences
Pros	Minimal effects on the residential neighborhood situated northwest of the intersection	Minimize any direct effects on the Benton Avenue Cemetery

Table 2: Comparison of traffic solution in Benton Avenue

3.1.7.4 Railroad-Highway Crossings in Carter Drive, Helena

Daily vehicle volumes in Carter Drive, Helena, were over 4,000 AADT in 2014. In 2034, the volumes are expected to be over 6,100. Thirty-three trains traveled through this crossing daily, with additional switching moves from the east end of the railroad yard. The frequency of trains resulted in traffic delays in urban areas. The MDT proposed an underpass railroad solution at Carter Drive. There are two main reasons why the underpass method is more feasible and practical: 1. The low vertical grade of Carter Drive on the north side of the crossing, and 2. The overpass will increase overall impacts, cutting off business and street access to the north side of the crossing.

The MDT proposed two methods to construct the underpass railroad. The first used temporary track relocations, or shoofly, and constructed the railroad bridge on the existing track alignment. The second method leaves the tracks in place, constructs the bridges south of the existing track alignment, and then relocates the tracks on a new alignment to construct the

bridge. The shoofly construction method will be required to maintain railroad operations at the east entrance to Helena Yard and the Main and East Long Lead tracks. Once the underpass track is completed, the shoofly construction will be removed from the road. The shoofly construction method was used to develop construction costs and BCA. (See 3.4.2.1.2) Another option is to build a new bridge to realign trackage to the south. However, further research was required to decide the potential of extending a few yard tracks depending on how the realigned East Long Lead Track connection with these tracks was maintained in the final configuration.

If the reconstruction plan is decided, complete preparation for traffic impacts during construction will be needed. For example, building a temporary at-grade rail crossing for use on the east, displaying advanced warning signs to inform drivers of possible delays, and informing construction plan and updating status for people living around the construction area.

3.1.7.5 Railroad-Highway Crossings in Montana Avenue, Helena

Montana Avenue crossing in Helena had the highest AADT volumes. In 2014, the AADT was 11,930 vehicles, and the MDT is estimated to reach 14,557 vehicles in 2034. The trains in Montana Avenue had thirty-five trains through the crossing per day. Due to the frequent train crossings and high roadway volumes, the research found a method to reduce congestion and provide practical solutions with key statistics for the crossing.

After analyzing land uses, rights-of-way, and existing crossing features, the MDT proposed an underpass solution with Montana Avenue traversing underneath the railroad, which would be the best solution. After the MDT compared an overpass and underpass solution, the grade line was found to be approximately three feet below the existing railroad grade from the south side of the tracks to the north side of the tracks. As a result, an underpass option would be more practical for the crossing. Table 3 provides a specific comparison of overpass and underpass solutions.

Criteria	Overpass	Underpass
Business Access Impact	High	Lower
Impact on Intersecting Streets	Greater	Less
Visual Impact	High	Lower
Construction Complexity	Higher	Lower
Safety	Moderate	Higher
Railroad Involvement in Funding	No direct railroad funding participation	Possible railroad participation with full underpass option
Connectivity & Traffic Flow	Reduced connectivity	Improved connectivity
Right-of-Way Requirements	Larger footprint required for approach ramps	Smaller footprint compared to an overpass
Overall Feasibility	Less practical due to extensive impacts	More practical due to fewer impacts and better safety benefits

Table 3: Comparison of overpass and underpass options in Montana Avenue, Helena

After the comparison based on several criteria, the underpass solution in Montana Avenue has fewer impacts on businesses, better safety benefits, and potential railroad funding participation for the crossing. On the contrary, since the overpass solution will cause significant disruptions to access, intersecting streets, and the overall streetscape when they eliminate at-grade railroad crossings, the overpass option will demand more effort for the crossing. Further estimate of probable construction cost will be explained in 3.4.2.2.

3.2 PRIMARY TRANSPORTATION METHODS BETWEEN HELENA AND GREAT FALLS BEFORE RAIL REACTIVATION

3.2.1 I-15 Improvement Plans Since 1987

Since the current status of the railroad was out of service and BNSF didn't plan to reopen the railroad of this line, Highway I-15 and aerial transportation became important ways for improving convenience for residents and travelers in Great Falls and Cascade County. From the past, current, and future projects in I-15 Gore Hill to Emerson Junction of corridor planning study, Great Falls have finished several projects to improve transportation system and the Interstate System, such as

- Great Falls Transit Development Plan (2010): Analyzing public transportation services for the Great Falls Transit District 2. Providing secure, reliable, affordable sound transportation system for people of Great Falls and Black Eagle, Montana
- Great Falls Area Long Range Transportation Plan (LRTP) and City of Great Falls Growth Policy Update (2013): 1. Offering guidance of transportation infrastructure investments for the decision-makers 2. Identifying I-15 as the main reginal route 3. Identifying Tenth Avenue South as the largest road facility
- Great Falls International Airport Master Plan (Ongoing): 1. Evaluate the long-term vision for Great Falls International Airport serving by Gore Hill Interchange 2. Changes to the transportation system and land use near airport could change the function of the Interstate System

Additional projects finishing since 1987 will be shown in Figure 1.

Table 1.1: MDT Projects within the Study Area Since 1987

Project Designation	Description
10TH AVE SOUTH - WARDEN BR TO 6TH SOUTHWEST	Concrete repair, median adjustment, and diamond grinding from Warden Bridge to Fox Farm intersection
2002-10TH AVE SOUTH/FOX FARM RD-GREAT FALLS	Roadway and Roadside Safety Improvements
BRIDGE DECKS-GREAT FALLS	Rehabilitation of I-15 bridges at Sun River and the overpass at 5th Avenue Southwest
FOX FARM RD & 10TH AVE SOUTH - GREAT FALLS - CASCADE COUNTY	Safety improvement project to address rear end crashes involving right turning vehicles
GREAT FALLS - CENTRAL AVE WEST BRIDGE APPROACHES – CASCADE COUNTY	Rehabilitation of the eastbound Warden Bridge
GREAT FALLS – FOX FARM RD./10TH AVE. SO CASCADE COUNTY	Concrete resurfacing between 6th Street Southwest / Fox Farm Road and Warden Bridge
GREAT FALLS-NORTH & SOUTH	Interstate rehabilitation
GREAT FALLS-NORTH & SOUTH CASCADE COUNTY	Interstate fence replacement and installation of cattle guards
GREAT FALLS URBAN (I-315)	Overlay of I-315 and ramps at 10th Avenue South and exit 0
I15-BRIDGE REPAIR-GREAT FALLS	Emergency repair of beams damaged by trucks hauling high load
SF 129-GREAT FALLS WRONG WAY-PH 1	New signing to address wrong way traffic on off ramps on I-15
2002 INTERSECTION IMPVT-GF	Safety adjustments to northbound I-15 off ramp at Central Avenue West
D3 SIGNING (I-15)	Guide sign replacement
GREAT FALLS-VAUGHN	Seal and cover from Emerson Junction to the north

Figure 5: MDT projects within the study area since 1987 [1]

The studies mainly focused on improving Highway I-15 and I-315. Since the I-15 is a principal arterial highway on the NHS Interstate System, connecting Montana and Canada as the main north-south corridor, the corridor strengthened the position in the global economy because of facilitating trade. Several problems that the MDT concentrated in:

- Prevent snow from blowing across the 10th Avenue South Interchange
- Implement alert systems, variable message sign (VMS), to alarm the drivers during adverse weather conditions
- Freeze on the bridges to cause operational issues for motorists
- Utilize a viable detour route for the Gore Hill area to reduce incidents near Gore Hill and increase in vehicle delay and queuing

3.2.2 I-15 Roadway Improvement Project [xi]

The I-15 roadway improvement project aims to enhance safety, extend the service life of the highway, and reduce ongoing maintenance needs. Key improvements focus on providing a smoother driving surface, upgrading roadside barriers, and improving signage and pavement markings.

[1] Source: MDT Project List accessible at http://www3.mdt.mt.gov:7,782/mttplc/mttplc.tplk0,007.project_init

3.2.2.1 Planned Upgrades for the Southbound Lanes (Current Work)

- Removal and replacement of two feet of deteriorated roadway material
- Repaving the driving surface for a smoother ride
- Upgrading concrete barrier rails, metal guardrails, and roadway signage
- Installing road delineators on inside curves for better visibility
- Enhancing erosion control measures

3.2.2.2 Future Upgrades for 2024-2025

Improvements will continue on the northbound lanes and surrounding infrastructure, including:

- Removing and replacing two feet of degraded roadway material on northbound I-15
- Resurfacing interstate ramps, crossroads, and pullouts
- Upgrading concrete barrier rails, metal guardrails, and signage
- Installing roadside markers for improved lane guidance
- Replacing right-of-way fencing and cattle guards as needed
- Adding new pavement markings for increased visibility
- Lining and repairing culverts along I-15
- Enhancing erosion control features
- Upgrading storm drains in the Wolf Creek area
- Updating curb ramps on Walsh Street (between Main Street and Recreation Road)

These upgrades will improve roadway durability, enhance safety features, and reduce maintenance needs along the I-15 corridor.

3.2.3 Freight Moved Concerns on Interstate 15 in Helena in the research of Greater Helena Area LRTP – 2014 Update

According to the report, trucks occupied 55 percent of freight moves in Montana in 2,012. Figure 3 shows the freight moved by truck (2012). Table 4 shows the average annual daily

traffic (AADT), the percentage of heavy vehicles at various locations, and the heavy vehicles per day average in 2013.

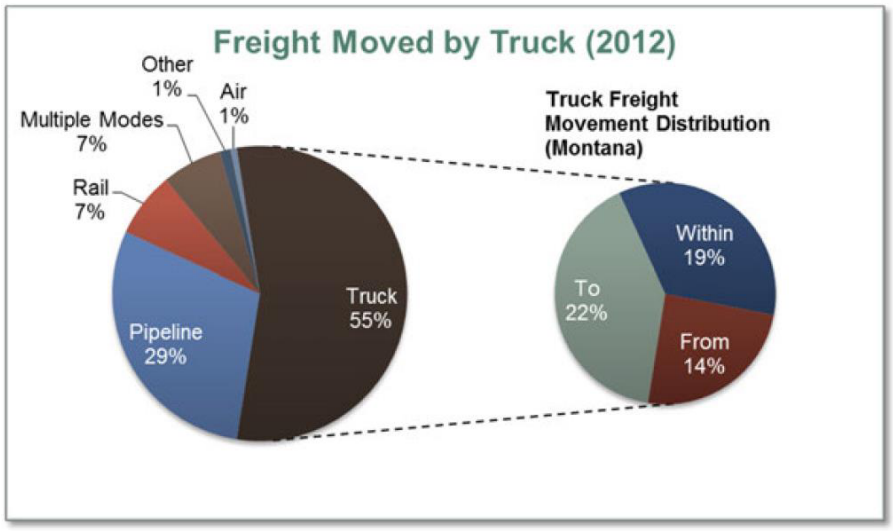

Figure 6: Freight Moved by Truck (2012)

Location	2013 AADT	Percent Heavy Vehicles	2013 Heavy Vehicles (per day average)
US 12 - east of Lake Helena Drive	6,160	5.7	351
US 12 - between Carter Dr and Wylie Dr	20,730	3.6	746
US 12 - between 11th Ave and Carter Dr	23,950	3.1	742
Montana Ave - between Prospect Ave and Lyndale Ave	18,840	2.0	377
Lyndale Ave - between Last Chance Gulch and Benton Ave	20,280	2.9	588
Eulcid Ave - west of Joslyn St	11,560	5.0	578
Custer Ave - east of I-15	18,860	3.2	604
Custer Ave - west of I-15	23,620	2.6	614
Montana Ave - north of Custer Ave	21,960	1.1	242
I-15 - south of South Helena Interchange	9,760	7.0	683
I-15 - south of Prospect Ave	13,270	5.1	677
I-15 - south of Cedar Ave	23,720	3.7	878
I-15 - south of Custer Ave	16,990	5.2	883
I-15 - south of Lincoln Rd	10,730	7.4	794
I-15 - north of Lincoln Rd	4,300	18.4	791

Source: Montana Department of Transportation Data and Statistics Bureau, Traffic Data Collection Section, 2014

Table 4: Percent of Heavy Vehicles

Based on the AADT and heavy vehicles in 2013, Interstate 15 carried almost 900 heavy trucks per day. The freight move number was the highest compared to US 12 within Helena, with 500 heavy vehicles per day, and 750 heavy trucks per day on US 12 outside of Helena. They estimated that the truck freight movement will reach 60 percent in Montana compared to other

types of movement. Figure 5 shows the estimate of freight moved by truck in 2040.

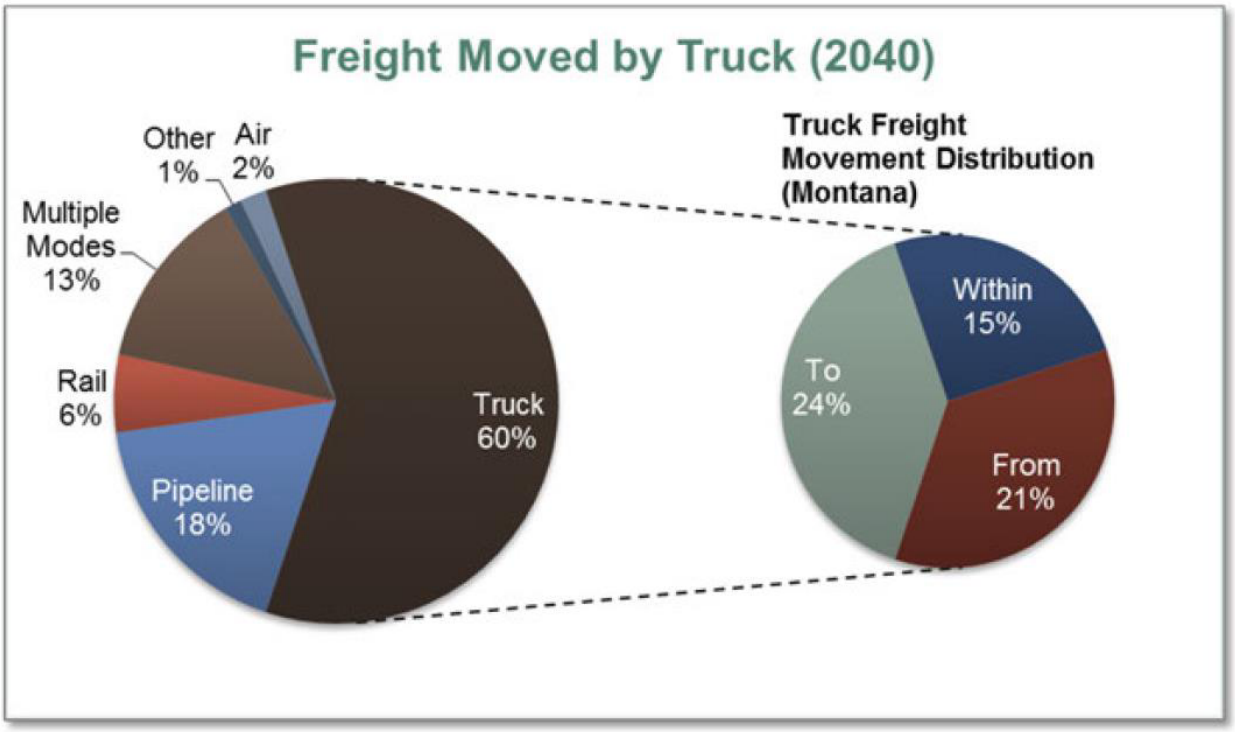

Figure 7: Freight Moved by Truck (2040)

A potential concern for the transportation network is that the location of trucking activity centers should be decided after careful consideration. Large trucks require enough space for them to unload goods and ensure that they do not block traffic and create a safety hazard.

