City and County of Denver

Freight Railroad Safety Study



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Prepared for:



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EXECUTIVE SUMMARY

In 2016 Denver Mayor, Michael B. Hancock, commissioned a study to review the City and County of Denver's (CCD or Denver) policies and practices for safety and hazard mitigation in areas near railroad rights-of-way (ROW) (CCD, 2016). This study expands on the mayor's study and reports on hazardous material shipments by rail throughout Denver. The purpose of this study's is to communicate current and future risks associated with freight rail throughout Denver in relation to population growth, land use, rail traffic patterns, and critical/sensitive facilities and resources. In addition to the mayor's 2016 study, the following documents were also reviewed and are incorporated throughout this study as appropriate:

- City of Calgary Baseline Risk Assessment of Land Development within Proximity of Freight Rail
 Corridors (2018): The City of Calgary commissioned this study to review rail safety hazards and risk
 assessment for the city following a large-scale disaster resulting from the derailment of a train
 carrying hazardous materials. The study assessed Canadian rail traffic volumes and trends, land use
 adjacent to railroad ROW, and rail operations and served as a model for the study being conducted
 by Denver.
- Colorado State Highway-Rail Grade Crossing Safety Action Plan (2022a): The State of Colorado, through the Colorado Department of Transportation (CDOT), generated this plan in compliance with the U.S. Department of Transportation's Federal Railroad Association (FRA) and Section 11401(b) of the Fixing America's Surface Transportation Act, which divided the nation's states into two groups: those with higher numbers of grade-crossing collision incidents and those with lower numbers. Under this Act, as part of the latter group, Colorado is required to develop a Safety Action Plan (SAP) to address high-risk crossings and at-grade crossing incidents.

This study analyzes spatial and statistical data obtained from the Association of American Railroads (AAR), the National Transportation Safety Board, FRA, and the City of Denver to summarize existing rail conditions, road crossings, and trespassing incidents within the city and to identify the locations, causes, types, and frequencies of rail-related accidents compared to the national, state, and local levels. As risk factors such as overall rail traffic volume, hazardous materials shipments, and high-density residential development near railroad ROW continue to increase, HNTB recommends a wide range of short-, medium-, and long-term mitigation measures. These measures can be addressed by Denver and by the railroads to decrease the likelihood of overall rail-related accidents in the city and to reduce the magnitude of impacts on surrounding communities and sensitive environmental resources. Mitigation measures detailed in this study include the following:

Short-term (less than 1 Year)

- Denver might develop and implement hazard management and evacuation plans.
- Denver might consider conducting a more comprehensive "parcel by parcel" study of emergency access and identify areas for improvement.
- Denver could develop an outreach and education program for emergency service responders, residents, and property owners near railroad ROW.
- Denver can request that the railroads manage vegetation near the railroad ROW.
- Denver Fire, in collaboration with the railroads, can monitor shipments of hazardous materials.

Medium-term (1 to 5 Years)

- Denver, with the help of state and federal funds, might consider grade crossing improvements, pedestrian overpasses at areas identified as high-risk for pedestrians, as well as construction of fencing along railroad ROW in high-trespassing areas.
- Denver can request that the railroads improve track conditions and install guard rails along ROW,
 which are to be identified though later studies.
- Denver planners could consider guidelines and requirements for future development adjacent to railroad ROW.

Long-term (greater than 5 Years)

- Denver and the railroads might also consider a larger construction project to include gradeseparation of high-risk vehicle crossings and long-term improvement/and or relocation plans for the freight railroad main lines.
- Denver could incentivize property owners on structural reinforcement of existing buildings along railroad ROW.

With Denver ranking fourth in the nation (for similar sized cities) for most grade-crossing rail accidents, HNTB identified 13 at-grade rail crossings in the city with a high frequency of accidents and the greatest need for safety improvements. Site-specific mitigation measures to improve traffic control and preliminary cost estimates are provided for each of the 13 crossings. Safety models predict more than a 50 percent decrease in risk at some of these locations if the recommended improvements are implemented. The site-specific mitigation measures identified for the at-grade crossings include the addition of pavement markings, warning lights, bells, signing, fencing, and gate systems; construction or relocation of roadway features such as medians, curbs, and traffic lights; asphalt repairs; and measures to improve visibility. Building off the risk assessment, HNTB proposes a list of potential funding sources and grants to aid in the implementation of the recommended safety improvements.



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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation Definition

AADT annual average daily traffic

AAR Association of American Railroads
ALARP as low as reasonably practicable

AM before noon

APS accident prediction and severity

BNSF Burlington Northern Santa Fe

CCD City and County of Denver

CDBG Community Development Block Grants
CDOT Colorado Department of Transportation

CFR Code of Federal Regulations

CO Colorado

CPD Community Planning & Development

CRISI Consolidated Rail Infrastructure and Safety Improvements

CY calendar year

DHS Department of Homeland Security

DOT Department of Transportation

DOTI Department of Transportation and Infrastructure

DPHE Department of Public Health & Environment

EO Emergency Order

FRA Federal Railroad Administration

HMEP Hazardous Materials Emergency Preparedness

IIFR or IR Involuntary Individual Fatality Risk

mph mile per hour

OEM Office of Emergency Management

PM after noon
ROW right-of-way

RTDC Regional Transportation District C-Line

SAP Highway Rail Safety Action Plan

UPRR Union Pacific Railroad

US United States



CHAPTER 1 – INTRODUCTION

In 2022, the City and County of Denver (CCD or Denver) authorized a study of freight rail safety hazards, vulnerabilities, and risk mitigations. The outcome of the Freight Railroad Safety Study identifies risks, therefore, HNTB proposes a wide range of mitigation options to improve safety. Knowing the risks and mitigating them will help Denver become a safer community, while continuing to grow alongside the railroads. Many risks commonly addressed by local governments have been quantified, measured, and mitigated by means of regulations, codes, and standards. This study offers a framework for quantifying and identifying potential risks and mitigation measures. It adds clarity to current conditions along the railroad right-of-way (ROW) that are unknown or not well quantified but are susceptible to derailments and hazardous material releases that could potentially impact nearby land users.

In 2013, a unit train carrying 73 cars of crude oil, operated by a one-man crew, expired on the hours of service outside of Lac Mégantic, Quebec. The locomotive engineer, by railroad rules, must secure the brakes on the locomotive before leaving the train unattended. If the engineer has time, he secures the rest of the train, tying a varying number of brakes according to the tonnage and grade at the location. This day on July 6, 2013, the engineer did not tie the train brakes. As air bled off the train line (a common occurrence in trains), the three locomotive brakes could not hold the train, and it began to roll down a 1.2 percent grade into town. When the train rolled into the city it derailed, resulting in fires and explosions of multiple tank cars. The result of this disaster was that 47 people were killed, twice that number were injured, and more than 30 buildings were destroyed. More than half the town was contaminated by the oil. The blast radius of this accident was more than half a mile. Damages to this city were over \$200 million, and the loss of life – immeasurable.

Since this disaster, a few studies have been created to assess potential risk mitigation measures around rail operations. Previous studies have identified issues surrounding cities that have been developed along the railroad ROW (CCD, 2016; CDOT, 2022a). In 2016, Denver Mayor, Michael B. Hancock, commissioned a study to look at and review the city's policies and practices around safety and hazard mitigation in areas near the railroad ROW (CCD, 2016). The conclusions of the 2016 study made recommendations on what needed to be considered to improve safety within the communities that surround the ROW. In 2018, the City of Calgary commissioned a study that reviewed the rail baseline and risk assessment for the city. The report looked at Canadian rail traffic volumes and trends, land adjacent to the ROW in Calgary, and railroad operations within this city. Based on their findings, this study completed a risk assessment of the area that is near the railroad ROW.

The National Transportation Safety Board and the Federal Railroad Administration (FRA) compile reports about train incidents and accidents from around the country (USDOT, 2021). These reports contain data significant to any rail study and highlight the potential for rail incidents and damage within the community where the accident occurs.

This study documents the existing freight rail conditions in Denver (e.g., rail volumes and commodity type) and the surrounding land uses, grade crossings, and facilities that run adjacent to the rail lines. It is the first step in identifying potential risks to life, property, and the environment and in recommending mitigation measures.



CHAPTER 2 – DENVER HAZARD MITIGATION FRAMEWORK

In 2022, Denver updated its overall assessment of hazards that pose risks to the city including, but not limited to, natural disasters, hazardous materials incidents, and transportation incidents. Individual city departments take responsibilities for preventing, reducing, or mitigating the risks these hazards pose. Table 2-1 identifies areas of risk in the hazards assessment conducted by the city (CCD, 2022).

Table 2-1. Denver Hazard Assessment Rankings

Hazard	Location/Spatial Extent	Magnitude/Severity	Likelihood of Future Occurrence	Significance
Communicable Disease	Extensive	Severe	Likely	High
Cyber Attack	Significant	Critical	Likely	High
Drought	Extensive	Moderate	Likely	High
Flooding	Significant	Moderate	Likely	High
Severe Thunderstorm	Extensive	Moderate	Highly Likely	High
Severe Winter Storm	Extensive	Moderate	Highly Likely	High
Extreme Temperatures	Extensive	Moderate	Likely	Medium
Dam Inundation	Significant	Critical	Unlikely	Medium
Earthquake	Extensive	Severe	Unlikely	Medium
Hazmat Incident	Limited	Moderate	Highly Likely	Medium
Critical Infrastructure Failure	Significant	Moderate	Occasional	Medium
Social Unrest	Limited	Moderate	Likely	Medium
Space Weather	Extensive	Critical	Unlikely	Medium
Terrorism and Mass Violence	Limited	Critical	Occasional	Medium
Tornado	Limited	Critical	Likely	Medium
Expansive Soils/Subsidence	Significant	Minor	Occasional	Low
Transportation Incident	Limited	Moderate	Occasional	Low
Mass Influx of Evacuees	Limited	Minor	Occasional	Low
Urban Conflagration	Limited	Moderate	Unlikely	Low
Volcanic Ash	Extensive	Moderate	Unlikely	Low
Wildland Fire	Limited	Moderate	Likely	Low

Source: CCD, 2022

2.1 Hazard of Accidental Deaths in Context

Table 2-2 lists the common causes of accidental deaths and is intended to provide an understanding of accidental deaths and the citywide planning efforts to prevent them. City planning is intended to protect life, safety, and general welfare. With information and awareness, city-wide resources can then be directed, according to each category of accidental deaths, to implement prevention measures.

While accidental deaths may seem unavoidable, a core tenet of Denver's Vision Zero Action Plan (CCD, 2017) is that people should not be killed or seriously injured because of mobility. Humans make mistakes, and physical/mechanical failures occur to cars, trains, and the underlying infrastructure; therefore, the transportation system should be designed and maintained to minimize the consequences of those errors.

Table 2-2. Accidental Deaths List in Denver County

Cause	2020	2021
Drug Overdoses	323	411
Suicides	152	156
Homicides	87	96
Roadway Vehicle Accidents	57	84
Work-Related Accidents	5	12
Freight Railroad Accidents	4	3

Sources: CDOT, 2022b, 2022c; USDOT, 2021.



CHAPTER 3 – FREIGHT VOLUMES

Currently, there are two major railroads (Class I) and ten local railroads (Class III) that deliver freight in the city. A Class I railroad is a railroad that has revenues of more than \$504 million; a Class II railroad has revenues between \$40 million and \$504 million; and a Class III railroad has revenues less than \$40 million. The major Class I railroads are the Burlington Northern Santa Fe (BNSF) and Union Pacific Railroad (UPRR). These major carriers account for 95 percent of the freight that passes through Denver.

The American Association of Railroads indicates that during the COVID-19 pandemic, traffic volumes decreased, as seen on Figure 3-1 (Statista, 2022). These conditions occurred due to manufacturing and product demand decreases during the pandemic and are slowly increasing as consumer product demands increase.

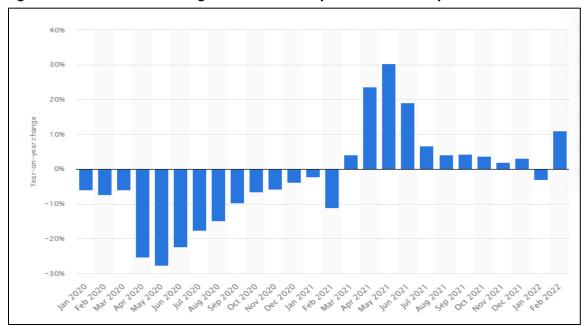


Figure 3-1. Traffic Volume Changes between January 2020 and February 2022

Source: Statista, 2022

The State of Colorado has 2,640 miles of active rail line, with 41 miles within Denver limits, and approximately 80 miles of industrial spur tracks, which are serviced by short line or Class III railroads (see the freight rail lines route paths through Denver as shown on Figure 3-2.

Overall statistics for Colorado compared to the rest of the United States (US) show the following:

- Colorado ranks 25th in the nation for train volume with 16.8 million tons of freight originating in the state.
- Colorado ranks 19th in tons of lading (freight or cargo that makes up a shipment) terminating within the state with 30 million tons.
- Colorado ranks 32nd with 204,200 railcars originating in the state.
- Colorado ranks 22nd with 427,866 railcars that are destined for Colorado consumers.

The freight rail lines routes paths through Denver are shown on Figure 3-2.

City F 56th Ave 1 270 Montbello (70) Martin Luther King Blvd Denver E Colfax Ave Alamo Placita 26 Auro Legend Florida Av UP Rail Gulch BNSF Rail 83 Industry Lines

Figure 3-2. Class 1 and Class III Railroads Within Denver Limits

Source: HNTB, 2022

3.1 Hazardous Materials Shipments

The U.S. Department of Transportation (USDOT) defines hazardous materials as substances that can pose an unreasonable risk to health, safety and property when transported in commerce. Class I carriers indicate that the 2021 hazard shipments through the Denver area totaled 102,280 cars (see Table 3-1). Although this is a decrease from previous years, the effects of the COVID-19 pandemic should be factored into this decrease. There has been a steady increase in car loadings over last year's numbers, indicating that Denver could see over 200,000 car loadings within the next few years. The most carried hazardous materials shipments are fuel/gasoline, petroleum crude oil, sulfuric acid, sodium hydroxide, and non-specified elevated temperature liquids. Denver has averaged 3.6 rail-related accidents per year from 2017 to 2021 (not necessarily hazardous-material related). Also, a recently approved train network addition means a petroleum producer from Utah (Uinta Basin Railway) could add 10 more crude oil unit trains through Denver, which will add to these estimates.

Table 3-1. Hazardous Materials Shipments List Within Denver Limits

Interval	Hazardous Cars	Non-Haz Mat	Total
Daily	280	6,720	7,000
Monthly	8,524	204,576	213,100
Yearly	102,280	2,454,720	2,557,000
	Uinta Basin Railw	vay (projected)	
Daily	781	Data Not Available	Data Not Available
Monthly	23,430	Data Not Available	Data Not Available
Yearly	281,160	Data Not Available	Data Not Available
	Combined Estima	te 2025 (+14%)	
Daily	1,061	7,760	8,821
Monthly	31,954	233,217	265,171
Yearly	383,440	2,798,381	3,181,821

Source: HNTB, 2022

Additional data provided by the Class I freight railroads for context is provided in Table 3-2 and describes the transportation of hazardous cargo moving through Denver by intermodal (rail and truck) transportation, as opposed to tank cars that move cargo from its origination destination to its end location.

Table 3-2. Number and Type of Hazardous Cargo Passing through Denver Limits (2021)

Trains Cars/Day	Trains Cars/Month	Train Cars/Year	Type of Cargo
177	5,373	64,473	Hazardous Material
66	2,000	23,997	Loaded Intermodal
37	1,145	13,740	Hazardous Material
0.2	6	70	Loaded Intermodal

Source: HNTB, 2022

Table 3-3 and Table 3-4 show train accident data between 2017 and 2021 that was obtained from FRA for Colorado. Table 3-3 shows accident causes while Table 3-4 shows the types of accidents.

Table 3-3. Train Accident Causes in Colorado (2017-2021)

Major Cause	Killed	Injured	Reportable Damage	Distinct Incident Count
Equipment	0	1	\$469,267	6
Human	0	0	\$2,356,783	32
Miscellaneous	1	3	\$1,521,200	8
Track	0	0	\$3,501,516	18
Total	1	4	\$7,848,766	64

Source: HNTB, 2022

Table 3-4. Train Accident Types in Colorado (2017-2021)

Accident Type	Killed	Injured	Reportable Damage	Distinct Incident Count
Collision	0	1	\$571,998	4
Derailment	0	0	\$6,198,622	53
Highway-rail crossing	1	3	\$987,102	4
Other Impacts	0	0	\$91,044	3
Total	1	4	\$7,848,766	64

Source: HNTB, 2022

3.2 Grade Crossing Accidents within Denver Limits

Table 3-5 shows the grade crossing accidents for the last 5 years along the railroad lines within Denver, as reported by the FRA.

Table 3-5. Grade Crossing Accidents within Denver Limits (2017-2021)

Year	Number of Accidents
2021	4
2020	4
2019	4
2018	3
2017	3

Source: HNTB, 2022

The following tables show where Colorado and Denver stand among other states and cities, respectively, in grade crossing accidents. Table 3-6 shows that Colorado ranks about in the middle of all states for accidents within the nation.

Table 3-6. Colorado's Ranking in Grade Crossing Accidents Nationwide (2017-2021)

Rank	State	Total Number of Accidents
1	Texas	641
2	Georgia	339
3	Indiana	313
4	California	268
5	Alabama	220
6	Ohio	210
7	Louisiana	201
8	Illinois	195
9	Pennsylvania	173
10	Tennessee	140
26	Colorado	70

Source: HNTB, 2022

Table 3-7 shows that Denver stands higher than average among the cities under 1 million in population, in regard to grade crossing accidents.

Table 3-7. Top 10 US Cities (Under 1 million population) with Most Grade Crossing Accidents

Rank	City	State	Total Number of Accidents 2017-2021	Total Number of Grade Crossings	Accidents per Grade Crossing 2017-2021
1	Memphis	TN	26	302	.086
2	Seattle	WA	17	248	.068
3	Nashville	TN	14	200	.070
4	Denver	со	12	212	.057
5	Detroit	MI	10	190	.053
6	Portland	OR	8	229	.035
7	El Paso	TX	8	89	.090
8	Oklahoma City	ОК	5	138	.036
9	Las Vegas	NV	1	22	.045
10	Washingt	on D.C.	1	7	.143

Source: HNTB, 2022

3.3 Derailments and Accident Reporting

Derailments occur whenever track or railcars are outside of recommended tolerances or whenever defective conditions exist. Title 49 *Code of Federal Regulations (CFR) Part 213*¹ sets standards on the procedures required for upkeep of track and switches to be followed by all railroads. Despite these regulations, metal fatigue, weather, and other conditions can influence the condition and state of these items. In addition to this, human factor also plays a role in derailments. Hard coupling (when excessive force is used to couple railcars together during switching operations), excessive speed (when going over posted or prescribed speeds), Loads-empty or long-short car configuration (when excessively long cars are coupled to short cars, which leads to train derailments; mostly occurs during switching operations) also can contribute to potential derailments. Figure 3-3 shows locations of rail incidents in Denver from 2017-2021 including derailments and classification yards.