3.2.4 Montana State Freight Plan 2022

The 2022 Montana State Freight Plan provides a comprehensive overview of the state's freight transportation system, understanding the importance of addressing current and emerging trends in Montana. Developed by federal legislation, including 49 USC §70202, the FAST Act, and the Infrastructure Investment and Jobs Act (IIJA), the plan aligns with Montana's long-range transportation policy, TranPlanMT, and supports national multimodal freight goals. The plan was created with input from freight stakeholders, regional partners, and the public and highlights the significance of efficient freight movement via truck, rail, pipeline, and air. In 2020, commercial trucks traveled 3.35 million miles daily, and trucking is forecasted to grow the most by 2050. Montana's freight network also includes 3,500+ miles of rail, 15,500 miles of pipelines, and 126 public-use airports, with air cargo increasing 34% between 2017 and 2020. Key concerns include commercial vehicle safety, inadequate truck parking, aging infrastructure (particularly bridges), and overall system reliability. The plan sets goals for safety, infrastructure preservation, system reliability, environmental stewardship, and network resiliency. It outlines how MDT will track progress through federal performance measures and the National Highway Freight Program (NHFP), particularly along corridors such as I-15 and I-90. Since freight demand is projected to grow 30% by 2050, this plan ensures Montana's infrastructure can support a safe, resilient, and

efficient freight network. The plan uses 2019 as a baseline year to mitigate the effects of COVID-19 on data. It includes infrastructure data (2019–2021), trade data through 2020, commodity data from 2017, and projections to 2050 based on FHWA's Freight Analysis Framework Version 5.

Trade plays a crucial role in exports supporting industry and employment, and imports provide access to essential goods in Montana. Montana's location makes it a gateway for trade with Canada, with its ports of entry handling $15.7 billion in trade in 2020 and averaging $18.4 billion annually in the three years before the COVID-19 pandemic. Imports have consistently made up 60–65% of the trade value during this period. Montana's top export commodities by weight include heavy, low-value goods such as coal, minerals, agricultural products, and cereal grains. In contrast, refined goods like basic chemicals, tobacco products, textiles, and pharmaceuticals lead to export value. Canada is Montana's largest export destination, accounting for 60% of the state's $1.8 billion in exports in 2017, with over 90% of exports by weight destined for Canadian markets. Imports are dominated by energy-related commodities, especially crude petroleum and coal byproducts, along with fertilizers, wood products, and cereal grains. High-value imports also include machinery, vehicles, and electronics. In 2017, nearly all Montana imports—99% by weight and 90% by value—came from Canada, while other goods entered through U.S. ports in Texas, Washington, and New Jersey.

Regarding freight transportation modes, trucks are the dominant carrier by value, moving about $51 billion of goods (61% of total value). At the same time, pipelines and rail dominate by weight, transporting 41% and 14% of total tonnage, respectively. Although air cargo accounts for just 1% by weight and value, it has the highest value per ton and is increasingly important due to growing e-commerce demand. Montana's reliance on pipelines and rail for bulk, low-value goods is higher than the national average, emphasizing the importance of its multimodal freight network.

In 2017, approximately $84 billion worth of goods and 179 million tons of freight were transported into and out of Montana, primarily by truck, rail, and pipeline. Trucking was the dominant mode by value, moving about $51 billion of goods. The "Other" category includes multimodal shipments, often involving trucks as part of the journey. However, rail and pipeline played a much more significant role when measured by weight, reflecting their typical use for transporting low-value, bulk commodities over long distances. Montana significantly exceeds the national average in rail and pipeline freight movement by weight, with rail accounting for 14 percent and pipelines for 41 percent of total tonnage, compared to national averages of just 8 percent and 18 percent, respectively.

Highways and trucking are vital to Montana’s freight transportation system, carrying 61 percent of freight by value and 35 percent by weight. The state’s highway network spans over 73,000 centerline miles, with about 78 percent classified as rural. The National Highway System (NHS) and Primary roads, while making up just 53 percent of the Montana Department of Transportation’s route mileage, handle 83 percent of overall traffic and 91 percent of commercial truck traffic as of 2019. Trucks transport many commodities, including gravel, cereal grains, animal feed, meat/seafood, live animals/fish, and machinery—reflecting Montana’s intense

extraction and agriculture sectors. While gravel leads by weight, higher-value items like live animals/fish and machinery rank among the top by value. The top six commodities moved by truck account for 61 percent of total tonnage but only 40 percent of the total value. Between 2002 and 2020, truck and container traffic entering Montana increased despite a brief dip in 2020 due to the COVID-19 pandemic. That year, approximately 164,000 trucks entered the state, with cross-border truck traffic and loaded containers growing 16 percent and 3 percent, respectively, since 2017. Commercial vehicles traveled about 3.35 million miles daily in 2020—a 2.7 percent increase from 2019—with most traffic occurring on interstate and non-interstate NHS routes. Interstate 90 (I-90), especially between Billings and Butte, saw the highest truck volumes, followed by I-94, I-15, US 212, US 87, and US 93.

Montana's transportation network includes several federally designated freight corridors, beginning with the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), which established high-priority corridors on the National Highway System (NHS). The state has three such congressionally designated corridors: the Canamex Corridor along I-15, the Camino Real Corridor spanning I-90, US 87, and I-15, and the Theodore Roosevelt Expressway following US 2 and Montana State Route 16 from North Dakota to the Canadian border. In June 2016, the US Department of Transportation (USDOT) released the Interim National Multimodal Freight Network (NMFN), which includes highway and rail components for Montana; however, this network remains in interim status. Additionally, the National Highway Freight Network (NHFN) strategically guides federal funding and policy decisions for improving freight movement. Within the NHFN, Montana has segments of I-15 and I-90 designated as part of the Primary Highway Freight System (PHFS), the core network prioritized for federal investment. I-94, while not part of the PHFS, is included in the NHFN as an important connector. Montana currently has no Critical Rural Freight Corridors (CRFCs) or Critical Urban Freight Corridors (CUFCs) designated. These designations are vital, as inclusion in the NHFN and PHFS determines eligibility for funding through the National Highway Freight Program (NHFP), supporting key freight projects across Montana.

Truck parking remains a significant national safety concern in freight transportation. Since a lack of available spaces can lead to driver fatigue or unsafe, unauthorized parking, "Jason's Law" under Title 23 USC §120 was proposed and mandated tracking and analyzing truck parking availability. A 2014 survey found Montana had the highest number of truck parking spaces per 100,000 daily combination vehicle miles traveled (VMT) in the U.S. The state remained in the top five in a 2019 update. MDT continues to work toward improving truck parking and rest area access to enhance safety along major freight corridors. On the rail side, Montana's BNSF Railway, the state's primary Class I railroad, runs east-west along U.S. Highway 2 and north-south from the Sweet Grass Canadian border crossing, connecting Montana to major intermodal hubs like Seattle and Chicago. Montana Rail Link (MRL), a key Class II railroad operating nearly 900 miles of BNSF track, is a critical link along the former Northern Pacific route paralleling I-90 and Highway 200. In 2021, BNSF began initial steps to acquire MRL, though no formal filing had been made with the Surface Transportation Board at the time of the plan. Class I and short-line railroads support Montana's industries and access to broader markets.

Coal is Montana's primary commodity transported by rail, which accounted for over 61 percent of total rail freight by weight and 9 percent by value in 2017. Other energy-related products, including oils, liquefied natural gas, and petroleum coke, are also commonly shipped by rail. Beyond energy, rail is essential for Montana's agriculture sector, with cereal grains such as wheat and barley ranking as the second-largest commodity by weight and the highest by value. Nonmetallic mineral products and natural sand also rank among the top five by weight. By value, other foodstuffs—such as oils, flours, and sugars—are the second-highest group, while wood products, including timber and wood chips, also contribute significantly despite their lower volume. These refined goods have a higher ton value than bulk raw materials. Between 2012 and 2019, Montana saw an 11 percent increase in rail carloads and a 33 percent rise in total rail tonnage. Montana's only international rail crossing is at Sweetgrass, where the BNSF Sweet Grass Subdivision connects to the Canadian Pacific Railroad at the Sweetgrass-Coutts border, enabling access to Canadian markets. At least one train per day enters the U.S. through this port, with annual entries typically ranging between 300 and 500. Since 2014, container traffic through this crossing has surged, reaching levels not seen before the 2008 recession.

At-grade highway-rail crossings pose safety risks and can cause delays for motorists due to potential conflicts between trains and vehicles. Montana has over 1,350 public at-grade crossings, and in 2016, the Montana Rail Grade Separation Study was conducted to evaluate the most active and congested crossings for potential grade separation. The study assessed factors such as vehicular and freight traffic volumes, average train speeds, bridge clearance, and ten crossings that would benefit from the separation. Seven of these are located in high-traffic areas within Billings, Bozeman, Belgrade, and Helena. To improve safety and traffic flow at these critical locations, the MDT is pursuing federal discretionary funding to implement solutions identified in the study.

Montana’s pipeline network spans over 15,500 miles and is critical in transporting crude oil, hydrocarbon gas liquids, natural gas (interstate and intrastate), and other coal and petroleum derivatives. Most of this network comprises natural gas pipelines, accounting for 80 percent of the state’s total pipeline mileage. The interstate natural gas system is a significant conduit from Canada to the Central and Midwestern United States, connecting Montana to broader national markets. In 2019, the U.S. Forest Service approved removing part of the abandoned Yellowstone Pipeline in the Lolo National Forest. This created a visible gap between Missoula and Thompson Falls—an area now reportedly rail-served. Montana’s pipelines are privately owned but regulated jointly by the Montana Public Service Commission and the Pipeline and Hazardous Materials Safety Administration (PHMSA) to ensure safe, reliable, and environmentally sound operations. According to the U.S. Energy Information Administration, Northwestern Energy Co. operates 38 percent of Montana’s intrastate pipelines, while WBI Energy Transmission manages 13 percent of the state’s interstate pipeline system. Most pipeline flows are domestic (59 percent), with over half of that volume staying within Montana; imports make up 41 percent, and exports account for less than one percent. Crude petroleum, which represents one-third of pipeline tonnage, contributes 45 percent of the pipeline’s total value. Other significant products include gasoline and fuel oils—each less than 10 percent by weight but higher in value—while miscellaneous coal and petroleum products account for over half of pipeline tonnage and 30 percent of value.

Additionally, water is transported via pipeline for industrial, energy, and residential uses, though it is not reflected in federal commodity databases.

Montana's aviation network includes 126 public-use airports, comprising 13 commercial service airports and 106 general aviation airports. Billings-Logan International Airport is the state's primary air cargo hub, handling 66 percent of total tonnage in 2019, followed by Great Falls International Airport, which manages 29 percent and is designated as a federal foreign trade zone. Together, these two airports handle 95 percent of Montana's air cargo. Driven by population growth and e-commerce, air cargo in Montana grew by 34 percent between 2017 and 2020. Most air cargo is inbound (66 percent), with outbound accounting for 29 percent, and less than 10 percent of air freight moves within the state. Air transportation is often used to move goods due to high speed and cost. In Montana, most air cargo by weight includes chemical products, machinery, and precision instruments, which are key in supporting the state's industrial operations. Various manufactured goods comprise about 10 percent of the total air freight by weight. By value, precision instruments and machinery each account for 19 percent, while pharmaceuticals—lightweight yet highly valuable—rank third. Other high-value air cargo includes electronics and various manufactured products, serving consumer and industrial markets.

Montana's freight transportation system is supported by Montana's interstates and transload facilities for transferring goods between trucks, rail, and air. Montana heavily relies on truck-to-rail and truck-to-air connections to move goods efficiently. These facilities enhance freight to shift based on the most cost-effective mode from each segment in the journey. Other notable sites include the Lincoln County Port Authority in Libby, Baker Transfer & Storage in Billings, and several airports such as Billings Logan, Great Falls International, Missoula International, and Bozeman Yellowstone, which handle airline and mail cargo. Numerous agriculture-based transload facilities, such as those operated by Columbia Grain, CHS Inc., and United Harvest, are located across the state in towns like Laurel, Carter, Glendive, and Havre, supporting the shipment of bulk commodities via BNSF rail lines. BNSF continues to expand its infrastructure in Montana, having added or upgraded seven facilities since 2019, including projects in Sidney, Plentywood, and Huntley. The company also identifies rail-served industrial sites for future development, with certified locations currently in Libby, Shelby, and Great Falls. These intermodal routes are part of the Strategic Rail Corridor Network and the National Multimodal Freight Network, connecting Montana's facilities to national freight corridors.

Montana plays a strategic role in national defense by including the United States military’s designated freight networks, prioritizing infrastructure critical to defense logistics. Malmstrom Air Force Base (AFB), located just east of Great Falls, is the only active military base in the state and is directly connected to Strategic Highway Network (STRAHNET) via I-15 and US 87, relies heavily on efficient and secure transportation links, particularly its roadway access to Great Falls International Airport—a vital node in the military transportation network and home to the Montana Air National Guard. The base is situated within the Great Falls Metropolitan Planning Organization’s (MPO) Long Range Transportation Plan (LRTP) study area and actively participates in its Technical Advisory Committee alongside the Montana

Department of Transportation (MDT). The LRTP prioritizes transportation system improvements that support the base's freight and logistics needs, ensuring continued operational efficiency and connectivity. Montana is served by an estimated 40 transit operators, which play a vital role in the state's transportation system due to its vast geography, rural landscape, and aging population. While freight movement on transit vehicles is minimal, some intercity transit providers—such as Jefferson Lines, Flathead Transit, Salt Lake Express, and Northern Transit Interlocal—may transport limited freight. However, specific data is not available for inclusion in this plan. Amtrak's Empire Builder, which runs along the Hi-Line, offers express service for shipping time-sensitive goods like fresh flowers, fish, and medical supplies between cities. This service adds a modest but valuable freight function to Montana's broader transit network.

The MDT engaged stakeholders and internal experts to identify key freight system concerns. A significant issue was that the workers became more arduous to find and retain in freight-related industries due to intense competition and the need for competitive wages and benefits. Truck parking shortages, particularly on non-interstate National Highway System (NHS) routes, were also a concern, leading to unauthorized and potentially unsafe parking, such as on/off ramps. Two reasons resulted in congestion and delays on outdated bridges. First, narrow widths or height and weight restrictions hinder the movement of oversized or heavy loads. Second, at-grade rail crossings have limited capacity, or bridges are narrow, resulting in congestion and delays. Stakeholders also emphasized the impact of extreme weather events—such as blizzards, wildfires, floods, and dust storms—on freight mobility. Reduced visibility from dust and smoke, high winds that threaten high-profile vehicles, and rainfall-triggered landslides or rockslides can all temporarily close vital routes and pose significant safety risks to drivers.

In State Fiscal Year (SFY) 2020, the Montana Department of Transportation (MDT) received approximately $351 million in revenue, primarily from state and federal unique revenue sources. State special revenues include diesel and gasoline fuel taxes and gross vehicle weight (GVW) fees. Following a rate increase effective July 1, 2017, Montana's fuel tax rose from 27 cents to 31.5 cents per gallon for gasoline and from 27.75 cents to 29.25 cents per gallon for special fuel, with scheduled annual increases through SFY 2023 to 33 cents and 29.75 cents per gallon, respectively—the first such increase since 1994. In SFY 2020, MDT also issued 68,216 commercial motor carrier permits, generating approximately $7 million in additional revenue. However, funding challenges remain, particularly in covering maintenance activities not eligible for federal funding and ensuring sufficient state revenue is available to meet federal matching requirements.

3.3 EXIST ISSUES WITH THE TRACK, LOCATE WASH-OUTS, AND EVALUATE THE NECESSITY OF REMEDIATION

3.3.1 Discussion of the Great Falls-Helena rail line

According to the discussion of the Great Falls-Helena rail line [xii], the railroad has abandoned since the mid-80s, used for car storage, and was covered with dirt. Possible reasons are the grade was too old to use it and high elevation resulted in lack of use. The railroad is 600

feet higher than Mullan Pass, and has no sidings long enough to hold modern freight trains. Although the rail can reactivate as a one-way empties-only route to reduce congestion on Mullan Pass, the congestion didn't reach the point. The purpose of the rail is mainly for passengers and local-freight route instead of heavy freight route. Washed out location in Great Falls-Helena line is located at the north of Ulm. The Great Falls to Ulm segment approximately ten miles of level track just north of Helena are used for container car storage.

Another discussion about the current condition of line from Helena to Great Falls [xiii] showed that the line has eaten by the Missouri River into the road bed. The cost for repairing an erosion issue would be arduous and expensive. Further issues in the discussion included: bad washouts at Sieben Siding, small landslide near Dearborn, sliding Hillside south of Cascade near Tintinger Siding, and sinking Fill at Antelope Butte east of Ulm.

From the discussion of the slip-out location between Great Falls and Helena railroad in Ulm [xiv], there is a sinkhole 10 miles south of Great Falls, causing the line to go out of service, and it has not been fixed since July 2001. The slip-out is easily visible from the bridge over the Missouri River at the north end of the town. From the slip-out location and walked down approximately 110 feet, the track and ties were missing. Besides, a long string of empty spine cars must be removed, approximately 10 miles south of Great Falls. Although the slip-out in Ulm was one of the reasons for the BNSF to abandon the line between Great Falls and Helena, BNSF might be concerned about other potential environmental issues that would affect the operation of trains.

From the 2010 Montana State Rail Plan [xv], the article pointed out a location that have riverbank stability problems on the Great Falls-Helena track near Ulm. The location is on the west of Great Falls approximately 14.2 miles, storing cars in this segment since 2010.

3.3.2 2017 Updated to Multi Hazard Mitigation Plan

According to the 2017 Updated to Multi-Hazard Mitigation Plan [xvi], 56 railroad accidents happened near Great Falls in Cascade County from 1990 to 2016. Most of the problems are caused by derailed cars each year, causing significant delays, hazards, or other problems for drivers. Also, railroad-related hazards such as toxic spill contamination and vehicle collisions threaten Cascade County residents. According to the National Transportation Safety Board (NTSB), over 80 percent of public railroad crossings do not have lights and gates, and 60 percent of all railroad accidents occur at these unprotected crossings.

3.3.2.1 Hazardous Materials

Cascade County does not have land use regulations to limit construction near facilities, transportation routes, or sites for storing hazardous materials. Even though the U.S. Department of Transportation regulates the transportation of non-radioactive hazardous materials (HAZMAT), central Montana currently has no designated HAZMAT routes, allowing these materials to be transported through Great Falls and Cascade County. The government might need to focus on controlling hazardous materials with regulations.

3.3.2.2 Wildfire

Wildfire is also an important risk on the Great Falls-Helena rail line. Low rainfall, high temperatures, low humidity, thunderstorms, high winds, and lightning cause the fire season. According to reports in Cascade County, over 60 percent of fires are caused by lightning. Another majority of fires were caused by farm equipment. Between 1992 and 2012, 70 fires burned over 6,337 acres in the county. The National Weather Service (NWS) proposed several warnings, advisories, and restrictions to reduce fire risk and prevent during high to extreme danger periods. The following criteria are:

- Fire Weather Watch
- Red Flag Warning
- Fire Warning
- Dense Smoke Advisory
- Stage 1 Fire Restriction
- Stage 2 Fire Restriction

Fire Weather Watch is aligned with the Red Flag Warning. The Fire Weather Watch will be implemented in the next 24 to 72 hours when Red Flag conditions occur. Red Flag Warning means when weather conditions that could sustain extensive wildfire activity and meet one of the following criteria in conjunction with "Very High" or "Extreme" fire danger:

- Sustained surface winds or frequent gusts of 25 mph or more
- Exceptionally hot, dry conditions with relative humidity below 20%
- Forecasted dry thunderstorms during an extremely arid period
- Any anticipated weather shift that could lead to a significant impact on fire danger

A Red Flag Warning is issued when Red Flag conditions are anticipated within the next 12 to 24 hours. Local officials may issue a Fire Warning when a wildfire or structure fire spreads to a populated area. The warning will inform people to evacuate to the direct area in the fire's path as recommended by officials according to state law or local ordinance. A dense Smoke Advisory will be implemented while the widespread visibilities are less or equal to 0.25 miles for a few hours or more due to smoke. Stage 1 Fire Restriction and Stage 2 Fire Restriction account for the restriction of using fire without a permit. Similarities and differences will be explained below.

Stages 1 and 2 have similarities in fire restrictions, smoking restrictions, torch use, and engine restrictions. Fire restrictions prohibit open fires, campfires, and stove fires, but Stage 1 allows some exceptions. In smoking restrictions, both restrict smoking to enclosed vehicles, buildings, developed recreation sites, or areas cleared to at least three feet in diameter. Both torch use prohibits welding, acetylene, or other torches with open flames. Internal and external combustion engines require a properly installed and maintained spark-arresting device in engine restrictions.

The differences will be showed in Table 5:

Category	Stage 1 Restriction	Stage 2 Restriction

Fire Use	Fires, campfires, and stove fires allowed with a permit in designated areas (Forest Service developed campsites/picnic grounds)	No open fires, campfires, or stove fires allowed under any circumstances
Smoking	Allowed in an enclosed vehicle/building, a developed recreation site, or a barren three-foot cleared area	Same, but specifies the area must be cleared to mineral soil

Table 5: Differences between Stage 1 and 2 Restrictions

Wildfire issues can be mitigated by comprehensive land use planning, housing development design, fuel management, and public education. Medium, high, and extreme wildland-urban interfaces (WUI) are required to follow exceptional design standards, including:

- Access and Evacuation: Roadside vegetation is maintained to ensure roads can serve as escape routes and fire breaks. Minimum two routes to provide multiple escape options and access for emergency vehicles
- Building Density Requirements: Reduce building densities in areas with steep slopes or dense forest growth to mitigate fire hazards
- Vegetation Management: Making guidelines for a comprehensive vegetation management plan to reduce fuel loads and fire risks. The guidelines included creating defensible space, establishing fuel breaks and green belts, and ensuring ongoing maintenance
- Water Supply: Ensure a water source for fire-fighting is available and maintained as part of the defensible space. Also, the water supply system should follow requirements such as including fire hydrants or storage tanks
- Fire Protection Covenants: Property owners should uphold fire protection measures, including maintaining fire protection water supplies, defensible spaces, driveway access routes, and fuel breaks

Wildfires are influenced by climate variability, local topography, and human activities. Climate change can impact multiple aspects of the wildfire system, including rising temperatures, prolonged hot and dry conditions, and stronger winds that accelerate fire speed reaching residential areas. Wildfire smoke also influences air quality and public health. Recent studies suggest that smoke waves will become longer, more intense, and more frequent, raising concerns about ecosystems, economic stability, and public health.

3.3.2.3 Severe weather and drought

Due to climate change, severe weather hazards have become more and more intense in recent years. The mean annual precipitation has been below average, and the mean annual temperatures have been above average for the past five years. Although severe storms are unfamiliar, thunderstorms, hailstorms, high winds, heavy snow, freezing rain, and sleet still occur. Severe weather conditions occurred from November through April in Cascade County. Snow, extended cold, and high wind occurred during these months. From May to October, thunderstorms, wind, hail, lightning, tornadoes, and microbursts occurred each year, resulting in drought. Further details will be elaborated on in the next paragraph.

In winter, storms bring straight-line winds well over 50 mph, potentially destroying property and killing livestock and people. Four storm types are sleet, ice storms or freezing rain, heavy snowfall or blizzards, and low temperatures. Blizzards are common to align with blowing snow and low visibility. Characteristics of severe winter storms are decided by the amount and extent of snow or ice, air temperature, wind speed, and event duration, creating conditions to disrupt essential regional systems. From the perspective of temperatures, when temperatures drop to 30 below zero, combined with high winds, roads may become impassable, utilities may fail, and access to rural homes can be severely restricted, influencing emergency services, businesses, vehicular accidents, and flight disruptions.

NWS provided a warning and advisory criterion for winter weather in Cascade County. The criteria for reacting to the severe winter weather conditions are categorized below:

- Winter Storm Watch: It will be issued to inform the public with 12 to 48 hours of advance notice when snow accumulation of 6 inches or more in 12 hours or 8 inches or more in 24 hours and sustained or frequent wind gusts of 25 to 34 mph. The wind gusts sometimes reduce visibility to 0.25 miles or less for 3 hours or more.
- Winter Weather Advisory: It will be issued when a combination of winter weather conditions may lead to significant impacts
- Winter Storm Warning: Same as Winter Storm Watch, but it will be issued when conditions are occurring, imminent, or highly probable
- Blizzard Watch: It will be issued 12 to 48 hours in advance to warn of potential blizzard conditions, including sustained winds or frequent gusts of 35 mph or more significant and visibility reduced to less than 0.25 mile due to falling or blowing snow for at least 3 hours
- Blowing Snow Advisory: It will be issued when visibility intermittently drops to 0.5 miles or less due to blowing snow
- Blizzard Warning: Same as Blizzard Watch, but it will be issued when conditions are occurring, imminent, or highly probable
- Freezing Rain Advisory: It will be issued when ice accumulation makes roads and sidewalks slippery, but significant damage is not expected
- Ice Storm Warning: It will be issued when significant and damaging ice accumulation is occurring imminent or highly probable
- Snow Advisory: It will be issued when 2 to 5 inches of snow is expected within 12 hours
- Sleet Advisory: It will be issued when sleet accumulation is expected to create hazardous conditions
- Heavy Snow Warning: It will be issued when 6 inches or more of snow in 12 hours or 8 inches or more in 24 hours is expected
- Wind Chill Watch: It will be issued 12 to 48 hours in advance for potential wind chills of -40°F or colder with wind speeds of 10 mph or higher lasting 6 hours or more
- Wind Chill Advisory: It will be issued when wind chills range from -20°F to -39°F, with wind speeds of 10 mph or higher lasting 6 hours or more
- Wind Chill Warning: It will be issued when wind chills reach -40°F or colder, combined with 10 mph winds and precipitation

For severe summer weather, a severe thunderstorm produces wind gusts of 58 mph (50 knots) or higher, hail of at least 1 inch in diameter, or tornadoes. The storms can cause intense downbursts, lightning, and microburst winds. Strong winds may occur in thunderstorms when weather conditions are favorable. Tornadoes are the most concentrated and violent atmospheric storms, forming a rotating vortex of wind and strong vertical motion, causing widespread devastation. Although tornadoes may cause devastating damage to the people, it is uncommon in Cascade County and will be confined to a small area. A microburst is a highly localized column of rapidly sinking air that generates damaging, straight-line winds at the surface. Microbursts are similar to tornadoes; however, microbursts have divergent wind patterns, which is dangerous to aircraft because of sudden and intense low-level wind shear. Table 6 compares these three types of severe summer weather in Cascade County:

Feature	Thunderstorm	Tornado	Microburst
Definition	A storm with lightning, thunder, strong winds, rain, and sometimes hail.	A rotating column of air extending from a thunderstorm to the ground, capable of extreme destruction.	A sudden, localized downdraft of air that produces intense, straight-line winds.
Wind Speed	Can exceed 58 mph (50 knots) in severe cases.	Can reach up to 300 mph in the most violent storms.	Can exceed 100 mph in extreme cases.
Wind Pattern	Can produce straight-line winds, gusts, and downbursts.	Rotating, cyclonic winds with strong updrafts and downdrafts.	Downward burst of air that spreads outward in all directions.
Size & Scale	Can cover large areas, up to hundreds of miles.	Usually small, concentrated (hundreds of yards to a few miles wide).	Very localized (typically 1-2.5 miles in diameter).
Formation	Develops when warm, moist air rises, cools, and condenses into clouds.	Forms from severe thunderstorms with strong wind shear and vertical motion.	Forms when cold air rapidly sinks within a thunderstorm, hitting the ground and spreading out.
Damage Potential	Can cause flooding, lightning damage, wind damage, and hail impact.	Capable of extreme destruction, leveling buildings and uprooting trees.	Can knock down trees, damage structures, and pose a severe risk to aircraft.
Duration	Can last from minutes to several hours.	Usually lasts a few minutes, though some persist longer.	Short-lived, typically 5-15 minutes.
Danger to Aviation	Moderate to high due to turbulence, lightning, and wind shear.	High risk due to violent winds and unpredictable movement.	Extremely high risk due to sudden wind shear near the ground.

Table 6: Comparison of severe summer weather in Cascade County

The NWS provided advisories to warn the public about the severe summer weather. For each type of summer weather, the NWS explained the advisories below:

- Hazardous Weather Outlook: Alert the public of potential severe weather in the area from 1 to 7 days in advance
- Severe Thunderstorm Watch: It will be issued when conditions are favorable for severe thunderstorms within the next several hours. The severe thunderstorm watch will remain in effect for 4 to 6 hours
- Severe Thunderstorm Warning: It will be issued when Doppler radar detects or the public reports a thunderstorm with 58 mph or higher wind gusts and/or hail at least 1 inch in diameter. Usually valid for 30 to 60 minutes
- High Wind Watch: It will be issued when the potential of sustained winds of 40 mph or more or gusts of at least 58 mph for an hour or longer. The High Wind Watch does not include timing, location, or intensity
- High Wind Warning: Sane as High Wind Watch, but includes timing, location, or intensity
- Tornado Watch: It will be issued within several hours when conditions are highly favorable for tornado formation. The Tornado Watch will remain in effect for 4 to 6 hours
- Tornado Warning: It will be issued when Doppler radar detects or the public reports a tornado. Usually valid for 15 to 45 minutes

Dry weather may cause a drought, which impacts economic hardship, deprives people of their livelihoods, and weakens local economies. The effects of drought became more severe over time as moisture-dependent activities suffered. Non-irrigated croplands faced the highest risk as drought conditions persist. Typical disasters are received from a Presidential Disaster Declaration; however, droughts are declared by the Secretary of the Department of Agriculture. Since the assistance is limited, the funds are often taken as low-interest loans or Conservation Reserve Programs (CRP) to graze the livestock. Severe droughts can exacerbate other hazards, such as range fires that threaten agricultural industries and wildlife habitats.

The NWS outlines warnings and advisories related to drought conditions below:

- Blowing Dust Advisory: It will be issued when blowing dust reduces visibility to 0.25 and 1 mile, with winds of 25 mph or higher.
- Dust Storm Warning: It will be issued when blowing dust reduces visibility to less than 0.25, with sustained winds of 25 mph or higher
- Heat Advisory: It will be issued when heat index values are expected to reach 105°F or higher for at least three consecutive days
- Heat Warning: It will be issued when high temperatures are forecasted to exceed 105°F, with nighttime lows remaining above 80°F, for three or more consecutive days

For future development, the State of Montana has adopted the 2012 International Building Code (IBC) for constructing buildings that can withstand a constant wind velocity of 75

mph, three-second gusts of 90 mph, and a minimum snow load of 30 pounds per square foot. However, the IBC did not apply to single-family residences.

Montana follows the 2012 International Residential Code (IRC) for one—and two-family residences and townhouses. Cities, counties, and towns have the option to become certified to enforce local jurisdictions. The City of Great Falls is certified for building code enforcement, while Cascade County does not have building departments. As a result, it lacks enforcement capabilities to ensure compliance with state building codes.

Climate change poses a significant challenge concerning severe weather and drought. The frequency of extreme weather events has increased over the past century. A warming climate is expected to intensify drought conditions. According to the National Climate Assessment, rising surface temperatures accelerate evaporation and increase plant transpiration rates. Unless these higher evapotranspiration rates are offset by increased precipitation, regions will experience drier conditions and a higher drought risk. In addition, population exposure and vulnerability to severe weather and drought are likely to grow. Extreme weather events will lead to increased risks to vulnerable groups, such as the elderly, young children, and individuals with weakened immune systems, creating a favorable environment for disease-carrying organisms during droughts, causing more significant structural damage from stronger winds and hailstorms, threatening farming sustainability while changing temperatures and precipitation patterns. From the economic perspective, decreased agricultural productivity may impact farming and ranching communities, while regions dependent on tourism could suffer revenue losses. Water-based recreational areas may also experience declines in visitors due to drought.