3.3.1 Non-grade Crossing Equipment-Related Accidents

Figure 3-3 shows the quantity of non-grade crossing incidents in all counties (excluding derailments in classification yards) causing damage greater than the FRA 2021 monetary threshold notice of \$11,200. Figure 3-4 shows locations of all rail incidents in Denver from 2017-2021, including derailments and classification yards causing damage greater than the FRA monetary threshold notice.

¹ Title 49 CFR Part 213: Available online at: https://www.govinfo.gov/app/details/CFR-2011-title49-vol4/CFR-2011-title49-vol4-part213.

County

ADAMS
BACA
BOULDER
BOULDER
BOULDER
BOUNTE
EL PASO
2
GARFIELD
JEFFERSON
LARIMER
2
LASANIMAS
2
LOGAN
MIESA

1 1.1 1.2 1.35 1.5 1.65 1.8 2 2.25 2.5 2.75 3 3.3 3.6 4 4.5 5 5.5 6 6.5 7 8 9 10 11 12 13.5 15 16.5 18 20 22.5
Total Accidents

Figure 3-3. Non-grade Crossing Train Accident by County (2017-2021)

Source: USDOT, 2022

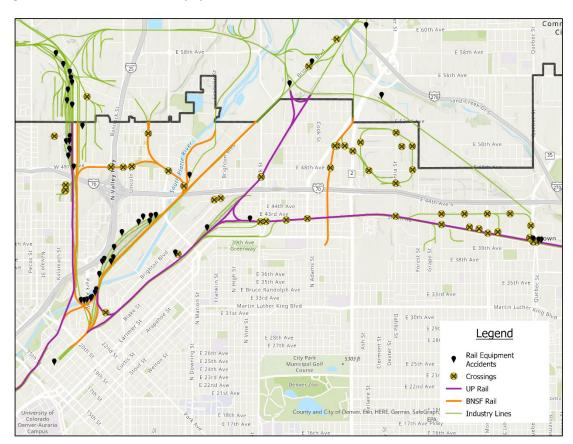


Figure 3-4. Locations of Rail Equipment Accidents within Denver from 2017-2021

Source: USDOT, 2022



CHAPTER 4 – RIGHT-OF-WAY

4.1 Current Residential Development along Right-of-Way

Blueprint Denver (CCD, 2019a) is a citywide land use and transportation plan that was first adopted in 2002 and updated in 2019. The plan covers a 20-year period, and according to Blueprint Denver the city population has grown by 150,000 between 2002 and 2019. Blueprint Denver goes on to state that Denver could approach 900,000 residents by 2040. Thus far, Denver has seen significant development, including high-density housing, near freight ROW over the last 20 years (see Figure 4-1). This is due to strategic and intentional direction of growth to areas near passenger rail stations (light-rail and commuter-rail) intended to reduce automobile trips and create a more livable city of complete neighborhoods connected by complete transportation networks.

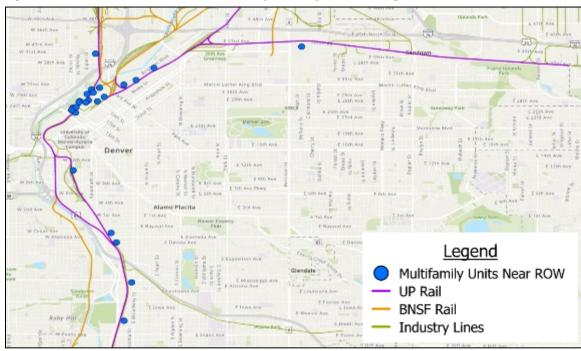


Figure 4-1. Current Locations of Multifamily Developments Along Railroad ROW

HNTB, 2022

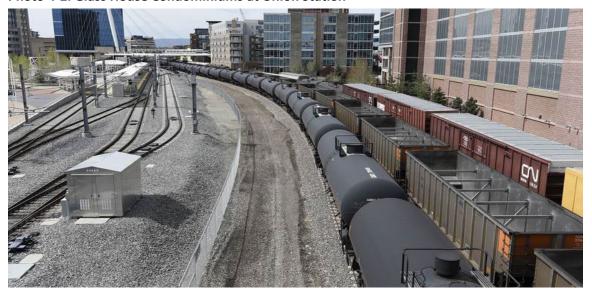
For example, Photo 4-1 shows the Encore Evans Station apartment complex, which is 18 feet from the edge of the railroad ROW, and Photo 4-2 shows the Glass House Condominiums, which is 26 feet away from the ROW. The freight railroad ROW is generally 100 feet wide.

Photo 4-1. Encore Evans Station Apartment Complex



Source: DOTI, 2022

Photo 4-2. Glass House Condominiums at Union Station



Source: DOTI, 2022

4.2 Current Tier II Facilities Along Right-of-Way

According to Denver's *Hazard Mitigation Plan* (CCD, 2022), there are two ways for potential hazardous materials incidents to occur along railroad ROW – those that are being transported through Denver and those that originate or are destined to locations that use and store chemicals daily within Denver limits (known as Tier II facilities). Tier II facilities are those facilities that store 10,000 pounds or more of any hazardous materials according to the Occupational Safety and Health Administration. These facilities are vital to the industrial and manufacturing economy, are tightly regulated, and often produce common household products. See Figure 4-2 for locations of Tier II facilities near railroad lines.

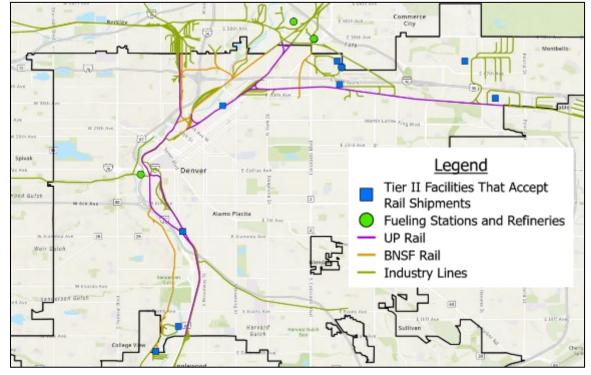


Figure 4-2. Current Locations of Tier II Facilities Along Railroad ROW

Source: HNTB, 2022

As of October 2021, there were 300 Tier II facilities in Denver with mandatory reporting requirements to the Denver Local Emergency Planning Committee; 15 of those facilities also have mandatory reporting requirements to the U.S. Environmental Protection Agency. While almost half of the Tier II facilities do not hold chemicals other than those used in batteries, there are several companies that use ammonia and chlorine daily, and these are considered toxic inhalation hazards.

There is always the potential for a release from either the fixed sites or from a train going through Denver. Based on National Railroad Construction and Maintenance Association data, Denver averages around 19 hazardous materials incidents per year, including an average of one incident per year that results in injuries or property damage. (CCD, 2022).

4.3 Environmental Considerations

Wildlife within the Denver area is monitored by the wildlife specialist. It appears that several species of wildlife within the areas of Denver, Adams, and Arapahoe counties could be severely compromised if there were to be a hazardous material release in the rivers or riparian areas located in Denver.

Photo 4-3 is an example, showing tracks crossing over the South Platte River in Denver. If a train derails in this location, it could affect the wildlife that are present in or along the river or their habitat. In addition, if a derailment occurs and hazardous materials are introduced into the river, river clean-up will be necessary, and downstream safety measures will need to be implemented.



Photo 4-3. Railroad Track Crossing over South Platte River

Source: Google Maps, 2022. https://www.google.com/maps

Another major concern are tank cars containing hazardous chemicals or flammable liquids, such as crude oil, falling into rivers or streams. A derailment like this occurred in Denver in February 2022; fortunately, there were no hazardous cars on the train at the time. To protect the environment, FRA issued an Emergency Order (EO or Order) in 2015 (USDOT, 2015a) to require that trains transporting large amounts of Class 3 flammable liquid through certain highly populated areas, such as Denver, adhere to a maximum authorized operating speed limit. The following is taken from the Emergency Order:

"This EO is necessary due to the recent occurrence of railroad accidents involving trains transporting petroleum crude oil and ethanol... Under the EO, an affected train is one that contains: 1) 20 or more loaded tank cars in a continuous block, or 35 or more loaded tank cars, of Class 3 flammable liquid; and 2) at least one DOT Specification 111 (DOT-111) tank car (including those built in accordance with AAR) Affected trains must not exceed 40 miles per hour (mph) in high-threat urban areas as defined in 49 CFR 1580.3. (USDOT, 2015.)"



CHAPTER 5 – FUTURE INDUSTRIAL DEVELOPMENT IN DENVER

Blueprint Denver (CCD, 2019a) provides a plan for land use growth, including zones for greater density. Along the rail corridor there are many types of industries. The production and manufacturing districts are classified as heavy production, value manufacturing, and innovative/flex manufacturing. Many of these facilities produce common household products and are vital to the industrial and manufacturing economy of Denver.

Figure 5-1 correlates the locations of crossing incidents and industrial zoning. *Blueprint Denver* identifies certain manufacturing areas to maintain their industrial character in the future. It's expected that some businesses in these locations that have existing industrial zoning will continue to use the existing railroad lines for shipping and receiving of materials; therefore, Denver should continue to expect a higher degree of risk, based on rail-related incidents along these corridors and zones.

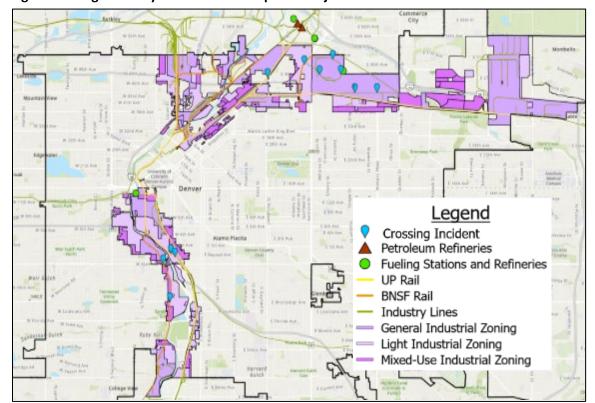


Figure 5-1. High-Density Industrial Development Adjacent to ROW

Source: HNTB, 2022

Blueprint Denver's, growth strategy map (Figure 5-2) shows the aspiration for distributing future growth in Denver. The map reflects community input on various growth scenarios received during the "Growing a Better Denver Game" workshop and online survey. City staff worked with the State Demographer's Office and the Denver Regional Council of Governments to develop projections for population, households, and employment by 2040. This included an analysis of vacant and underutilized land available through 2040 and the estimated development capacity of land based on these future places.

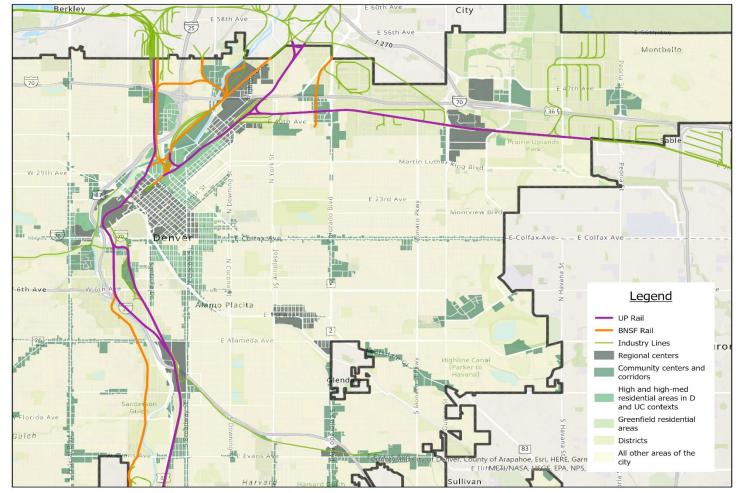


Figure 5-2. Growth Strategy Map from Blueprint Denver (2019)

Source: HNTB, 2022

As Figure 5-2 shows, a portion of this new growth strategy lays along the rail corridor. Four "regional centers" (the highest intensity of development) are located along railroad main lines because of the location of transit stations and transit-oriented development.



CHAPTER 6 – HAZARDOUS RAIL TRAFFIC: PRESENT AND FUTURE

The state of hazardous freight rail traffic in and through Denver depends primarily on economic conditions. In 2021 there were 102,280 hazardous carloadings or train cars that passed through Denver that were carrying hazardous materials (See Table 6-1). Overall, Denver should expect to see growth in rail traffic, including trains passing through the city carrying hazardous materials and trains originating from or destined to industrial and manufacturing facilities within the city (CCD, 2019a). An example driver of this growth is the Uinta Basin Railway Project currently under construction.

Table 6-1. Freight Railroad Traffic - Hazardous Materials

Hazardous Material	2021	2025 Estimated with Uinta Basin Railway
Daily Cars	280	1,061
Monthly Cars	8,524	31,954
Yearly Cars	102,280	383,440
Daily Freight Trains Through Denver	38	45
Freight Cars with Hazardous Materials	4%	14%

Source: HNTB, 2022

6.1 Uinta Basin Railway

In 2022, the Surface Transportation Board approved the Uinta Basin Railway construction. The \$1.5 billion Uinta Basin Railway will be the largest new railroad project in the US in nearly 50 years. The project will connect the Uinta Basin region to the national rail network, allowing crude oil to be transported over the Rocky Mountains to refineries along the Gulf Coast (Woodruff, 2022).

Much of the additional crude oil produced because of the Uinta Basin Railway would be hauled through Colorado on a route that passes through Glenwood Canyon along the Colorado River, then through the Moffat Tunnel and central Denver (Figure 6-1). Up to ten 2-mile-long trains would travel the route daily, and because the Uinta Basin produces a type of oil known as "waxy" crude, the tank cars used to transport it need to be heated, which creates additional safety and environmental risks (Woodruff, 2022).

The *Uinta Basin Railway Environmental Impact Statement* projects an accident rate of two accidents per million train miles on its new track. Once connected to UPRR, the rate drops to 0.5 to 2 per million train miles. Dozens of cities, counties, and water districts along the route have voiced opposition to the project, including Glenwood Springs, where city officials worry about potential impacts to the Colorado River Basin, and Eagle County, which has joined environmental groups in suing the Surface Transportation Board in a federal appeals court over its 4 to 1 vote to approve the project as a whole in December (Surface Transportation Board, 2021).

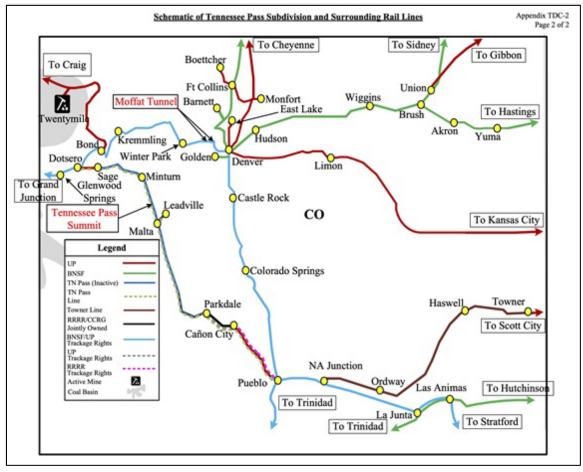


Figure 6-1. Map of Uinta Railway Route

Source: Jason Blevins, The Colorado Sun, 2022

6.2 National Context for Oil Derailments

For context, at least 21 oil train derailments have occurred in the US and Canada since 2013, according to a 2021 report from the nonprofit Sightline Institute. Such incidents frequently result in fires and spills, such as was the case with the 2016 derailment of an oil train in Oregon's Columbia River Gorge, in which an estimated 42,000 gallons of crude oil were spilled. (Sightline Institute, 2021).

USDOT projects that nationwide, 278 mainline derailments of crude oil or ethanol-carrying trains could statistically occur between 2015 and 2034 (not including derailments of other hazmat, other derailments, or other rail hazmat incidents). These include 93 incidents in densely populated areas (33 percent); 85 incidents with at least one carload of released flammable liquid igniting and causing fire (30 percent); 12 incidents with at least 230,000 gallons of released flammable liquid (7 to 8 tank carloads) and large fires (13 percent); and 2 derailments projected to be high consequence events or major disasters (less than 1 percent). (USDOT, 2015b).



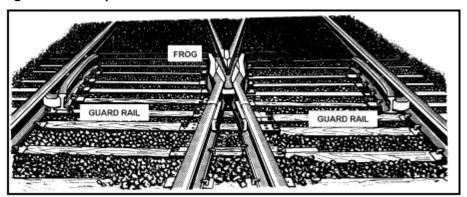
CHAPTER 7 — MITIGATION OPTIONS FOR TRAIN-RELATED ACCIDENTS AND DERAILMENTS

There are multiple types of mitigation to help prevent large impacts associated with hazardous materials spills and/or train derailments. This section discusses some of the more common ones that could be implemented in Denver. The placemaking implications of these options is beyond the scope of this study and would need to be addressed in the planning process.

7.1 Freight Railroads

Train containment (Figure 7-1) is a mitigation method that is designed to prevent conventional trains from overturning or deviating away from its track. Typical containment includes guard rails, parapets, and undercar guards. Specific locations that have relatively higher derailment risks such as bridges, switches, and interlockings are chosen to install railcar containment. Installing train containment is technically feasible for both existing and newly built shared operation settings. The containment methods are installed by the railroads on conventional tracks. A guard rail, for example, is installed to contain the rolling stock and prevent it from intruding the adjacent track when it derails. The cost of containment depends on the type and length of containment (USDOT, 2019, p.40).

Figure 7-1. Example of Train Containment: Railroad Guard Rail



Source: Railway Structure, Reconnaissance, Construction, and Rehabilitation. https://www.globalsecurity.org

7.2 Land Use Options

Along multi-family areas close to the ROW, supplementary barriers may be considered to prevent derailment incursion. Buildings within 100 feet of the edge of the ROW would benefit the most from an installation.

Mitigation options such as ROW defection walls (Photo 7-1) or similar would help mitigate potential risks in case of a derailment. Structural barrier protection can help reduce or eliminate potential impacts into structures from trains that derail.

Photo 7-1. Deflection Wall



Source: Reinforced Earth Company Risk Mitigation & Protective Structures. https://reinforcedearth.com

Anti-climb fencing (see Photo 7-2) can help mitigate risks of trespassers in areas identified by Denver's Office of Emergency Management and along high-density and areas along the railroad ROW, which are prone to trespassing.

Photo 7-2. Example of Anti-Climb Fencing



Source: Ameristar – ASSA ABLOY. 2022.

7.3 Rail Crossings

Figure 7-2 shows the locations with the highest incident rates according to the available FRA data (2017-2021).



Figure 7-2. Locations of Denver Grade Crossings with the Highest Incident Rates according to FRA Data

Source: HNTB, 2022

FRA rates road risks by analyzing only past accidents that have actually occurred. FRA also provides a statistical software called GradeDec.NET that allows the user to add alternative safety appliances that subsequently change annual predicated accidents that are measured in percentage (USDOT, 2020). Each grade crossing can be improved upon. Whether a full grade-separation is added, or a simple bell to notify pedestrians, grade crossing safety is improved upon exponentially depending on the safety appliance added. More details about the GradeDec.NET results and incidents are available in Appendices C and D, respectively. Appendix E contains the risk register for this project that supports the minimum recommendations. Appendix E also contains a menu of costs for a variety of safety devices and items that can be applied to grade crossings.