In conclusion, climate change is a critical effect of severe weather and drought. Rising temperatures, shifting precipitation patterns, and increased exposure to extreme events pose significant threats to public health, property, agriculture, and economics. In the following years, effective risk management and adaptation strategies will be required to mitigate these challenges.

3.3.2.4 Communicable diseases

Communicable diseases caused by bacteria, viruses, fungi, and parasites are one of the risks in Cascade County. There are three ways to transmit the diseases: person-to-person contact, animal-to-human transmission, animal-to-animal transmission, and indirect transmission through contaminated surfaces. Infectious disease outbreaks could have severe economic and agricultural consequences that disrupt the food supply chain locally and beyond. The greatest threat to public health and economic stability is contagious diseases. Since infection rates can surge when an epidemic occurs, leading to isolation measures, quarantines, and even mass fatalities, preparedness and response strategies are essential to mitigate the impact of communicable diseases in Cascade County.

The Centers for Disease Control and Prevention (2011) identifies three categories of biological agents or diseases. The first one is Category A: The U.S. public health system and primary healthcare providers must be prepared to address various biological agents, including pathogens rarely seen in the United States. (Tetra Tech Inc., 2017) The following reasons are why high-priority agents are organisms that pose a risk to national security.

- Highly contagious or easily transmitted among populations
- High mortality rates lead to severe public health crises and widespread panic
- Have the potential to disrupt social and economic stability
- Require specific measures for public health preparedness

Category B and C are the article's second and third-highest priority agents. Category B can be spread easily, causes moderate illness rates but low fatality rates, and requires improved CDC diagnostic capabilities and enhanced disease monitoring. Category C are emerging pathogens that could be engineered for widespread dissemination in the future because of widespread availability, ease of manufacturing and distribution, and high potential for severe illness, fatalities, and significant public health consequences, in 2012 to 2016 data for Cascade County, 2583 influenza cases in the Cascade County with total 80 fatalities across the State. According to the Montana Department of Livestock, losses to the livestock population would be devastating due to diseases and could have an economic impact.

Diseases pose a direct threat to the population, plants, and animals in Cascade County. The population can influence vulnerability at risk of contracting infectious diseases. The urban city will spread rapidly compared to the county's more rural area. Since high tourism and visitor traffic in Great Falls, new diseases would cause the risk of outbreaks in the local population. The severity of disease impacts depends on mortality rate, infection rate, contagiousness, and population movement. Because of unpredictability, Cascade County is considered to have a potential risk of communicable diseases across all areas. From historical reports to individual infectious diseases, the diseases are classified as "highly likely" hazards: a probability of a global communicable disease outbreak affecting Cascade County. From historical data from the 1918 influenza pandemic, infection rates in the U.S. reached 28% of the population (Billings, 1997), 35% from the World Health Organization record. A similar event in Cascade County would severely impact local healthcare resources, especially in the case of bioterrorism-related outbreaks, where no vaccine or containment measures may be available. While the 2014 Ebola outbreak and Zika virus transmission affected parts of the U.S., the likelihood of Ebola reaching the region is low, and the Zika virus is unlikely to spread locally and will primarily affect individuals traveling to or returning from Zika-affected regions; however, effective containment, response strategies, and public health measures still crucial in managing potential outbreaks.

Environmental conditions influence many prevalent human infections. For example, some infectious diseases spread by mosquitoes are restricted in warm climates. Additionally, climate conditions shape the distribution of other species necessary for disease transmission, limiting where infections can occur. However, rising temperatures contributed to the expansion of insect-borne diseases, and the prediction for full infections is still complex. For instance, increased waterborne infections will cause diarrheal illnesses, heavy rainfall events, and warmer temperatures, causing pathogens to spread more rapidly. The primary impact of climate change on communicable diseases will be on human populations. Insect and waterborne infections linked to higher temperatures and flooding could increase public health risks, particularly for young children, the elderly, and other vulnerable groups.

3.3.2.5 Transportation accidents

Transportation accident hazards include highway, railroad, and aircraft accidents. Cascade County has approximately 104,000 passenger automobiles and trucks operating within the region. These vehicles travel 1,700 miles of county-maintained roads, secondary highways, and light-duty roads and 375 miles of state-maintained highways, including primary highways such as Interstate 15 and its frontage roads. Great Falls is a major transportation hub, with approximately 30 interstate carriers providing transport services across the United States and Canada.

Highway accidents occur due to distracted driving, driver fatigue, drunk driving, speeding and aggressive driving, and adverse weather conditions. Montana also has a high rate of vehicle collisions with wildlife. Although there is no history of mass casualty accidents involving school buses or tour buses in Cascade County, severe weather conditions increase the risk of accidents.

BNSF Railway Company provides freight rail service to Cascade County. According to the article, rail service is the second-largest freight transport method in the region. Agricultural products and supplies, large bulk manufactured goods, and lumber are a significant portion of freight shipments. However, Great Falls is no longer on a central rail mainline connecting the South, Midwest, and West Coast due to the 1972 merger of the Great Northern, Northern Pacific, Chicago, Burlington, and Quincy lines. According to the Federal Railroad Administration (FRA), Cascade County recorded 56 railroad accidents, 21 involving railcars carrying hazardous materials damaged from 1990 to 2016. The National Transportation Safety Board (NTSB) reports that 60 percent of all railroad accidents occur at unprotected or passive crossings. Notable railroad accidents in Cascade County are Belt train derailment and explosions in 1976 and a fatal train-vehicle collision near Vaughn in 2015; both accidents caused severe consequences to businesses, homes, and overpass.

While major derailments and collisions are relatively rare, the historical incidents indicated that the potential for catastrophic damage and loss of life when accidents occur could be prevented through infrastructure improvements, rail safety measures, and continued monitoring to reduce risks associated with rail transportation in the county.

The Great Falls International Airport serves as the primary public airport in the region. According to the Federal Aviation Administration data, between 1980 and 2016, 10 fatalities in Cascade County were caused by aircraft accidents. Federal disaster or State emergency declarations did not exist to associate with the Transportation Accident hazard in Cascade County.

Since privately owned vehicles serve as the primary mode of transportation for individuals in Cascade County, frequent highway accidents are caused by severe weather conditions and high speeds. Railroad-related hazards are also a significant risk to Cascade County residents; more than 80 percent of public railroad crossings lack lights and gates, and approximately 60 percent of all railroad accidents occur at unprotected crossings. The MHMP

Planning Team rated the probability of future highway and railroad accidents as "highly likely," while aircraft accidents are classified as "likely" in the article.

3.3.2.6 Flooding and Dams failure

Flooding is a natural occurrence caused by excess water from snowmelt and heavy rainfall overflowing onto adjacent floodplains. Three types of flooding can impact Cascade County.

- Flash Floods: short-duration torrential rainfalls or cloudbursts over small drainage areas, leading to sudden and intense flooding
- Ice Jam Flooding: when floating ice accumulates at a stream obstruction, causing water to back up and flood upstream. If the ice jam breaks, it can trigger flash flooding downstream.
- Dam Failure Flooding: If a structural failure occurs within a dam's inundation zone, areas inside this zone are at risk of severe flooding

Flooding is also one of the costliest natural disasters in the U.S.; 90 percent of all property losses from natural disasters come from flooding, resulting in an average of 150 deaths annually. Floodwaters sweep away individuals, causing most fatalities, and sediment-laden water inundation caused property damage. Fast-moving floodwaters can wash away buildings, sweep vehicles downstream, and damage critical infrastructure. Additionally, basement flooding can lead to significant structural damage. There are four types of seasonal flooding factors:

- Chinook Winds (March-April): Warm, dry winds gust up to 100 mph, rapidly melting snow and causing flooding while the ground remains frozen and unable to absorb water
- Heavy Snowmelt (May/June): Rainstorms combine with heavy snowmelt, increasing water flow and causing flooding
- High-Intensity Summer Rainstorms (July-August): Intense rainfall leads to flash floods and urban flooding
- Ice Jams (Winter-Early Spring): Ice formations obstruct river flow, such as the Missouri River from Craig to Hardy, creating flood risks

The NWS provides forecasts, watches, and warnings for heavy rain and flooding to mitigate flooding risks and prevent natural disasters to people, infrastructures, and properties.

- Flash Flood Watch: It will be issued when conditions are favorable for flash flooding, but it does not guarantee that flash flooding will occur
- Flash Flood Warning: It will be issued when flash flooding is imminent with rapidly rising water levels leading to inundation within less than six hours
- Flood Watch: It will be issued when conditions are favorable for flooding, but flooding is not yet sure to occur.
- Flood Warning: It will be issued when flooding is expected to occur more than six hours after the triggering event

Flooding in Great Falls has historically been caused by rapid snowmelt combined with heavy rainfall in the Sun River and Missouri River Basins, leading to both rivers overflowing

their banks. Cascade County has experienced widespread flooding in several years. Many of these events required evacuations and caused extensive property damage. The recurring flood events required flood mitigation, emergency preparedness, and infrastructure improvements.

Great Falls is located east of the confluence of the Sun and Missouri Rivers and is protected from flooding by dams. However, west areas of the Missouri River lie within the Sun River floodplain and are safeguarded by a levee system. Two artificial structures adjust water levels in Great Falls.

- Black Eagle Dam (Missouri River): Removable flashboards to help reduce floodwater constriction during a flood and build for power production
- 6th Street Bridge & Interstate 15 (Sun River): Create minor flow restrictions by reducing the floodwater conveyance area

The Missouri River floodplain near the Cascade is susceptible to ice damming during most winters. However, due to limited development in the floodplain, the risk of catastrophic flooding remains relatively low. Most of the flood-prone land is currently used for agriculture and grazing, reducing the impact of potential flooding events. However, areas beyond the east bank of the Missouri River remain at higher risk of flooding (Town of Cascade Growth Policy, 2011).

The main concern for project stakeholders is flash flooding in wildfire-affected areas. When moderate to heavy rainfall occurs over burned landscapes, ash, and debris can be washed into streams and rivers, contaminating domestic water supplies for subdivisions and private property owners. Watershed protection and erosion control are required to prevent post-wildfire flooding.

Dam failures can occur due to seismic activity, poor maintenance, extreme weather, and flow conditions. The consequences of a dam failure are similar to riverine or flash flooding, with potential impacts extending far beyond the immediate downstream area. The U.S. Army Corps of Engineers (USACE) National Inventory of Dams (NID) maintains records of dams nationwide, assigning hazard ratings for emergency management planning. High, significant, and low ratings are based on the potential loss of life and property damage in the event of failure rather than the actual condition or likelihood of failure. The Department of Emergency Services (DES) maintains a comprehensive library of Emergency Action Plans (EAPs) for high-hazard dams across Montana. Cascade County DES also retains copies of EAPs for local high-hazard dams. In addition, North Western Energy updates inundation mapping for Missouri River dams annually and revises EAPs regularly to improve emergency response planning. Three types of dam hazard potential are elaborated below:

- Low Hazard Potential: Dam failure is not expected to result in any human life loss. Any losses would be limited to the owner's property.
- Significant Hazard Potential: Dam failure is not expected to cause human life loss but has the potential to cause economic losses, environmental damage, and disruptions to critical infrastructure. Rural or agricultural areas have a higher chance of causing significant hazards but may be near populated regions with critical infrastructure.

- High Hazard Potential: Dam failure would likely result in loss of human life

Cascade County has five high-hazard dams and several significant and low-hazard dams. The last recorded dam failure in Cascade County occurred in 1908 when Black Eagle Dam was intentionally breached. However, no federal disaster declarations have been issued for dam failures in Cascade County.

High-hazard dams pose the greatest risk to life and property in the event of a breach, especially downstream of the dams in Cascade County and Great Falls. To ensure preparedness, DES maintains EAPs for high-hazard dams and conducts regular exercises with dam owners and emergency response personnel to improve coordination and response strategies in the event of a dam failure.

Flood Protection and levees have been planned and constructed in Cascade County. For example, two levees have been constructed along the Sun River to provide flood protection at Vaughn and West Great Falls. These flood control structures help protect millions of dollars in property from flood damage. A levee system exists along the Sun River near Great Falls, developed in response to persistent flooding issues at the junction of the Sun and Missouri Rivers. From the Great Falls flood protection project before the 1975 Presidential Flood Disaster, the city would not have experienced flooding (USACE, 1976; USACE, 1979). However, the West Great Falls Levee has not been officially certified. In 2011, the West Great Falls Levee District, Cascade County Commissioners, and the City of Great Falls signed a Provisional Accreditation Levee (PAL) agreement. Two key conditions of the PAL agreement are:

- Complete data and documentation must be submitted within 24 months of signing.
- FEMA will revise the Digital Flood Insurance Rate Maps (DFIRMs) to redesignate landward areas if certification is not achieved.

Although the PAL designation expired in 2013, it remains accepted until the area is remapped. Homeowners in the levee-protected zone can purchase Preferred Risk Flood Insurance Policies. In 2015 and 2016, the USACE inspected the levee, rating it as an outstanding designation (Mares, personal communication, 2016). The National Flood Insurance Program (NFIP) promotes effective floodplain management to help local governments minimize flood-related property losses in Cascade County and the City of Great Falls. The City of Great Falls Public Works Department collected LIDAR data for the Sun and Missouri Rivers, extending one mile beyond city limits. However, no LIDAR data exists for other rivers and streams in Cascade County.

Cascade County enforces a Floodplain and Floodway Management Ordinance to comply with the Montana Floodplain and Floodway Management Act and ensure NFIP participation requirements are met. These ordinances regulate land use in all identified 100-year floodplains within local jurisdictions. Any 100-year floodplain or floodway construction requires a permit from the Floodplain Program Administrator.

The City of Great Falls has floodplain zoning regulations, prohibiting construction within the floodway but allowing development in the fringe, provided structures are elevated or flood-proofed to at least one foot above the one percent annual chance flood elevation.

According to the Montana Department of Natural Resources and Conservation (DNRC), Cascade County and Great Falls have three and one repetitive loss properties, respectively. A repetitive loss property is any insured building with two or more NFIP claims over $1,000 within any rolling 10-year period since 1978. No severe repetitive loss properties exist in Cascade County. On the other hand, the City of Great Falls Floodplain Administrator reported that three of the repetitive loss properties are located in the Skyline Park Addition, and the stormwater drainage issues caused flooding. However, all flood-related issues for these properties have been successfully mitigated.

The NFIP's Community Rating System (CRS) rewards local flood protection efforts by offering discounts on flood insurance premiums. Cascade County and the City of Great Falls participate in the CRS program. Each community holds a CRS rating of 8, which qualifies property owners for a 10 percent discount on flood insurance premiums. CRS discounts range from 5 to 45 percent, incentivizing communities to implement flood protection measures that save lives and reduce property damage.

Based on the frequency of past flood events, the probability of flooding in Cascade County is expected to occur less than once yearly but more than once every 10 years. In the event of a dam failure, advanced warning may be possible, allowing time for public evacuation and emergency response efforts. As a result, the potential impact on the population is considered moderate. The MHMP Planning Team assessed the probability of a high-hazard dam breach in Cascade County. It indicated that while not frequent, an event remains a realistic risk requiring ongoing preparedness and monitoring.

The City of Great Falls Growth Policy recommends developing a coordinated stormwater management plan, adopting a Capital Improvement Program to fund drainage infrastructure improvements, and incorporating sound stormwater management practices into new land development regulations and site plan reviews. Future regulations should encourage innovative solutions to reduce runoff from parking lots and other impervious surfaces, helping to minimize flood risks and improve water management throughout the city.