California Department of Transportation (CDOT) rates road risks by the potential for future accidents to occur. This is done by analyzing train traffic vs. vehicle traffic over a particular crossing, then assigning a risk factor (the higher the traffic volumes, the greater the risk.) Conversely, FRA measures only the number of incidents at a particular road crossing, and the number of safety appliances at that location. The greater the number of safety appliances at a location the lesser the probability of an incident occurring due to increased warning measures. According to CDOT analysis methods for future potential risk, there is one crossing at 13th Avenue and Umatilla that requires risk mitigation appliances, in addition to the 12 identified through FRA's accident data.

The 13 crossings shown in Table 7-1 are being recommended for safety treatments, ranging from highway markings to crossing gates. The greater the traffic and potential incident rate, the stronger the urgency for grade crossing improvements to be considered; however, there is no zero-effect here, even if the crossing is closed, unless the railroad tracks are removed. For instance, if the crossing was closed, the alternate predicted accident rate would be zero, due to no traffic flow, but incidents will continue to take place due to human error and trespassing.

Table 7-1. Safety Treatments for 13 Specific Locations in Denver

Crossing Location	Possible Safety Treatments	Base Annual Accidents (Fatalities + Injuries+ Property Damage Only)	Alternate Annual Accidents (Fatalities + Injuries+ Property Damage Only)	Preliminary Estimated Costs
BNSF - South Kalamath Street	Extend median, add pavement markings on all quadrants, add warning lights, blank-out signs, relocate signs, raise curb, and repair asphalt.	0.0398	0.02211	~\$230,000
RTDC - Quebec Street Southbound Frontage Road	Add pavement markings, move traffic signal to the north side of the rail crossing, add fencing, and add preemption to traffic signal at crossing.	0.04649	0.02583	~\$260,000
BNSF - South Santa Fe Drive	Extend median, add pavement markings on all quadrants, add warning lights, blank-out signs, noright turn signs, relocate signs, raise curb, and repair asphalt.	0.04118	0.02258	~\$560,000
UPRR - Holly Street	Add pavement markings on main street as well as on the industry road, add warning lights, blank-out signs, relocate signs, raise curb, repair asphalt, and a two-quadrant gate system.	0.20451	0.09087	~\$360,000
BNSF - Dahlia Street North Of 51 st Street	Add pavement markings, add warning lights, and add two-quadrant gate system.	0.10207	0.04535	~\$220,000
BNSF - Alameda Avenue	Add four quadrant gates, add median, add pavement markings, add warning lights and bells, add pedestrian gates, and ROW fencing.	0.10397	0.00464	~\$550,000
UPRR - Monaco Street	Add pavement markings, add warning lights, add two-quadrant gate system.	0.10286	0.04571	~220,000
BNSF – West Mississippi Avenue	Add median, add pavement markings on all quadrants, add warning lights, blank-out signs, no-right turn signs, relocate signs, raise curb, repair asphalt, and a two-quadrant gate system.	0.10337	0.04593	~560,000

Crossing Location	Possible Safety Treatments	Base Annual Accidents (Fatalities + Injuries+ Property Damage Only)	Alternate Annual Accidents (Fatalities + Injuries+ Property Damage Only)	Preliminary Estimated Costs
BNSF – East 48 th Avenue at Ash Street	Add median, add pavement markings on all quadrants, add warning lights, blank-out signs, no-right turn signs, relocate signs, raise curb, repair asphalt, and a two-quadrant gate system.	0.1022	0.04541	~560,000
BNSF - 48 th Avenue, West of Forest Street	Add two quadrant gates, pavement markings, warning lights, and signage.	0.10239	0.0455	~370,000
BNSF – East 50th Avenue	Add two quadrant gates, pavement markings, warning lights, and signage.	0.10173	0.0452	~370,000
UPRR – East 47 th Avenue and York Street	Add four quadrant gates, fencing along ROW, Wrong-Way sign on York Ln., extend median, add pavement markings, add warning lights, add pedestrian gate, and relocate signs.	0.10563	0.00845	~500,000
13 th Avenue and Umatilla	Add four-quadrant gates, pavement markings, warning lights, and signage. Add pedestrian crossing gates and sidewalks	0.00663	0.00119	~500,000
Combination of all Crossings in this Table		Base Annual Average is 0.08945	Alternate Annual Average is 0.03452	Prelim Estimated Total Cost is \$5,260,000

^{~ =} approximately

RTDC = Regional Transportation District C-Line



CHAPTER 8 – SUGGESTED GUIDELINES AND CONSIDERATIONS

Table 8-1 presents overall suggested considerations based on the analysis from the study, along with some potential sources of funding for capital project improvements discussed in Section 8.1.

Table 8-1. Overall Suggested Guidelines

Guideline Considerations	Lead City Agency	Responsible Parties	Time Horizon
Develop and implement hazard-management plans for railroad corridors	OEM	OEM	Short Term
Conduct a detailed study "parcel by parcel" of emergency access along the railroad ROW and identify areas / projects to enhance access	CPD	CPD	Short Term
Develop and implement evacuation plans in the event of a hazardous materials release in high-risk areas	OEM	OEM	Short Term
Support DFD staffing, training, and equipment for response to rail incidents.	DFD	DFD	Short Term
Provide education and outreach to emergency service responders and adjacent property owners/residents about railroad hazards and response – information should be updated at least annually, but more frequently if significant changes occur. Consider large-scale training exercises to simulate a train derailment with a large hazardous material on-board on a regular basis. Include railroad personnel on regular walkthroughs so that first responders are familiar with the infrastructure/areas prior to an event.	DFD	DFD, DPD	Short Term
Provide education to CCD staff about CCD's recently adopted Hazard Mitigation Plan (2022) and ensure that the plan is considered when working in areas adjacent to railroad corridors	OEM	OEM	Short Term
Review current vegetation management requirements and enforcement in areas adjacent to railroad corridors and explore enhancements, such as xeriscaping that is fire-resistant.	CPD	City for Public Property, Private Property Owners	Short Term
Ensure that city and emergency response personnel have real- time alerts on the Rail Crossing Locator app where first responders can request to be notified in advance of a train that is going to go through Denver carrying certain petroleum products in a quantity of 1 million gallons or more. This will allow for proactive preparations in case of a derailment/spill.	DFD	DFD, OEM, PUC	Short Term
Ensure that existing fire hydrants near railroads are accessible to the railroad ROW	DFD	DFD, CPD, DOTI	Short Term
Consider designating projects as pilot projects to test mitigation measure effectiveness.	DOTI	DOTI	Short Term

Guideline Considerations	Lead City Agency	Responsible Parties	Time Horizon
Consider guidelines or requirements for new development along railroad ROW to reduce the effect of derailments, especially in areas with a higher risk of derailment. Development of requirements or guidelines for development should be informed by peer city research, an analysis of impacts and costs on development, and stakeholder outreach. Potential guidelines could include: • Locating surface parking, access aisles, landscape buffers, or other non-structural features adjacent to railroad ROW to reduce the effect of derailments • Requiring reinforced columns in specific locations on structures constructed adjacent to railroad ROW when other mitigation is not feasible • Elevating air intakes and adding chemical sensors to heating, ventilation, and air conditioning equipment adjacent to railroad ROW • Using berms or walls to reduce the effect of derailments in high-risk locations • Elevating the first occupied floor above the railroad ROW grade	CPD	CPD (see also DOTI and PUC below for crossing)	Medium Term
Identify areas with sensitive environmental resources adjacent to railroad corridors and work with railroad owners to add protection strategies, such as guard rails	DPHE	DPHE	Medium Term
Add fencing along the railroad ROW, beginning with areas where higher concentrations of pedestrians and encampments occur	Railroads, DOTI	DOTI, PUC	Medium Term
Implement grade crossing improvements as described in this report	DOTI	DOTI, PUC	Medium Term
Consider adding pedestrian overpasses at areas identified a high risk for pedestrians	DOTI	DOTI, CPD	Medium Term
Work with railroads to repair/upgrade switches, tracks, and other track-related infrastructure causing derailments	DOTI	Railroads, DOTI	Medium Term
Grade-separate high-risk crossings – underpasses or overpasses	DOTI	DOTI, Railroads, CDOT, PUC	Long Term
Place freight rail lines in below-ground (open-air) trenches with access control, fire hydrants, fencing, and intrusion detection alarms	DOTI	Railroads, DOTI	Long Term
Work with railroads to eliminate higher-risk switches, wye tracks, and other higher-risk track conditions	DOTI	Railroads, DOTI	Long Term
Consider incentivizing structural reinforcement of existing buildings along railroad ROW at high-risk locations	CPD	CPD	Long Term
Consider new freight rail lines or routes that direct trains with hazardous cargo away from densely populated areas	DOTI	Railroads, CDOT, DOTI, PUC	Long Term

DPH&E = Department of Public Health & Environment

CDOT = Colorado Department of Transportation

CPD = Community Planning & Development

DFD = Denver Fire Department

DOT = Department of Transportation

DOTI = Department of Transportation and Infrastructure

DPD = Denver Police Department

OEM = Office of Emergency Management

PUC = Colorado Public Utilities Commission

8.1 Potential Funding Sources

There are several grant programs available for things such as wildfire, flooding, training, etc. Some of the grants wouldn't work for a large corridor, but could work for high-risk, spot-specific areas where fire reduction strategies need to be employed, for example. The sources of these grants include:

- Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance grant programs:
 - The Hazard Mitigation Grant Program provides funding to state, local, tribal, and territorial governments so they can develop hazard mitigation plans and rebuild in a way that reduces, or mitigates, future disaster losses in their communities.
 - Building Resilient Infrastructure and Communities supports states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards.
 - Flood Mitigation Assistance is a competitive grant program that provides funding to states, local communities, federally recognized tribes, and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program. This isn't the most applicable but may be applicable in certain areas/instances.
 - Non-Disaster Grants preparedness program funding to improve the capacity of state and local emergency responders to prevent, respond to, and recover from a weapons of mass destruction terrorism incident involving chemical, biological, radiological, nuclear, and explosive devices and cyberattacks.
- Hazardous Materials Emergency Preparedness (HMEP) Grants:
 - In 1993, the Pipeline and Hazardous Materials Safety Administration began issuing grants to assist States, Territories, and Native American Tribes to "develop, improve, and carry out emergency plans" within the National Response System and the Emergency Planning and Community Right-To-Know Act of 1986. The HMEP grant program is designed to allow grantees the flexibility to implement training and planning programs that address differing needs for each location based on demographics, emergency response capabilities, commodity flow studies, and hazard analysis.
- U.S. Department of Homeland Security (DHS) Transportation Security Administration Surface Transportation Security Grants:
 - DHS provides security grants to mass transit and passenger rail systems, intercity bus companies, freight railroad carriers, ferries, and the trucking industry to help protect the public and nation's critical transportation infrastructure against acts of terrorism and other large-scale events.
- Community Development Block Grants (CDBG):
 - The CDBG Program supports community development activities to build stronger and more resilient communities.
- Federal Railroad Administration
 - Consolidated Rail Infrastructure and Safety Improvements (CRISI):
 - The CRISI grant program supports communities in improving at-grade crossings. Some of the atgrade crossings in this report are already mentioned in ongoing CRISI grant applications for road crossing improvements.

- Railroad Crossing Elimination Grant Program: This program provides funding for highway-rail or pathway-rail grade crossing improvement projects that focus on improving the safety and mobility of people and goods.
- Federal Highway Administration The Railway-Highway Crossings (Section 130) Program:
 - This program provides funds for the elimination of hazards at railway-highway crossings. The Infrastructure Investment and Jobs Act (Pub. L. 117-58, also known as the "Bipartisan Infrastructure Law"), and Part 924 of title 23 of the Code of Federal Regulations (23 CFR Part 924), continues the annual set-aside for railway-highway crossing improvements under 23 U.S. Code 130(e).



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APPENDIX A. RISK AND METHODOLOGIES



APPENDIX A – RISK AND METHODOLOGIES

Risk

Risk is a measure of the effect of probabilities of occurrence of detrimental events and the consequence of such events. For involuntary individual fatality risk (IIFR), also known as IR, arising from shipments on rail of hazardous materials, including compressed natural gas and liquid natural gas, it is recommended that the "acceptance" criteria shown on Figure A-1 and Figure A-2 be used to evaluate the IIFRs.

Figure A-1. Acceptance Criteria for Evaluating IIFR

Individual risk (per year)	Comments
Zone 1: IR $> 5 \times 10^{-5}$	Unacceptable
Zone 2: $3 \times 10^{-7} \le IR \le 5 \times 10^{-5}$	ALARP; applies for non-sensitive/non-vulnerable populations only
Zone 3: IR $\leq 3 \times 10^{-7}$	Acceptable

Source: USDOT, 2020b

Notes:

< = less than

 \leq = less than or equal to

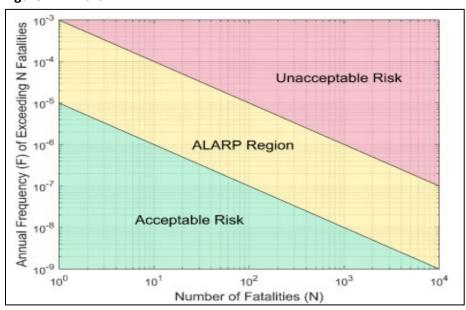
ALARP = as low as reasonably practicable

IR = Individual Risk

 $5 \times 10^{-5} = 0.00005$, or 5 in 100,000

 $3 \times 10^{-7} = 0.000003$, or 3 in 10,000,000

Figure A-2. Risks



The following bullets explain how to interpret Figure A-1 and Figure A-2:

- If the IIFR is less than 3 in 10 million (3 x 10⁻⁷) per year, this falls into Zone 3 and the green "Acceptable Risk" category.
- If the IIFR is above 3 in 10 million per year (3 x 10⁻⁷), this is unacceptable risk for sensitive populations and places of public assembly (e.g., hospitals, schools, prison, houses of worship, major event venues).
- If the IIFR is greater than 5 in 100,000 (5 x 10⁻⁵) per year, this falls into Zone 1 and the red "Unacceptable Risk" category, which is for all populations.
- Conditionally acceptable if the IIFR value is between 3 in 10 million (3 x 10⁻⁷) per year and 5 in 100,000 (5 x 10⁻⁵) per year for non-sensitive populations that will reduce the risk to ALARP. This falls into Zone 2 and the yellow "ALARP" category. (USDOT, 2020a)

Methodology

This section describes the methodology behind the two tools that were used in this report, FRA's GradeDec.Net and CDOT's Hazard Rating formula procedure.

FRA GradeDec.Net

The GradeDec.Net is a web-based support tool that helps evaluate grade crossing improvements and gives the user an idea of the current safety/risk factor at the crossing. The modeling framework was designed by the FRA, Volpe National Transportation Systems Center, and the National Cooperative Highway Research Program to effectively support grade crossing projects. This simulation tool determines risk and generates the results, which includes user quantified variables with an 80 percent confidence rate. This process aids in determining risk (i.e., accidents, injuries) at the road crossing before and after safety devices have been implemented. Risk is reflected in the probability distribution of the results. Figure A-3 is an example of the risk summary for the Holly Street crossing.

GradeDec.Net addresses two types of risk, 1) Accident risk, which is the probability of an accident occurring at a crossing. The principal metric of accident risk is measured in GradeDec.Net using the U.S. Department of Transportation's Accident Prediction and Severity (APS) model (USDOT, 2020b). 2) The type of risk determines that aggravated risk occurrence and risk severity and allows for the assigning of probability distributions to input variables of the analysis and determining the effects of uncertainty on the outcomes. GradeDec.Net also has capabilities for risk analysis, distinct from accident risk, which is concerned with quantifying uncertainty associated with forecasts.

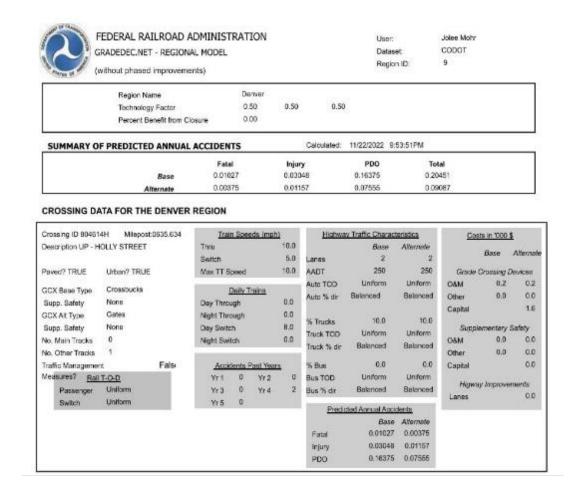
The type of sampling used is repeated Monte Carlo sampling on several random variables that are inputs to a model and repeatedly solving the model to arrive at probability distributions for the resultant variables. Random sample variables take a random number on the 0 to 1 interval. The result is determined by finding the variable whose cumulative probability equals "x" risk, accidents, and occurrence based on the data. The methodology used to determine the values provided are consistent with Executive Order 12866 (Regulatory Planning and Review-1993). The criteria used is based on average annual daily traffic, number of trains per day, and number of accidents in the previous 5 years.

The APS formulas used are based up regression analyses of accidents and grade crossing characteristics. The APS model delivers risk values, and the lower the values the safer the crossing. In the DOT APS, the incident metrics are "fatal accidents" (accidents with at least one fatality), "injury accidents" (accidents with no fatalities and at least one injury), and "property damage only" accidents. This model uses the

same accident prediction methodology as the DOT model but has distinct accident severity formulas. The model is based on an analysis of grade crossing accidents while focusing on the accident types (train strikes vehicle, vehicle strikes train), the impact of severe derailment, and fatalities among train and highway vehicle occupants.

The values required to calculate risk are as follows. Two elements (general and devices) require data from the road crossing such as location and current devices. Highway and rail data provide location, traffic, and speeds of both train and vehicle traffic. Once this data has been introduced, a score is produced in the aggravated risk page (base and alternate) using the resource allocation method. The base model includes the current road crossing safety configuration and measures the road crossing safety values. The alternate model takes into consideration the additional safety devices and measures added to the crossing. The aggravating factors result in a calculated score for occurrence between 0 and 60, and a score for severity between 0 and 60. The occurrence score will scale the predicted accidents down by 30 percent for a score of 0 and up by 30 percent for a score of 60. The more safety devices added to a location will decrease occurrences and will reduce potential incidents (USDOT, 2020a).

Figure A-3. Example Risk Summary – Holly Street Crossing



CDOT Hazard Rating Formula Procedure (CDOT H.R.)

CDOT's Railroad Coordination Unit is responsible for inventorying public highway-rail crossings within the State of Colorado (CDOT, 2022). The collected inventory data is used to identify those crossings that are below minimum standards for crossing warning devices and to calculate a hazard rating for each crossing. Numerous elements exist at a rail/highway crossing, and each can impact the calculation of a hazard rating, and yet to consider each of these elements in a single formula would make the formula far too complex to be of practical use.