Climate changes influence the amount and timing of snowmelt, which are critical for water supply and flood control. More mountainous areas contribute to peak storm runoff, increasing the frequency of high-intensity floods. Several projects are created to analyze it:

- A declining snowpack and accelerated snowmelt led to increased runoff and flooding
- Greater storm intensity, resulting in more direct runoff and flash floods
- Changes in watershed vegetation and soil moisture, altering runoff and recharge patterns
- Shifting erosion patterns, which could modify river channels, increase sedimentation behind dams, and impact water quality and habitats
- More post-wildfire floods, increasing sediment loads, and further degrading water quality

With these hydrological changes, a one percent annual chance that flood may occur more frequently increases community flood risks. To account for these evolving conditions, planners should enhance flood protection standards for dams, bypass channels, levees, storm drains, and local sewer systems.

Dams are engineered based on assumptions about a river's flow behavior. Precipitation, runoff, and snowpack may significantly impact a dam's designed safety margins (freeboard). If freeboard is diminished, dam operators may be required to release larger water volumes earlier in a storm cycle, increasing flood risks downstream. While climate change does not raise the probability of catastrophic dam failure, it may heighten the risk of design failures, stressing flood protection infrastructure.

Three types of vulnerability of population, property, and critical facilities in the following:

- Flood Hazard Exposure: As runoff patterns shift, flooding may occur in areas previously unaffected, increasing risk to communities and facilities that were not historically vulnerable
- Dam Failure Exposure: Climate Change is not expected to significantly alter the exposure or vulnerability of populations and infrastructure to dam failures
- Infrastructure Adaptation: Flood protection systems may require modifications to withstand additional stress from increased runoff, sedimentation, and shifting flood patterns. Dam owners and operators may need to adjust maintenance and operational strategies to address changing hydrographs and sediment loads.

By proactively addressing these challenges, water resource managers, engineers, and policymakers can reduce flood risks, enhance dam safety, and strengthen community resilience to climate change.

3.3.3 Mitigation strategies from 2017 Updated to Multi Hazard Mitigation Plan

From the DMA 2000 requirements, Cascade County has implemented various hazard mitigation activities to protect its assets and residents from natural and human-made threats. Efforts include continuously updating emergency response resource lists for hazardous material incidents and conducting wildfire fuel mitigation projects in areas such as Gore Hill, Fort Shaw, Monarch, and Neihart, supported by federal funding. The U.S. Forest Service has also undertaken hazardous fuel reduction projects, while local fire departments promote wildfire awareness and improve firefighting capabilities through new equipment, training, and water source databases. Severe weather preparedness measures include upgrading school windows with shatter-proof glass, enhancing snow removal services, providing public education on storm awareness, and requiring buried power lines in new subdivisions. Transportation safety has been improved through ongoing emergency response training, recruitment of EMS volunteers, discussions on railroad underpass reconstruction, and safety enhancements at railroad crossings. Flood mitigation efforts include levee maintenance, public education on flood insurance, debris removal, levee security upgrades, construction of drainage improvements, and rehabilitation of the Belt sewer system. Multi-hazard preparedness initiatives include enhancing emergency

communications with new radio repeaters, establishing emergency shelters, identifying and supporting residents with special needs, equipping schools and critical facilities with NOAA weather radios, assigning rural addresses for emergency response, evaluating backup locations for the Dispatch Center, implementing the Code Red reverse 911 system, installing a new cell tower in Sun River, and securing a generator for the Emergency Operations Center to ensure continuity of operations. These ongoing efforts reflect Cascade County's proactive approach to disaster mitigation and preparedness.

The Cascade County's mitigation strategy followed FEMA guidelines for local mitigation plan development, incorporating DMA 2000 regulations (44 CFR 201.6), the Local Mitigation Planning Handbook (2013), Integrating Hazard Mitigation into Local Planning (2013), Identifying Mitigation Actions and Implementing Strategies (FEMA 386-3), and Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (2013). The approach involved reviewing and updating mitigation goals and objectives, assessing existing mitigation capabilities, evaluating past and ongoing mitigation activities, identifying appropriate county and local strategies to address risks from natural and man-made hazards, and developing an implementation strategy that priorities mitigation projects.

The hazard mitigation goals and objectives aimed at reducing or preventing long-term vulnerabilities to identified hazards. According to CFR 201.6(c)(3)(i), a hazard mitigation strategy must include a description of goals designed to minimize long-term risks. In this plan, goals serve as broad, long-term policy statements that define the intended benefits of mitigation efforts and provide a benchmark for measuring success. In 2017 MHMP update, the Planning Team refined goals for each hazard in 3.3.2, ensuring one goal for each hazard profile in the plan along with a general all-hazard goal. Mitigation objectives from the original PDM Plan were revised to align with FEMA's Local Mitigation Planning Handbook (March 2013), categorizing objectives under Public Education and Awareness, Property Protection, Prevention, Structural Measures, Natural Resource Protection, and Emergency Services.

Cascade County's hazard mitigation goals and objectives build on the community's existing capabilities, leveraging resources from local, regional, state, and federal partners along with the expertise of county and municipal staff who enforce zoning, building codes, subdivision regulations, and floodplain ordinances. The county's mitigation strategy includes programs addressing capital improvements, wildfire mitigation, stormwater management, and the National Flood Insurance Program (NFIP) compliance. The goals focus on reducing the impacts of hazardous material incidents, wildfires, severe weather, drought, communicable diseases, transportation accidents, flooding and dam failures. Objectives include implementing prevention, property protection, structural, and public education projects, as well as enhancing emergency service capabilities and supporting mapping, analysis, and planning efforts. Specific mitigation actions target reducing hazardous material risks through prevention and emergency response improvements, wildfire risk through property protection and public awareness, and severe weather impacts through structural upgrades and education. These efforts collectively strengthen Cascade County's ability to mitigate risks, protect assets, and enhance community resilience.

The NFIP plays a key role in reducing flood risks by providing affordable insurance to property owners and encouraging communities to adopt and enforce floodplain management regulations, helping minimize flood damage to new and existing structures while mitigation the socio-economic impact of disasters by promoting risk insurance. Additionally, the NFIP Community Rating System (CRS) serves as a voluntary incentive program that rewards communities for implementing floodplain management practices that exceed NFIP requirements. By meeting CRS goals—reducing flood losses, ensuring accurate insurance rating, and increasing public awareness of flood insurance—communities benefit from discounted flood insurance premiums, reflecting the reduced risk achieved through proactive mitigation efforts.

Cascade County possess various administrative and technical capabilities to support and implement hazard mitigation projects, leveraging expertise from community planners, engineers, floodplain managers, GIS personnel, emergency managers, and financial and legal professionals. The County collaborates with local and regional planning partners, including the City of Great Falls to administer the NFIP and depend on county support for broader mitigation efforts. The County and the City of Great Falls have comprehensive policies and programs that support hazard mitigation, including growth policies, subdivision regulations, and zoning that recognize hazard areas. All jurisdictions participate in the NFIP, but only the City of Great Falls enforces local building codes. Technical capabilities vary across jurisdictions, with the County and the City of Great Falls having emergency managers, public works engineers, GIS mapping capabilities, floodplain administrators, and community planners, whereas smaller towns have more limited resources, often relying on planning boards or county assistance for mitigation planning. The Cascade County Disaster and Emergency Services (DES) and the Great Falls Preparedness Program are dedicated to protecting property and the environment by mitigating, preventing injury, and saving lives. The DES Coordinator oversees emergency management and Homeland Security activities, including a full-time coordinator and an administrative assistant, with funding split between the Emergency Management Performance Grant (EMPG) program and the County general fund. The City of Great Falls also has a dedicated emergency manager funded entirely by the city. Additionally, the Cascade County Local Emergency Planning Committee (LEPC) plays a vital role in community safety by identifying and mitigating potential hazards, cataloging resources, and providing education and coordination for hazard materials planning. While the LEPC does not operate during emergencies, it works proactively to enhance preparedness. The committee comprises representatives from businesses, local government, emergency responders, and citizen groups in Great Falls.

The Cascade County Planning Division and the City of Great Falls Planning and Community Development Department oversee land use management, zoning, and development regulations to support sustainable growth and hazard mitigations. Fire protection services in Cascade County and Great Falls focus on prevention, suppression, and education, with fire departments divided into multiple divisions. Rural Cascade County relies on a volunteer fire protection system, supported by agencies. Additionally, the Montana Air National Guard and Malmstrom Air Force Base maintain fire departments for their respective locations. The City of Great Falls also provides fire and emergency medical services to county fire districts. Coordination among these entities is facilitated by the Cascade County Rural Fire Council,

fostering operational collaboration, enhancing communication, and ensuring mutual aid agreements between local fire districts, neighboring counties, and state and federal fire agencies.

The Montana Department of Natural Resources and Conservation (DNRC) Forestry Division is responsible for planning and implementing forestry and fire management programs across the state, collaborating with local, tribal, state, and federal partners to ensure wildfire protection on state and private lands. The Fire and Aviation Management Bureau provides leadership, coordination, and resources for Montana's wildland fire services, focusing on fire prevention education, training programs for DNRC and local personnel, equipment development and maintenance, and fire support programs that offer financial and technical assistance for fire assessment, GIS, radio systems, and equipment upkeep. The U.S. Forest Service also participates in planning activities for public lands within Cascade County. Additionally, FireSafe Montana, a private non-profit organization, coordinates a statewide coalition to increase fire safety awareness and preparedness. By promoting the establishment of local FireSafe councils, the organization educates communities on wildland fire threats, motivates residents to adopt Firewise practices, and provides access to resources and expertise to improve property resilience. Through public outreach efforts, including informational materials, newsletters, special events, and collaboration with federal, statem and local fire mitigation initiatives, FireSafe Montana actively reduces wildfire risks and enhances community safety.

The National Fire Prevention Association's (NFPA) Firewise Communities Program promotes wildfire safety by encouraging homeowners to take individual responsibility in preparing their properties for wildfire risks. As a key component of the Fire Adapted Communities initiative, Firewise connects communities with resources for wildfire education, planning, and mitigation, with sponsorship from the U.S. Forest Service, the U.S. Department of the Interior, and the National Association of State Foresters. The program emphasizes proactive measures, urging neighbors to work together to reduce wildfire threats and enhance property resilience. Similarly, the NOAA Weather-Ready Nation (WRN) Program recognizes organizations committed to improving national readiness and resilience against extreme weather, water, and climate hazards. WRN Ambassadors, which include government agencies, nonprofits, academic institutions, and private businesses, collaborate with NOAA to strengthen public preparedness by promoting WRN messages, engaging in partnership opportunities, sharing success stories, and educating employees on workplace preparedness. Through these programs, communities are empowered to take proactive steps in mitigating risks from wildfires and severe weather events, fostering a culture of safety and resilience.

Cascade County funds mitigation projects through local budgets, appropriations, and federal and state grants. FEMA offers several hazard mitigation funding opportunities, typically requiring a 10-25% local cost share. The Hazard Mitigation Grant Program (HMGP) provides post-disaster funding for flood-proofing, structure elevation, and hazard-prone property acquisition, requiring a FEMA-approved Hazard Mitigation Plan. The Flood Mitigation Assistance (FMA) Program funds flood risk reduction measures for NFIP-insured properties, covering 75% of project costs and 25% from non-federal sources. The Pre-Disaster Mitigation Competitive (PDMC) Grant Program is an annually funded nationwide program providing up to

$3 million for mitigation projects without requiring a disaster declaration. The Fire Management Assistance Grant Program supports wildfire response efforts on non-federal lands, covering 75% of eligible costs with rapid approvals within 72 hours. Additionally, the Fire Prevention and Safety Grants (FP&S), part of FEMA's Assistance to Firefighters Grants, fund public and firefighter safety initiatives, with eligibility extended to fire departments, tribal governments, and nonprofit organizations. These programs, administered through Montana DES, provide critical financial resources to support Cascade County's mitigation and emergency preparedness efforts.

Cascade County has access to various federal and state funding opportunities to support hazard mitigation, wildfire prevention, emergency preparedness, and community resilience. The Wildland Urban Interface Community and Rural Fire Assistance Program provides grants for local fire protection training, planning, and mitigation. The Secure Rural Schools and Community Self-Determination Act funds Firewise Community activities such as wildfire assessments and mitigation projects. The U.S. Fish & Wildlife Service Rural Fire Assistance Grants and the BLM Community Assistance Program offer financial aid for firefighting equipment and wildfire mitigation efforts in rural areas. FEMA's Fire Management Assistance Program provides cost-sharing for wildfire response, while the Community Facilities Loans and Grants through the USDA support essential public services. The General Services Administration's Surplus Property Program, the Hazardous Materials Emergency Preparedness Grants, and Homeland Security Grants also aid for emergency response and infrastructure protection. The Community Development Block Grants (CDBG) fund public improvements, such as post-disaster rebuilding and flood mitigation. The Volunteer Fire Assistance Program and Western States Wildland Urban Interface Grant Program provide financial aid for wildfire prevention, while Hazardous Fuel Reduction Grants support fuel reduction near national forests. The Renewable Resource Grant Program funds projects that conserve and protect natural resources. These programs mitigate hazards, improve emergency response, and build community resilience in Cascade County.

The Planning Team conducted a comprehensive review of mitigation actions from the 2011 PDM Plan, assessing completed projects and determining necessary revisions for the 2017 mitigation strategy, carrying out through team discussions in early 2017, ensured alignment with FEMA's Local Mitigation Planning Handbook (2013) by incorporating a range of mitigation action types. These include prevention projects (regulatory measures influencing land use and construction), property protection projects (structural modifications or relocations to reduce hazard risks), structural projects (modifications to public and private infrastructure to withstand hazards), natural resource protection (preserving and restoring ecosystems to mitigate hazard impacts), education and awareness programs (public outreach on hazard mitigation strategies), emergency service projects (enhancing preparedness through training and equipment acquisition), and mapping, analysis, and planning projects (developing mapping tools and planning documents for mitigation implementation). The Planning Team prioritized initiatives that address vulnerable properties, strengthen NFIP participation, enhance public awareness, and support countywide and regional mitigation capabilities will benefit these strategies.

Due to financial and time constraints, Cascade County prioritizes mitigation actions based on their cost-effectiveness and potential impact, ensuring the most critical projects are addressed first. In compliance with 44 CFR 201.6.c.3iii, the county conducted a qualitative benefit-cost review to assess and rank mitigation projects based on population and property protection, project feasibility, and cost. The evaluation categorized each project as high, medium, or low priority using a cost-benefit scoring matrix. Projects protecting more than 50% of the population or over $500,000 in property received a high ranking, while feasibility was determined based on the availability of technology and ease of implementation. Cost was assessed in tiers, with projects exceeding $500,000 ranked high and those under $100,000 ranked low. The overall prioritization helps guide funding decisions, ensuring resources are allocated efficiently to maximize life and property protection.

The Cascade County Multi-Hazard Mitigation Plan (MHMP) outlines a comprehensive strategy to reduce the risks and impacts of various hazards affecting the county and its municipalities. The MHMP Planning Team identified, reviewed, and assigned responsibility for implementing projects to relevant county, city, and town departments, with additional support from local, state, federal, and regional agencies. Each project was given an implementation timeline, categorized as "ongoing" (part of existing emergency programs), "short-term" (1-2 years), "mid-term" (3-4 years), "long-term" (5+ years), or "Year 1-5" (covering the entire planning period). The Cascade County DES (Disaster and Emergency Services) Coordinator oversees mitigation project administration.

The plan includes six main goals, each addressing a specific hazard or risk factor, with corresponding objectives and projects. These goals focus on prevention, emergency response improvements, public education, structural enhancements, mapping, and planning.

1. Hazardous Material Incidents
    - Developing alternative hazardous material routes to prevent exposure in populated areas.
    - Enhancing first responder training and acquiring containment equipment.
    - Conducting public education programs on hazardous material awareness and response.
2. Wildfire Risk Reduction
    - Offering grants to landowners to create defensible space around properties.
    - Continuing wildfire education programs for the public.
    - Recruiting and training volunteer firefighters and obtaining firefighting equipment like 4WD tenders.
    - Conducting fuel treatments along evacuation routes and improving fire response planning.
3. Severe Weather & Drought Preparedness
    - Installing shatterproof windows in schools and critical facilities.
    - Promoting severe weather spotter training and drought response programs.
    - Encouraging utility companies to bury power lines in high-risk areas.
4. Communicable Disease Mitigation

- Supporting public health education programs.
- Encouraging immunizations and collaboration between public health agencies and healthcare providers.

5. Transportation Accident Prevention
    - Conducting mass casualty incident exercises for emergency responders.
    - Recruiting and training EMS volunteers.
    - Working with railroads to improve crossings and redesign unsafe underpasses.
6. Flooding & Dam Failure Prevention
    - Re-certifying levees in key locations.
    - Educating homeowners about flood insurance.
    - Removing floodway debris, installing river gauges, and improving drainage systems.
    - Conducting structural improvements, such as resizing culverts and constructing dikes to prevent flood damage.

Each project was ranked based on its benefit-cost ratio, county priority, and expected jurisdictional impact. Some projects involve infrastructure improvements, such as constructing firebreaks, storm drains, and flood control systems, while others focus on education, planning, and response training. The mitigation plan emphasizes collaboration between local governments, emergency services, and the community to enhance resilience against disasters.

The Cascade County MHMP includes a structured plan maintenance process to ensure it remains an active and relevant document. The plan is monitored, evaluated, and revised every five years or more frequently of major disasters, project completions, new mitigation needs, or shifts in funding availability. The Cascade County DES Coordinator oversees the review process, ensuring mitigation activities are assessed and integrated into existing planning mechanisms. The Local Emergency Planning Committee (LEPC) will conduct quarterly reviews of different hazard profiles, evaluating emerging risks, completed projects, and mitigation priorities to determine if early updates are needed. After a major disaster, the plan will be reassessed to confirm the relevance of mitigation actions and identify necessary revisions to improve community resilience. Three years after adoption, the DES Coordinator may apply for a FEMA planning grant to initiate the next update (2022), with a proposed one-year timeline for completion. Once FEMA approves the updated plan, it will be submitted to the Cascade County Board of Commissioners and municipal councils in Great Falls, Belt, Cascade, and Neihart for adoption. The updated plan will be publicly available on the county website, and stakeholders will receive notifications. Since the 2011 PDM Plan, several mitigation projects have been completed, while others remain ongoing. The LEPC prioritizes projects based on hazard severity and funding availability, and the Cascade County DES Coordinator tracks mitigation progress, although the 2011 plan lacked a structured monitoring process. Under the 2017 MHMP, agencies responsible for specific projects—such as fire councils, public works departments, and levee districts—coordinate with the LEPC to discuss challenges, successes, and opportunities. Evaluations assess whether goals align with current risks, resources are sufficient, actions remain cost-effective, and implementation challenges exist. Individual projects are monitored by the

implementing department or grant administrator, with HMGP and PDMC projects overseen by the DES Coordinator and fire-related projects managed by the Cascade County Fire Department, USFS, BLM, or DNRC. Progress is tracked through a central database with quarterly reports submitted to federal agencies. The MHMP Planning Team continuously evaluates project implementation, ensuring necessary adjustments during updates. Cascade County may also measure mitigation success by participating in the STAR Community Rating System, which helps local leaders assess sustainability, set goals, and track progress. Through plan revisions and amendments, Cascade County will integrate hazard mitigation projects into existing plans, regulations, and ordinances. The MHMP will be incorporated into future updates of emergency operations plans, growth policies, zoning and subdivision regulations, floodplain management plans, and transportation strategies. Partnering with state agencies, local governments, and organizations aims to promote disaster-resistant building codes, allocate resources for mitigation projects to develop incentives for citizens and businesses to participate in hazard mitigation efforts. Growth policies in Cascade County, the City of Great Falls, and the Towns of Cascade and Neihart will be updated to ensure high-hazard areas are prioritized for low-risk development. Additionally, staff responsibilities will be expanded to include mitigation planning—the Planning Director will participate in the LEPC, the GIS Manager will manage and update spatial hazard data, and the DES Coordinator will oversee outreach activities, funding efforts, project implementation, and MHMP updates. A master file will be maintained to track damage reports, mitigation progress, and meeting records. The Board of County Commissioners and the City of Great Falls Emergency Manager will regularly review progress on integrating mitigation strategies into local planning efforts to ensure ongoing risk reduction and disaster preparedness.

3.4 THE NUMBER OF TUNNELS REQUIRING UPGRADES AND ESTIMATE THE COSTS INVOLVED IN REACTIVATING THE RAILROAD

3.4.1 Montana Branch Line Study Phase II – Other At-Risk Lines

To achieve a break-even operational level for the branch line, at least 2,400 carloads must be transported annually between Great Falls and Helena at a rate of at least $500 per carload. The estimated track and structure maintenance cost on the branch line is approximately $4,445 per mile. To support operations, the rail line requires two locomotives in active use and one as a backup. Leasing these locomotives is recommended, with rental costs ranging from $75 to $100 per day.

It is advised to hire an external contractor for locomotive maintenance. Given that two locomotives will be used three days per weekday, annual expenses for parts and labor per locomotive are estimated at $17,000.

General and administrative costs include salaries for a general manager overseeing all administrative functions, two employees for train operations, and four-track maintenance personnel. All positions are required to be full-time and non-union. The estimated total cost for general and administrative expenses—including utilities, legal and accounting services, insurance, and property taxes—is projected to be $135,000 annually.

PROJECTED INCOME STATEMENT		
	YEAR 1 – YEAR 4	YEAR 5 – YEAR 10
ACQUISITION PRICE	-	-

PROJECTED CARLOADS	$2,400	$2,400
REVENUE PER CARLOAD	$500	$500
OPERATING REVENUES		
FREIGHT REVENUE	$1,200,000	$1,200,000
MAINTENANCE FEES	-	-
AAR BILLINGS	-	-
DEMURRAGE	-	-
TOTAL OPERATING REVENUES	$1,200,000	$1,200,000
OPERATING EXPENSES		
MAINTENANCE OF WAY	$422,250	$422,250
MAINTENANCE OF EQUIPMENT	$63,375	$63,375
TRANSPORTATION	$571,330	$571,330
GENERAL AND ADMINISTRATIVE	$136,300	$122,300
TOTAL OPERATING EXPENSES	$1,192,255	$1,179,255
INCOME FROM OPERATIONS	$7,745	$20,745
OTHER INCOME	-	-
ONE-TIME EXPENSES	-	-
INCOME AVAILABLE FOR FIXED CHARGES	$7,745	$20,745
INTEREST ON DEBT/CAPITAL LEASES	-	-
AMORTIZATION OF ACQUISITION	-	-
PRE-TAX INCOME	$7,745	$20,745
INCOME TAXES	$3,098	$8,298
NET INCOME AFTER TAXES	$4,647	$12,447
EBITDA	$20,745	$20,745

Table 7: Projected Income Statement from Montana Branch Line Study Phase II – Other At-Risk Lines

PROJECTED BALANCE SHEET										
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
CASH	$17,002	$34,649	$52,296	$69,943	$81,306	$93,753	$106,200	$118,647	$131,094	$143,541
SHORT-TERM INVESTMENTS	-	-	-	-	-	-	-	-	-	-
ACCOUNTS RECEIVABLES	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
PROPERTY AND PLANT	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000
ACCUMULATED DEPRECIATION	$13,000	$26,000	$39,000	$52,000	$52,000	$52,000	$52,000	$52,000	$52,000	$52,000
NET PROPERTY AND PLANT	$52,000	$39,000	$26,000	$13,000	$13,000	$13,000	$13,000	$13,000	$13,000	$13,000
OTHER ASSETS	-	-	-	-	-	-	-	-	-	-
TOTAL ASSETS	$169,002	$173,649	$178,296	$182,943	$194,306	$206,753	$219,200	$231,647	$244,094	$256,541
LIABILITIES AND EQUITY										
ACCOUNTS PAYABLE	$99,355	$99,355	$99,355	$99,355	$98,271	$98,271	$98,271	$98,271	$98,271	$98,271
SHORT TERM DEBT										

LONG-TERM DEBT	-	-	-	-	-	-	-	-	-	-
OTHER LIABILITIES	-	-	-	-	-	-	-	-	-	-
TOTAL LIABILITIES	$99,355	$99,355	$99,355	$99,355	$98,271	$98,271	$98,271	$98,271	$98,271	$98,271
STOCKHOLDERS EQUITY	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000	$65,000
RETAINED EARNINGS	$4,647	$9,294	$13,941	$18,588	$31,035	$43,482	$55,929	$68,376	$80,823	$93,270
TOTAL LIABILITIES AND EQUITY	$169,002	$173,649	$178,296	$182,943	$194,306	$206,753	$219,200	$231,647	$244,094	$256,541
DEBT TO EQUITY RATIO	143%	134%	126%	119%	102%	91%	81%	74%	67%	62%

Table 8: Projected Balance Sheet from Montana Branch Line Study Phase II – Other At-Risk Lines

PROJECTED CASH FLOW										
CASH PROVIDED FROM OPERATIONS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
NET INCOME	$4,647	$4,647	$4,647	$4,647	$12,447	$12,447	$12,447	$12,447	$12,447	$12,447
DEPRECIATION	$13,000	$13,000	$13,000	$13,000	-	-	-	-	-	-
OTHER	-	-	-	-	-	-	-	-	-	-
SUB-TOTAL	$17,647	$17,647	$17,647	$17,647	$12,447	$12,447	$12,447	$12,447	$12,447	$12,447
DECREASE (INC.) IN WORKING CAPITAL										
RECEIVABLES	($100,000)	-	-	-	-	-	-	-	-	-
PAYABLES	$99,355	-	-	-	($1,083)	-	-	-	-	-
OTHER CURRENT ASSETS/LIAB	-	-	-	-	-	-	-	-	-	-
SUB-TOTAL	-645	-	-	-	($1,083)	-	-	-	-	-
CASH PROVIDED FROM OPERATIONS	$17,002	$17,647	$17,647	$17,647	$11,364	$12,447	$12,447	$12,447	$12,447	$12,447
EXPENDITURE FOR PROPERTY	($65,000)	-	-	-	-	-	-	-	-	-
INCREASE IN STOCKHOLDER EQUITY	$65,000	-	-	-	-	-	-	-	-	-
REDUCTION IN LONG-TERM DEBY	-	-	-	-	-	-	-	-	-	-
INCREASE IN LONG-TERM DEBY	-	-	-	-	-	-	-	-	-	-
INC/DEC IN CASH $(65,000)	$17,002	$17,647	$17,647	$17,647	$11,364	$12,447	$12,447	$12,447	$12,447	$12,447
CASH-BEGINNING OF THE YEAR	-	$17,002	$34,649	$52,296	$69,943	$81,306	$93,753	$106,200	$118,647	$131,094
CASH-END OF THE YEAR	$17,002	$34,649	$52,296	$69,943	$81,306	$93,753	$106,200	$118,647	$131,094	$143,541
NPV OF OPERATIONS: 10 YEARS	$49,750 Cash from Operations									
@ 12% DISCOUNT RATE	$44,420 Inc/Dec Cash									
IRR AFTER 10 YEARS	25%									
ACQUISTION PRICE	-									
PROJECTED CARLOADS	$2,400									
AVE REVENUE/CAR	$500									
NET LIQUIDATION VALUE (YR 1)	-									
VALUE OF RAILROAD YEAR 10	$103,725									

Table 9: Projected Cash Flow from Montana Branch Line Study Phase II – Other At-Risk Lines

3.4.2 2,016 Montana Rail Grade Separation Study

3.4.2.1 Estimate Cost For Railroad-Highway Crossings In Carter Drive, Helena

The following estimate cost was based on the anticipated order of magnitude conceptual estimate of Preliminary Engineering (PE), Construction Engineering (CE), Interest During

Construction (IDC) [2], right-of-way [3] and 25 percent contingency is $27,800,000 (2015$). Table 6 showed the estimate cost for Carter Drive with underpass option.

3.4.2.1.1 Carter Drive Underpass Option Estimate Cost

Carter Drive Components	Cost ($)
Road Work	$2,444,000
Railroad Work	$4,330,000
New Structure(s)	$4,026,000
Hydraulics	$400,000
Utilities	$1,000,000
Miscellaneous Items	$600,000
Mobilization (18%)	$2,200,000
Contingencies (25%)	$3,800,000
Preliminary Engineering (15%)	$2,800,000
Construction Engineering (15%)	$2,800,000
Right-of-Way	$826,000
IDC (10.37%)	$2,600,000
Total Cost (2015$)	$27,800,000

Table 10: Carter Drive Underpass Estimate Cost

3.4.2.1.2 Benefit-Cost Analysis (BCA) For Carter Drive Underpass Option

The following analysis considered travel time, safety, vehicle operating costs, environmental (emissions), and pavement maintenance at Carter Drive. The methodology is consistent with the guidance of the DOT Transportation Investment Generating Economic Recovery or TIGER Discretionary Grant program. The BCA results estimated total benefits over a 20-year analysis period for Carter Drive. Tables 8 and 9 showed Benefit categories and BCA results for Carter Drive, and Figure 3 showed undiscounted benefits for the Carter Drive grade separation plan.

Problems from the result in Figure 3 were not captured with empirical data and constraints in conducting a highly detailed analysis of each crossing. Other constraints could be considered, such as improved access to first responders and travel time reliability, and the result will be less accurate each year.

Due to the high volumes of vehicles and trains, the Carter Drive at-grade railroad crossing was regarded as a priority location for enhancing traffic flow. An under-crossing of the railroad was recommended at this location to increase vehicular and non-motorized safety. The project could align with the long-range vision for the Carter Drive corridor in the 2014 LRTP project.