The hazard rating is affected by whether a highway-rail crossing has active warning devices or passive warning signs. Therefore, the Railroad Coordination Unit has revised previous versions of the procedure to identify more applicable procedures, specifically for active warning crossings and passive warning crossings. Crossing warning devices are categorized as being either passive or active. Passive type devices (e.g., signs) are seen as informing the driver of the existence of a crossing, but it is still the driver's responsibility to determine independently whether a train is approaching and whether it is safe to cross. On the other hand, active type devices (e.g., flashing lights and gates) are seen as offering a driver a positive indication of an approaching train. If a driver can see the crossing while still having stopping sight distance and the crossing has active crossing warning devices, then the procedure views the crossing as being safer than if the crossing had only passive traffic warning devices. For this reason, sight distance to the crossing for crossings treated with active warning is not a relevant calculation because the active warning devices provide clear indication to approaching drivers, by means of their operation, that a train is approaching.

Passive warning crossings, those with static signs, require additional evaluation that includes visibility by approaching crossing users, in the absence of active warning. As such, the formula that the Railroad Coordination Unit uses to determine hazard ratings for passive crossings is unique to Colorado because there is no nationally recognized formula. The formula uses elements that have been selected as having the largest impact on safety at a passive highway-rail crossing.

CDOT's Railroad Coordination Unit evaluates the following elements finishing with a numerical value that indicates the respective crossing hazard rating:

- The crossing's existing crossing warning devices
- A vehicle's stopping sight distance
- Ability of the driver to see approaching trains
- The highway's annual average daily traffic (AADT)
- The railroad's AADT
- The number and type of railroad tracks existing at the crossing

Active warning crossings, those with active devices such as flashing lights and/or gates, utilize the same factors for calculating the hazard index, except for the vehicle's stopping sight distance, and the ability of the driver to see approaching trains. These two factors are not utilized at crossings having active warning, as those devices at the crossing clearly indicate a train is approaching, eliminating the need for approaching drivers to make this determination on their own.

One important element, grade crossing accidents, is not directly used in the Railroad Coordination Unit's hazard rating formula. This non-usage is not an oversight; instead, it is due to Colorado having very few grade crossing accidents each year. As such, it has not been possible to determine a relationship between accidents and physical crossing characteristics for use in a hazard rating formula. However, high accident

numbers at any given crossing should be considered subjectively by the railroad unit in coordination with the Public Utilities Commission staff.

Active/Passive Crossing Hazard Rating Procedure Factor – Highway Traffic (AADT) and Railroad Train Traffic (AADT)

Many of Colorado's public rail/highway crossings have low volumes in both vehicles and trains. While an individual crossing might have poor sight distances and inadequate crossing warning devices, if the crossing has very little train or vehicle traffic, its accident potential is seen as being lower. The Railroad Coordination Unit uses the following relationship as the amount of exposure due to the number of vehicles and trains at both active warning and passive warning crossings:

$$\frac{[AADTvehicles \ x \ AADTtrains]}{100000}$$

Where: AADTvehicles = annual average daily traffic volume of vehicles using crossing (estimated). AADTtrains = annual average daily traffic volume of trains using crossing (from railroad).

One important assumption regarding AADT is that the arrival of both vehicles and trains is uniform throughout the day — no attempt is made to determine the peak hours of vehicle and train usage. This assumption is due to the Railroad Coordination Unit not having enough resources to measure each crossing's traffic volume characteristics and both the railroad's and highway's ever changing usage characteristics. The factor of 100,000 normalizes the overall rating to a reasonable level.

Active/Passive Crossing Hazard Rating Procedure Factor – Number and Type of Tracks

The final element in the hazard rating formula is a factor for the number and type of railroad tracks that must be traversed at each active and passive crossing. This factor [T] is found as follows:

- Take the number of non-mainline tracks and multiply by 0.3.
- The first mainline track equals 1.0
- Take the number of remaining mainline tracks and multiply by 2.

The sum of these numbers gives the [T] factor. As an example: if the number of tracks counted consisted of two mainline tracks and one non-mainline track, the [T] factor would be as follows: $[T] = (1 \times 0.3) + (1) + (1 \times 2) = 3.3$.

Hazard Rating Index Formula – Active Crossings

Combining the last element with the first element produces the formula below for active crossings for which the Railroad Coordination Unit calls a crossing's hazard rating.

Hazard Rating =
$$\frac{[AADTvehicles \ x \ AADTtrains]}{100000} \ x \ [T]$$

The Railroad Coordination Unit gives extra consideration to public crossings along school bus routes. Also, since Colorado has several tourist-based railroad companies that employ steam locomotives, extra consideration should be given to those public crossings as well. An added factor of 10 percent is given to each condition. Predicting when and where the next rail/highway accident will occur is impossible. Understanding this, CDOT's Railroad Coordination Unit considers each crossing in terms of exposure, drawing the conclusion that accident potential is more likely to occur at those crossings having a higher exposure, that is, a higher hazard rating.

Public crossings that experience higher usage of hazardous cargo trucks are considered during the diagnostic reviews but are not given a separate added factor. The hazard rating formula is completely objective in nature. (CDOT, 2022).

References for Appendix A

- Colorado Department of Transportation (CDOT). 2022. *Colorado State Highway-Rail Grade Crossing Safety Action Plan February 14, 2022*. CDOT Project No. 18-HAA-XB-00076-ZD0028 SA 24385
- U.S. Department of Transportation (USDOT). 2020a. Federal Railroad Administration (FRA). 2020a. GradeDec.NET Crossing Evaluation Tool. Retrieved online at: https://gradedec.fra.dot.gov/
- U.S. Department of Transportation (USDOT). 2020b. Federal Railroad Administration (FRA). 2020b. New Model for Highway-Rail Grade Crossing Accident Prediction and Severity. Available online at: https://railroads.dot.gov/elibrary/new-model-highway-rail-grade-crossing-accident-prediction-and-severity



APPENDIX B. NATIONAL DERAILMENT AND ACCIDENT REPORTING



APPENDIX B - NATIONAL DERAILMENT AND ACCIDENT REPORTING

Title 49 *Code of Federal Regulation* (CFR) 213²: Track Switches prescribes minimum safety requirements for railroad track that is part of the general railroad system of transportation. In general, the requirements prescribed in this part apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from the requirements in this part, may require remedial action to provide for safe operations over that track. This part does not restrict a railroad from adopting and enforcing additional or more stringent requirements not inconsistent with this part. Figure B-1 shows the summary statistics of national accident trends. This chart shows that there is a high occurrence of derailments when compared to other accident types.

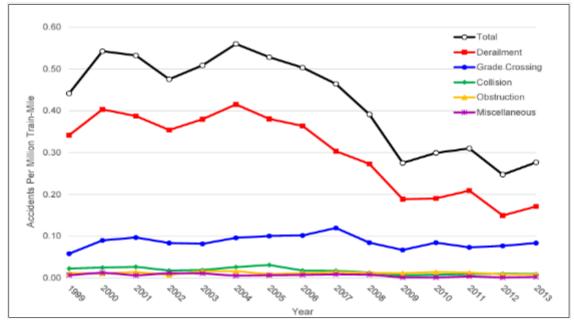


Figure B-1. Summary Statistics of National Accident Trends

Source: USDOT, 2020

For freight train accidents, derailments are both frequent and severe and thus fall in the upper-right quadrant on Figure B-2. Collisions and derailments are still the most severe accidents among all accident types. Although grade-crossing accidents are the most common type of accident, they are among the least severe in their consequences. Collisions and derailments are caused by the interaction of two or more trains in shared-use corridors regarding passenger train collisions with a derailed freight train, or vice versa (USDOT, 2019, p.29).

² Title 49 CFR Part 213: Available online at: https://www.govinfo.gov/app/details/CFR-2011-title49-vol4/CFR-2011-title49-vol4-part213.

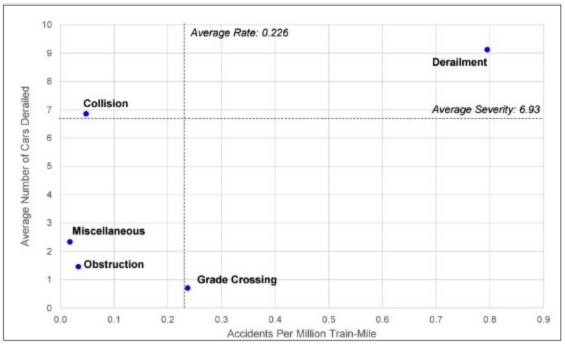


Figure B-2. Frequency and Severity Graph of Mainline Freight Train Accidents by Accident Type

Source: USDOT, 2020

FRA Accident Investigations (General Criteria)

Whenever there is some negative occurrence on track, and/or with railcars, derailments can occur. Railroads report accidents under the conditions listed below and jointly investigate accidents and incidents with FRA as determined by the Accident Analysis Branch or regional management:

- Any collision (main or yard track), derailment, or passenger train incident resulting in at least one fatality or serious injury to railroad passengers or crewmembers
- Any railroad-related accident resulting in death to an on-duty railroad employee, including an employee of a contractor to a railroad, regardless of craft
- Any highway-rail grade crossing accident resulting in any of the following:
 - Death to one or more people being transported in a commercial vehicle or school bus
 - Serious injury to several persons being transported in a commercial vehicle or school bus
 - Death to three or more persons in a private highway vehicle
 - Accidents involving grade crossing signal failure or allegations of grade crossing signal failure
- Any non-casualty train accident resulting in derailment of a locomotive, 15 cars or more, and extensive property damage
- Any train accident/incident resulting in a fire, explosion, evacuation, or release of regulated hazardous materials, especially if it exposed a community to these hazards or the threat of such exposure
- Any accident/incident involving a train transporting nuclear materials
- Any train incident involving runaway or rollaway equipment, with or without locomotives

- Any collision involving maintenance-of-way or hi-rail equipment
- Any accident caused by failure of a locomotive or any part of a locomotive, or a person contacting an electrically energized part that resulted in severe injury or death of one or more persons
- Accidents resulting from signal failure including positive train control-related failures and malfunctions
- Any other train accident/incident likely to generate considerable public interest
- Most Amtrak accidents/incidents.