---

[2] IDC
https://www.fe.training/free-resources/project-finance/interest-during-construction-idc/
[3] Right-of-Way
https://en.wikipedia.org/wiki/Right_of_way

Benefit Category	Total Undiscounted Benefits (2015$ M)	Total Benefits Discounted at 3% (2015$ M)	Total Benefits Discounted at 7% (2015$ M)
Travel Time Savings	$1.31	$0.91	$0.60
Improved Safety	$0.64	$0.45	$0.29
Vehicle Operating Cost Savings	$0.08	$0.06	$0.04
Reduced Environmental Costs	$0.01	$0.01	$0.01
Avoided Operations and Maintenance Costs	$0.36	$0.26	$0.18
Reduced Pavement Damage Costs	$0.00	$0.00	$0.00
TOTAL	**$2.40**	**$1.69**	**$1.12**

Table 11: Benefit Categories for Carter Drive Grade Separation

Benefit Category	Total Undiscounted Benefits (2015$ M)	Total Benefits Discounted at 3% (2015$ M)	Total Benefits Discounted at 7% (2015$ M)
Total Benefits ($2,015 M)	$2.40	$1.69	$1.12
Total Costs ($2,015 M)	$28.04	$27.16	$26.10
Net Present Value (NPV)	-$25.63	-$25.47	-$24.98
Return on Investment (ROI)	-91.42%	-93.78%	-95.71%
Benefit-Cost Ratio (BCR)	0.09	0.06	0.04
Payback Period	N/A	N/A	N/A
Internal Rate of Return (IRR)	-16.58%	-19.01%	-22.02%

Table 12: BCA Results of Carter Drive Grade Separation

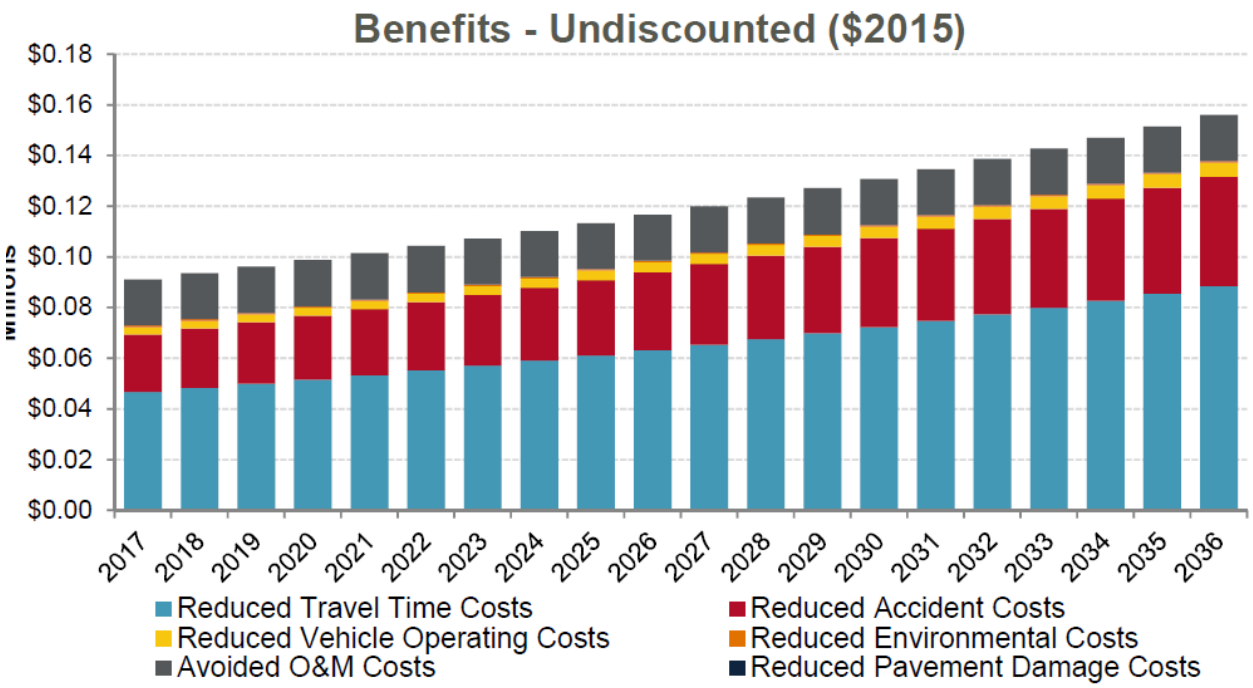

Figure 8: Undiscounted Benefits for Carter Drive Grade Separation

3.4.2.2 Estimate Cost For Railroad-Highway Crossings In Montana Avenue, Helena

3.4.2.2.1 Montana Avenue Underpass Option Estimate Cost

The following estimate cost was based on the anticipated order of magnitude conceptual estimate of Preliminary Engineering (PE), Construction Engineering (CE), Interest During Construction (IDC), right-of-way and 25 percent contingency is $29,600,000 (2015$). Table 10 showed the estimate cost for Montana Avenue with underpass option.

Montana Avenue Components	Cost ($)
Road Work	$5,705,000
Railroad Work	$1,446,000
New Structure(s)	$3,249,000
Hydraulics	$500,000
Utilities	$1,500,000
Miscellaneous Items	$600,000
Mobilization (18%)	$2,200,000
Contingencies (25%)	$3,800,000
Preliminary Engineering (15%)	$2,900,000
Construction Engineering (15%)	$2,900,000
Right-of-Way	$2,000,000
IDC (10.37%)	$2,800,000
Total Cost (2015$)	$29,600,000

Table 13: Montana Avenue Underpass Estimate Cost

3.4.2.2.2 Benefit-Cost Analysis (BCA) For Montana Avenue Underpass Option

The following analysis considered travel time, safety, vehicle operating costs, environmental (emissions), and pavement maintenance at Montana Avenue. The methodology is consistent with the guidance of the DOT Transportation Investment Generating Economic Recovery or TIGER Discretionary Grant program. The BCA results estimated total benefits over a 20-year analysis period for Montana Avenue. Tables 11 and 12 showed Benefit categories, BCA results for Montana Avenue, and Figure 4 showed undiscounted benefits for the grade separation plan.

Benefit Category	**Total Undiscounted Benefits (2015$ M)**	**Total Benefits Discounted at 3% (2015$ M)**	**Total Benefits Discounted at 7% (2015$ M)**
Travel Time Savings	$9.37	$6.62	$4.42
Improved Safety	$2.79	$1.97	$1.32
Vehicle Operating Cost Savings	$0.13	$0.09	$0.06
Reduced Environmental Costs	$0.10	$0.08	$0.07
Avoided Operations and Maintenance Costs	$1.09	$0.79	$0.54
Reduced Pavement Damage Costs	-$0.03	-$0.02	-$0.01
TOTAL	**$13.45**	**$9.53**	**$6.40**

Table 14: Benefit Category of Montana Avenue Grade Separation

Benefit Category	**Total Undiscounted Benefits (2015$ M)**	**Total Benefits Discounted at 3% (2015$ M)**	**Total Benefits Discounted at 7% (2015$ M)**
Total Benefits ($2,015 M)	$13.45	$9.53	$6.40
Total Costs ($2,015 M)	$29.84	$28.91	$27.78
Net Present Value (NPV)	-$16.39	-$19.38	-$21.38
Return on Investment (ROI)	-54.92%	-67.04%	-76.97%
Benefit-Cost Ratio (BCR)	0.45	0.33	0.23
Payback Period	N/A	N/A	N/A
Internal Rate of Return (IRR)	-6.39%	-9.12%	-12.48%

Table 15: BCA Results of Montana Avenue Grade Separation

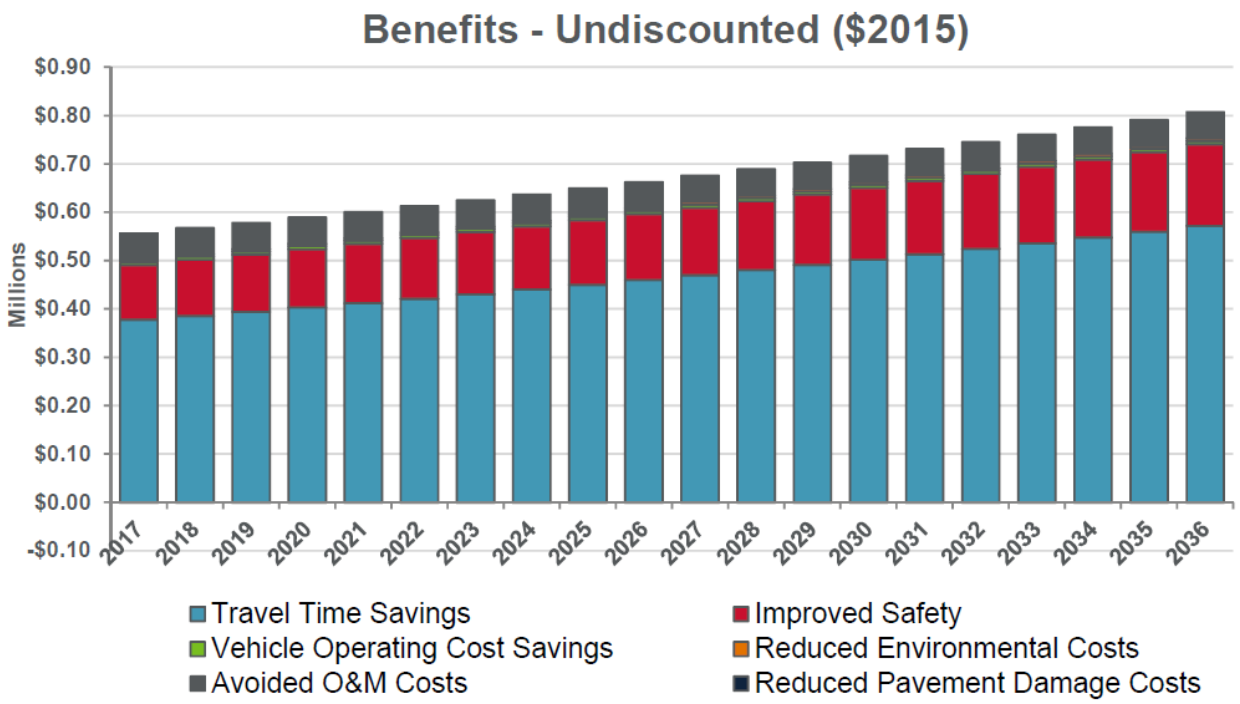

Figure 9: Undiscounted Benefits for Montana Avenue Grade Separation

Problems from the result in Figure 4 were not captured with empirical data and constraints in conducting a highly detailed analysis of each crossing. Other constraints could be considered, such as improved access to first responders and travel time reliability, and the result will be less accurate each year. Although the funding currently cannot fund the proposed improvements, the results help analyze current and future conditions for the crossing solution.

Montana Avenue is also regarded as a priority location for research. According to a review of existing conditions, published documents, and consideration of public sentiment, an undercrossing solution is recommended for this location. Further information within this section should consider how the funding becomes available, a progression plan of the project, and the environmental impacts of significance level under NEPA/MEPA during project development.

3.4.3 Financial Analysis in Greater Helena Area LRTP – 2014 Update

The LRTP implement a variety of recommend street improvement projects, which include two types of projects: major street network (MSN) and county road network (CRN). Since we focused on the railroad reactivation plan between Helena and Great Falls, we only considered the improvement MSN projects. MSN projects means large, robust road reconstruction projects that take time to develop, are costly, and are needed to meet existing or future capacity demands (MDT, 2014). Committed projects which are relevant to the railroad in MSN will listed in the table below.

Project ID	Location	Problem	Recommendation	Estimate Cost	Other Project References

MSN-2	Montana Avenue – Railroad Grade Separation	• Vehicle delay • Traffic congestion • Poor air quality	• A fully separated underpass crossing (See 3.1.6.5)	$21,780,000	• MSN-14 • MSN-15 • BL-31 • SUP-5
MSN-21	Benton Avenue – MRL Railroad Crossing to Custer Avenue	• Increasing traffic volume result in congestion on Benton Avenue	• Implement 0.7-mile segment to provide appropriate driving lanes, shoulders and lighting • Consider pedestrian in the design and widen shoulders of bicycle lanes	$1,815,000	• PED-1 • BL-29 • MSN-23 • SUP-3 • SUP-24
MSN-22	Henderson Street Railroad Crossing	• Narrow roadway width • Lack of suitable vertical clearance • Poor roadway drainage	• Provide at least 16.5 feet of vertical clearance • Incorporate road improvements to reach City complete streets standards	$2,904,000	• BL-20 • SPOT-27
MSN-23	Benton Avenue Railroad Grade Separation	• Traffic delay and operational problems on railroad crossing	• Implement overpass or underpass crossing option based on the city's demand (See 3.1.6.3)	$5,929,000	• PED-1 • BL-29 • MSN-21 • SUP-3 • SUP-24

Table 16: Recommendations for Railroad Crossing and Grade Separation in Helena

3.4.4 2017 Updated to Multi Hazard Mitigation Plan

The plan presented several hazards and estimated potential costs in Cascade County and Great Falls. Hazardous materials are one of the risks in Cascade County and Great Falls. Since Great Falls is home to several extensive industrial facilities that generate, store, or transport hazardous materials and petroleum products through Cascade County, hazardous materials have risks of accidents, spills, or derailments through highways, pipelines, and railroads. In order to enhance safety in crude oil transportation, the U.S. Department of Transportation (DOT) issued an emergency order on February 25, 2014, to require the following restrictions for a series of crude oil train derailments:

- Shippers moving Bakken crude oil from the Williston Basin to test their product before transit to ensure proper classification.
- The use of more robust tank cars for highly flammable oil shipments.
- Prohibition of rail cars designed for less hazardous materials when transporting volatile crude oil.

In order to model the spatial distribution of hazardous material risks, a GIS-based analysis was conducted:

- Transportation routes (highways, major roads, and railroads) were mapped.
- TRI facility locations were overlaid on this dataset.

- A 0.25-mile buffer was applied around these routes and facilities to assess potential exposure zones.
- Building exposure was calculated by intersecting the hazardous material buffer with the MDOR parcel and critical facility GIS data.
- Population exposure was estimated by intersecting the buffer zone with U.S. Census block data.

Because of limited property damage estimates from past incidents, the values presented in Table 16 showed the estimated cost of exposure risk to hazardous material incidents instead of actual losses.

Category	Cascade County (Balance)	Great Falls
Residential Property Exposure $	$402,495,883	$4,691,105,943
# Residences At Risk	2,935	10,736
Commercial, Industrial & Agricultural Property Exposure $	$133,811,952	$1,395,432,061
# Commercial, Industrial & Agricultural Property At Risk	419	1,646
Critical Facilities Exposure Risk $	$848,395,808	$663,373,830
# Critical Facilities At Risk	37	69
Bridge Exposure $	$140,446,775	$16,933,895
# Bridge At Risk	125	19
Persons At Risk	6,898	25,230
Persons Under 18 At Risk	1,579	5,778
Persons Over 65 At Risk	1,029	3,759

Table 17: Estimate Cost of Hazardous Material Incidents in Cascade County and Great Falls

The estimated cost of hazardous material incidents in Cascade County was based on GIS analysis. The hazardous area is 155,404 acres, including 14073 residences, 2138 commercial, industrial, and agricultural buildings, and 130 critical facilities.

Regarding wildfire risk and vulnerability in Cascade County, although the primary risks are related to structures and residents in the wildland-urban interface (WUI), most wildfire-related costs stem from firefighting efforts. Recently, climate trends have contributed to more severe wildfires. Stakeholders have also noted a significant increase in the size and intensity of Conservation Reserve Program (CRP) fires. Property damage from wildfires is often challenging to quantify. Most losses affect agricultural resources and forests rather than residential or commercial structures. As a result, wildfire severity is typically measured by acres burned and the cost of suppression efforts.

To analyze wildfire exposure, the Multi-Hazard Mitigation Plan (MHMP) team utilized the County's Community Wildfire Protection Plan (CWPP) WUI layer to classify risk zones up to four miles from interface communities with population densities greater than 250 people per square mile. The four-mile zones were divided into one-mile buffers, each assigned a WUI risk class.

In order to complete the vulnerability assessment, Geographic Information System (GIS) tools were used to overlay the wildfire hazard area with datasets containing information on critical facilities and property parcels from the Montana Department of Revenue (MDOR). U.S. Census estimated vulnerable populations based on the number of individuals per residence. The table estimates the exposure values and monetary structure values. These estimates do not account for additional property improvements or personal belongings that could be lost to wildfire. The comprehensive analysis highlights the significant wildfire risk across Cascade County. It underscores the need for proactive mitigation efforts, land use planning, and fire prevention strategies to reduce the impact of future wildfires.

Category	Cascade County (Balance)	Great Falls
Residential Property Exposure $	$1,299,940,864	$106,532,382
# Residences At Risk	6,961	363
Commercial, Industrial & Agricultural Property Exposure $	$166,381,741	$15,769,986
# Commercial, Industrial & Agricultural Property At Risk	581	14
Critical Facilities Exposure Risk $	$717,190,781	$66,481,888
# Critical Facilities At Risk	53	12
Bridge Exposure $	$139,411,573	$0
# Bridge At Risk	177	0
Persons At Risk	16,359	853
Persons Under 18 At Risk	3,733	195
Persons Over 65 At Risk	2,429	127

Table 18: Estimate Cost of Wildfire in Cascade County and Great Falls

Severe summer and winter weather events in Cascade County reported damages from the SHELDUS and NCDC databases. The SHELDUS dataset includes all loss-causing or deadly events from 1960 to 1975 and from 1995 onward. The NDCD dataset includes sporadic damage figures incorporated when they represent unique damaging events. From the datasets, although snowfall rarely shuts down Cascade County communities, extreme winter weather can pose significant challenges, such as hazardous road conditions that lead to motor vehicle accidents. Most accidents involve passenger vehicles, but commercial trucks carrying materials or school buses transporting vulnerable populations remain a serious concern. Extended severe winter weather conditions require the following essential services could be severely impacted:

- Transportation and communication networks
- Energy supply
- Shelter supplies and heating
- Medical care access
- Food availability and preparation

- Sanitation and waste management

Local government resources could become quickly overwhelmed, and mutual aid or state assistance may be challenging due to the regional impact of extreme weather events. The American Red Cross is in Cascade County and is prepared to provide emergency shelter during severe weather events. These services are coordinated through pre-determined sheltering agreements, ensuring they meet national standards for disaster response. Table 19 presents the estimated cost of severe summer and winter weather events.

	No. of events	Period of Record (Yrs)	Frequency	Damage	Magnitude	Exposure	Annual Loss
Severe Summer Weather	70	56	1.25	$18,518,794	0.00293%	$9,016,974,972	$330,693
Severe Winter Weather	89	55	1.62	$1,215,702	0.00015%	$9,016,974,972	$22,129

Table 19: Estimate Cost of Wildfire in Cascade County

Windstorms and microbursts threaten tree-covered areas, exposed properties, critical infrastructure, and above-ground utility lines. Severe hailstorms can cause significant damage to buildings and vehicles, though they rarely result in fatalities. Nationally, hailstorms cause nearly one billion dollars in property and crop damage annually, with peak occurrences aligning with agricultural seasons. The National Drought Mitigation Center tracks indemnity payments for drought-related losses at the county level. The NOAA Paleoclimatology Program has analyzed historical drought patterns using tree rings, lake sediments, archaeological records, and historical documents to understand long-term drought frequency in the United States. Their research suggests that droughts as severe as the 1950s have occurred several times per century over 300 to 400 years. A similar drought could be expected approximately once every 50 years. More extreme droughts have occurred in North America within the last 500 years, with an estimated probability of one every 500 years. Table 20 presents drought damages from 1989 to 2014 in Cascade County.

Year	Cascade County
1989	$8,887
1990	$51,752
1991	$166,478
1992	$2,117,438
1993	$0
1994	$367,452
1995	$379,512
1996	$881,542
1997	$16,389
1998	$847,255
1999	$1,167,417

2000	$2,341,370
2001	$5,911,633
2002	$3,545,118
2003	$2,359,867
2004	$788,425
2005	$90,566
2006	$180,381
2007	$133,687
2008	$394,037
2009	$682,224
2010	$0
2011	$35,995
2012	$2,683,806
2013	$480,870
2014	$241,308
TOTAL	$25,873,409

Table 20: Estimate Cost of Drought Insurance Claims in Cascade County from National Drought Mitigation Center, 2016 [4]

The flood hazard area was analyzed by intersecting it with the critical facility database, the Natural Resource Information System (NRIS) structures shapefile, and the Montana Department of Revenue (MDOR) cadastral database for building valuations. The estimated vulnerable populations used the NRIS structures shapefile and U.S. Census data, indicating an average of 2.35 individuals per structure; 22.5 percent is under age 18, and 17.4 percent is over age 65. Table 21 presents the estimated cost of flooding in Cascade County.

Category	Cascade County (Balance)	Great Falls
Residential Property Exposure $	$114,923,448	$92,198,951
# Residences At Risk	662	318
Commercial, Industrial & Agricultural Property Exposure $	$5,214,547	$3,420,803
# Commercial, Industrial & Agricultural Property At Risk	39	6
Critical Facilities Exposure Risk $	$86,828,071	$32,110,966
# Critical Facilities At Risk	6	7
Bridge Exposure $	$93,227,824	$7,974,774
# Bridge At Risk	41	4
Persons At Risk	1,555	747
Persons Under 18 At Risk	356	171
Persons Over 65 At Risk	231	111

Table 21: Estimate Cost of Flooding in Cascade County and Great Falls

[4] Source: National Drought Mitigation Center
http://drought.unl.edu/Planning/Impacts/DroughtIndemnityData.aspx

GIS analysis indicates that 87,369 acres—approximately 5 percent of Cascade County—are within the dam inundation hazard area. This area includes 6,450 residential structures, 940 commercial, industrial, and agricultural buildings, 53 critical facilities, and critical facilities and bridges within the dam inundation zone. Table 22 presents the estimated cost of dam failure in Cascade County and Great Falls.

Category	Cascade County (Balance)	Great Falls
Residential Property Exposure $	$433,839,391	$931,597,349
# Residences At Risk	2,513	3,810
Commercial, Industrial & Agricultural Property Exposure $	$39,896,496	$527,304,977
# Commercial, Industrial & Agricultural Property At Risk	170	721
Critical Facilities Exposure Risk $	$840,641,796	$301,844,790
# Critical Facilities At Risk	18	28
Bridge Exposure $	$107,266,202	$14,020,357
# Bridge At Risk	54	12
Persons At Risk	5,906	8,954
Persons Under 18 At Risk	1,353	2,050
Persons Over 65 At Risk	881	1,334

Table 22: Estimate Cost of Dam Failure in Cascade County and Great Falls

3.5 POTENTIAL FINANCIAL PARTNERSHIPS THAT COULD SUPPORT THE REACTIVATION EFFORTS

3.5.1 Greater Helena Area LRTP – 2014 Update

The Montana Department of Transportation (MDT) managed a Montana Rail Freight Loan Program (MRFL) – a revolving fund to encourage projects for construction, reconstruction, and rehabilitation of railroads and related facilities in the State and implements MCA 60-11-113 to MCA 60-11-115. According the website on LAWS [xvii], MCA 60-11-113 to MCA 60-11-115 have the following meaning:

- **MAC 60-11-113**: Short title. Sections 60-11-113 through 60-11-116 may be cited as the "Montana Essential Freight Rail Act".

- **MAC 60-11-114**: Purpose. (1) Montana's railroad branch lines provide critical transportation to Montana businesses and communities. These lines are especially important to Montana's agricultural and wood products industries that rely on railroads to transport Montana products to national and international markets. The branch lines are also critical to efforts to increase or expand businesses that process Montana commodities into more valuable products. (2) A state rail funding program will provide Montana with an important tool to help preserve and enhance Montana's branch lines. (3) The purpose of sections 60-11-113 through 60-11-116 is to provide low-interest loans to railroads, cities, counties, companies, or regional rail authorities for the purposes provided in 60-11-120 to preserve or enhance cost-effective rail service to Montana communities and businesses.

- **MAC 60-11-115**: Revolving loan account -- statutory appropriation -- rulemaking. (1) There is a revolving loan account to be administered by the department. Any interest or income that is earned by the account and loan repayments must be deposited into the revolving loan account unless revenue bonds are issued to fund a loan, in which case the loan repayments must be deposited in the debt service account. The department may request the board of investments to issue revenue bonds, as provided in 60-11-117 through 60-11-119, for the purpose of providing funds for a loan. (2) The department may make loans from the account pursuant to 60-11-120. (3) Funds in the account that are deposited pursuant to former 49 U.S.C. 1654 must continue to be managed as local rail freight assistance program funds. Any additional federal funds received for local rail freight assistance programs or for railroad projects must be deposited in the account. (4) There is statutorily appropriated, as provided in 17-7-502, to the department up to $2 million annually for the purposes of making loans pursuant to 60-11-120. (5) Loans may not be made if the loan would cause the balance in the account to be less than $500,000. (6) The department may adopt rules to implement 60-11-113 through 60-11-116.

Loans aimed to rehabilitation and improvement of railroads and attendant facilities, including sidings, yards, buildings, and intermodal facilities. Rules to apply loans should have 30

percent loan-to-value match in rehabilitation and improvement assistance projects, and 50 percent match in facility construction assistance projects. Eligible applicants for the loans required to integrate with the railroad transportation system in the State, include railroads, cities, counties, companies, and regional rail authorities, and demonstrate that they will implement cost-effective strategies to bring economic benefits on rail service to Montana communities and businesses.

3.5.1.1 Local Funding Sources

The following funding sources are from the local governments of Helena to finance transportation improvements, and satisfy specific transportation functions in the city and county.

- Special Revenue Funds: Revenues with legally restricted for a specific purpose to benefit transportation system
- SID Revolving Fund: A fund for improving special districts in need of additional funds. It is available to bond repayment with the adjoining landowners to receive the benefit for the improvement
- Gas Tax Apportionment: The apportion of State gasoline taxes provide a revenue. In 2,014, the amount of state gas tax apportionment was $554,354. The revenue used for reimbursing expenditures in construction, reconstruction, repair, and maintenance of streets
- Street Maintenance Assessment: The assessment fund maintenance activities on public roadways generate revenues.
- Helena Parking Commission: Revenues which is coming from monthly lease rental payments and meter collections will help to fund parking improvements in the downtown area

3.5.1.2 Future Potential Funding Sources

The following funding sources generate funds to improve transportation system from different types of taxes and fees.

- Local Sales Tax: A funding source from local governments to initiate option taxes for transportation improvements
- Wheel Tax: Revenue which is from a tax per wheel or vehicles licensed to support transportation network improvements
- Local Option Motor Fuel Tax: Funds generate from increasing taxes for the construction, reconstruction, maintenance, and repair of public streets and roads.
- Excise Taxes: A substantial revenue from goods or products with excise tax to generate local funds
- Development Impact Fees: A fee generate from the developers to improve transportation network.
- Value Capture Taxes: Taxes from businesses which will bring benefit for transportation system. For example, cash flow management will implement for current revenue instead of introducing new sources to use the funds wisely.

The LRTP ensured a stable financial support from sources from 2015 to 2035 to fund transportation projects. Table 15 showed the sources and revenue for the LRTP.

Table 10.1: Projected Funding (Estimated)

Funding Source	Current Account Balance	Current Annual Allocation (2015)	Projected Annual Allocation (per year)	Revenue Projection 2025	Revenue Projection 2035
NHPP – NH, IM *	$0	$350,000	$350,000	$3,500,000	$7,000,000
HSIP Safety *	$0	$100,000	$100,000	$1,000,000	$2,000,000
STPU – Urban	$2,456,071[a]	$1,043,290	$1,050,000	$10,500,000	$21,000,000
STPS – Secondary *	$0	$50,000	$50,000	$500,000	$1,000,000
STP – Bridge *	$0	$100,000	$100,000	$1,000,000	$2,000,000
RRS – Railroad *	$0	$50,000	$50,000	$500,000	$1,000,000
UPP – Preservation *	$0	$250,000	$250,000	$2,500,000	$5,000,000
TA		$50,000 [b]	$50,000 [b]	$500,000	$1,000,000
MACI -State Disc.		$100,000	$100,000	$1,000,000	$2,000,000
State Fuel Tax (City)		$554,354	$555,000	$5,550,000	$11,100,000
State Fuel Tax (County)		$274,965	$275,000	$2,750,000	$5,500,000
SID's / RID's[c]		VARIES	VARIES	VARIES	VARIES
FTA Sec. 5311		$636,000	$636,000	$6,360,000	$12,720,000
FTA Sec. 5310 **		$10,000	$10,000	$100,000	$200,000
Other (Private, Bonds, TIF, CBDG, etc.) Local Transit Mill Levy		$250,000	$250,000	$2,500,000	$5,000,000
TOTAL[d]				**$38,260,000**	**$76,520,000**

Notes: Although MAP-21 only provides for Federal funding through FFY2015, 2025 and 2035 projections are based on continuance of current levels of funding unless otherwise noted. It is important to note that the projected funding estimates are based on the best information available at this time and that there is no guarantee that these funding sources will be available beyond MAP-21. Estimated Federal fund allocations do not include amounts of any required local matching funds. Federal revenues, local revenues and local and state matching funds are held constant and do not inflate over time due to uncertainty with federal transportation program reauthorization. Accordingly, future year allocation for year 2025 and 2035 are based on current annual allocations being projected out to the future. Reevaluation of revenue estimation may be necessary as part of a future LRTP update if a trend of shorter authorizations continues.

[a] Only STPU – Urban is a set funding allocation; current account balance (01/2015) per MDT Statewide and Urban Planning Section.
[b] The TA (Transportation Alternatives) funding program does not have a set allocation. For purposes of estimating, an annual allocation of $50,000 was identified, assuming Helena would be successful in procuring some of the statewide TA available funding.
[c] Local SID/RIDs (Special / Rural Improvement Districts) are primarily available for "local" road projects and not on Major Street Network roadways.
[d] Totals given are not entirely available for "road" projects. For example, totals presented include FTA funds (available for transit), which are not available for road or intersection construction activities, per se.

** Estimates from MDT are based on historical obligation figures with input from district.*
*** 5310 administered by MDT for qualified providers.*

Table 23: Funding sources and revenue from 2014 LRTP

4 REFERENCE

Cover page picture credit: Justin Franz / MTFP

https://montanafreepress.org/2,024/07/29/helena-could-be-passed-up-by-passenger-rail-route/

[i] Montana Central Railway
https://en.wikipedia.org/wiki/Montana_Central_Railway#cite_ref-2

[ii] Railroads Link Montana to the Nation (1881-1915)
https://mhs.mt.gov/education/textbook/chapter9/Chapter9.pdf

[iii] Montana Branch Line Study Phase II Other At-Risk Lines
https://www.mdt.mt.gov/publications/docs/brochures/railways/branchlinestudy-phaseii.pdf

[iv] Montana Rail Link
https://en.wikipedia.org/wiki/Montana_Rail_Link

[v] Federal board sides with Navajo coal company, says BNSF must ship to Canada port
https://www.montanarightnow.com/helena/federal-board-sides-with-navajo-coal-company-says-bnsf-railway-must-ship-to-canadian-port/article_f21a7b70-15e3-11ee-b4e9-4bb8cc4ca989.html

[vi] Rail expansion at Calumet refinery threatens access to Great Falls wastewater treatment plant
https://montanafreepress.org/2,025/01/22/rail-expansion-at-calumet-refinery-threatens-access-to-great-falls-wastewater-treatment-plant/

[vii] Greater Helena Area Long Range Transportation Plan (LRTP) – 2014 Update
https://www.mdt.mt.gov/publications/docs/brochures/helena-transportation-plan.pdf

[viii] Great Falls Area Long Range Transportation Plan (LRTP) – 2,018 Update
https://www.mdt.mt.gov/publications/docs/brochures/great-falls-transportation-plan.pdf

[ix] I-15 Gore Hill to Emerson Junction Corridor Planning Study
https://www.mdt.mt.gov/pubinvolve/i15/docs/I15-ExistingProjectedConditions.pdf

[x] 2016 Montana Rail Grade Separation Study
https://www.mdt.mt.gov/publications/docs/brochures/MDT-RGSS-Final-Report-2,016.pdf

[xi] I-15 Wolf Creek North & South Project under MDT
https://www.mdt.mt.gov/pubinvolve/i15wolfcreek/default.aspx

[xii] An old section of Montana Rail Link track on Homestake Pass
https://www.reddit.com/r/rustyrails/comments/htqgy7/an_old_section_of_montana_rail_link_track_on/

[xiii] Condition of line from Helena to Great Falls
https://www.trainorders.com/discussion/read.php?1,5699514

[xiv] Slip-out location in Ulm
https://www.trainorders.com/discussion/read.php?1,236222

[xv] 2010 Montana State Rail Plan

https://www.mdt.mt.gov/publications/docs/brochures/railways/railplan.pdf

[xvi] 2017 Updated to Multi Hazard Mitigation Plan
https://www.cascadecountymt.gov/DocumentCenter/View/248/Pre-Disaster-Mitigation-Plan-PDF

[xvii] MCA 60-11-113 to MCA 60-11-115
https://archive.legmt.gov/bills/mca/title_0,600/chapter_0,110/part_0,010/section_0,130/0,600-0,110-0,010-0,130.html
https://archive.legmt.gov/bills/mca/title_0,600/chapter_0,110/part_0,010/section_0,140/0,600-0,110-0,010-0,140.html
https://archive.legmt.gov/bills/mca/title_0,600/chapter_0,110/part_0,010/section_0,150/0,600-0,110-0,010-0,150.html