FRA recently amended their accident/incident reporting regulation December 9, 2020 (Title 85 Federal Register 79130). This amended regulation requires railroads to report to the agency all rail equipment accidents/incidents above the monetary reporting threshold (reporting threshold) for that calendar year. For 2021, the monetary threshold was \$11,200, and for 2022 it was raised to \$11,300.

References for Appendix B

- U.S. Department of Transportation (USDOT). 2019. *Hazards Associated with HSR Operations Adjacent to Conventional Tracks Enhanced Literature Review Part II: Best Practices*, pg. 29
- U.S. Department of Transportation (USDOT). 2020. Federal Railroad Administration (FRA). 2020b. New Model for Highway-Rail Grade Crossing Accident Prediction and Severity. Available online at: https://railroads.dot.gov/elibrary/new-model-highway-rail-grade-crossing-accident-prediction-and-severity



APPENDIX C. GRADEDEC.NET RESULTS



APPENDIX C – GRADEDEC.NET RESULTS

South Kalamath Street Crossing – MP 3.466, CDOT Hazard Rating 5

South Kalamath Street is a one-way street in the central part of Denver and in the BNSF Pikes Peak subdivision (See Photo C-1³). This crossing has seen three at-grade incidents. Appendix D provides specific accident reports. The primary operating railroad at the South Kalamath Street grade crossing is BNSF, but UPRR also operates less frequently at this crossing. This road crossing has no markings designating direction.





Possible Safety Treatments

Traffic Control Systems

Extend the median, add pavement markings on all quadrants, add warning lights and blank-out signs (automated warning signage that display specific instructions, such as road closures, no turn allowed, etc.), relocate signs, raise the curb, and repair asphalt. Reduces risk from 4 percent to 2 percent.

Estimated cost is ~\$230,000

Viewing Considerations

Relocate telephone poles. Sometimes telephone poles obstruct the field of view and can create a hazard to vehicular traffic. Removing or relocating them helps the driver's field of view.

Estimated cost is ~\$10,000

Results

Figure C-1 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents. When this number in traffic volume increases, the percentages of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

³ The source for all the photos in Appendix C is HNTB, 2022.

Jolee Mohr

CODOT

User:

Dataset: Region ID:

Figure C-1. South Kalamath Street Crossing



Region Name	Denver				
Technology Factor	0.50	0.50	0.50		
Percent Benefit from Closure	0.00				

SUMMARY OF PREDICTED ANNUAL A	CCIDENTS	Calculated:	11/29/2022 6:3	6:47PM	
	Fatal	Injury	PDO	Total	
Base	0.00548	0.01160	0.02272	0.03980	
Alternate	0.00305	0.00644	0.01262	0.02211	

Crossing ID 245394V Milepost:0003.466 Description BNSF - S KALAMATH ST	Train Speeds (mph) Thru 30.0	Highway Traffic Characteristics Base Alternate	Costs in 1000 \$
Description by or - 3 to Lower IT 31	Switch 1.0	Lanes 3 3	Base Alternate
Paved? TRUE Urban? TRUE	Max TT Speed 30.0	AADT 14,000 14,000	Grade Crossing Devices
GCX Base Type Gates	Dally Trains	Auto TOD Uniform Uniform	O&M 2.5 5.0
Supp. Safety One-way street	Day Through 12.0	Auto % dir Balanced Balanced	Other 0.0 1.0
GCX Alt Type New technology 1	Night Through 12.0		Capital 280.0
Supp. Safety Barrier curbs	Day Switch 0.0	% Trucks 10.0 10.0	Supplementary Safety
No. Main Tracks 2	Night Switch 0.0	Truck TOD Uniform Uniform	O&M 0.0 5.0
No. Other Tracks 0	regit Omizi	Truck % dir Balanced Balanced	Other 0.0 1.0
Traffic Management False	Accidents Past Years	% Bus 0.0 0.0	Capital 10.0
Measures? Rall T-O-D	Yr1 0 Yr2 1	Bus TOD Uniform Uniform	· · · · · · · · · · · · · · · · · · ·
Passenger Uniform	Yr3 0 Yr4 1	Bus % dir Balanced Balanced	Higway Improvements Lanes 240.0
Switch Uniform	Yr5 0		Lanes 240.0
		Predicted Annual Accidents Base Alternate	
		1 4144	
		-9-9	
		PDO 0.02272 0.01262	

Quebec Street Southbound Frontage Road Crossing - MP 5.81, CDOT Hazard Rating 10

The Quebec Street Southbound Frontage Road crossing is in the north part of Denver and in the Regional Transportation District (RTD) C Limon subdivision (see Photo C-2). This crossing has seen two at-grade incidents. Appendix D provides specific accident reports.. The primary operating railroad at the Quebec Street Southbound Frontage Road grade crossing is the RTD A-Line. UPRR and BNSF also operate at this crossing. There have been three trespassing incidents at this location.



Photo C-2. Quebec Street Southbound Frontage Road Crossing

Possible Safety Treatments

Traffic Control Systems

Add pavement markings, move traffic the signal to the north side of the rail crossing, add fencing, and add preemption to the traffic signal at the crossing. Reduces risk from 5 percent to 3 percent.

Estimated cost is ~ \$260,000

Viewing Considerations

Viewing considerations are not applicable.

Results

Figure C-2 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents. The prediction is based on a statical percentage, which is founded upon current traffic flows. When this number in traffic volume increases, the percentages also increase of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

Jolee Mohr CODOT

Figure C-2. Quebec Street Southbound Frontage Road Crossing



User:

Dataset: Region ID:

SUMMARY OF PREDICTED ANNUAL A	ACCIDENTS	Calculated:	12/2/2022	1:38:38PM	
	Fatal	Injury	PDO	Total	
Base	0.01122	0.01665	0.01862	0.04649	
Alternate	0.00623	0.00925	0.01034	0.02583	

Crossing ID 804638	5B Milepost:0005.810	<u>Train</u>	1 Spe	edis (mph	_	Highwa	y Traffic Charact	teristics	Cor	sts In '000	<u>\$</u>
Description RTDC - SBFR	QUEBEC STREET	Thru Switch			79.0 65.0	Lanes	Base 4	Alternate 4		Base	Alternate
Paved? TRUE	Urban? TRUE	Max TT Sp	peed		79.0	AADT	19,313	19,313	Grade	Crossing i	Devices
00V D D	Gates		- II- 7			Auto TOD	Uniform	Uniform	M8O	2.5	5.0
GCX Base Type Supp. Safety	One-way street	Day Throu	_	Trains	92.0	Auto % dir	Balanced	Balanced	Other	0.0	0.0
	New technology 1		-		50.0				Capital		280.0
GCX Alt Type	Barrier curbs	Night Thro	-		0.0	% Trucks	15.0	15.0			
Supp. Safety No. Main Tracks	2	Day Switch			0.0	Truck TOD	Uniform	Uniform	O8M	lementary 0.0	C.O
	0	Night Swit	Call		0.0	Truck % dir	Balanced	Balanced		0.0	0.0
No. Other Tracks						n/ n	0.0	0.0	Other	0.0	0.0
Traffic Managemen Measures? Rail		<u>A0000</u> Yr 1	0	Past Year Yr 2	0	% Bus Bus TOD	Uniform	Uniform	Capital		0.0
	Uniform						Balanced	Balanced	Higwa	y Improve	ements
Passenger Switch	Uniform	Yr3 Yr5	1	Yr4		Bus % dir	Datariceu	Dalariceu	Lanes		0.0
SWICH	Official	115	U			Predic	cted Annual Acci	dents			
							Base	Alternate			
						Fatal	0.01122	0.00623			
						Injury	0.01665	0.00925			
						PDO	0.01862	0.01034			

South Santa Fe Drive Crossing – MP 3.653, CDOT Hazard Rating 16

South Santa Fe Drive is in the central part of Denver and in the BNSF Pikes Peak subdivision (see Photo C-3). This crossing has seen two at-grade incidents. Appendix D provides specific accident reports. The primary operating railroad at the South Santa Fe Drive grade crossing is BNSF, but UPRR also operates at the crossing. This crossing is intersected by access roads that lead into local industries. This crossing is closest to South Kalamath Street and is the crossing within the CCD that has the second highest incident rates. Road crossing safety measures are very minimal at this location, which include two gates and no other signage.



Photo C-3. South Santa Fe Drive Crossing

Possible Safety Treatments

Traffic Control Systems

Extend the median; add pavement markings on all quadrants; add warning lights, blank-out signs, and noright turn signs; relocate signs; raise the curb; and repair asphalt. Reduces risk from 4 percent to 2 percent.

Estimated cost is ~\$ 560,000

Viewing Considerations

Relocate power poles

Estimated cost is ~\$10,000

Results

Figure C-3 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents. The prediction is based on a statical percentage, which is founded upon current traffic flows. When this number in traffic volume increases, the percentages also increase of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

Jolee Mohr

Figure C-3 South Santa Fe Drive Crossing



Dataset: CODOT Region ID: 9

Reg	gion Name	Denver		
Ted	thnology Factor	0.50	0.50	0.50
Pen	roent Benefit from Closure	0.00		

SUMMARY OF PREDICTED ANNUAL A	CCIDENTS	Calculated:	11/29/2022 10	:42:33PM	
	Fatal	Injury	PDO	Total	
Base	0.00586	0.01219	0.02313	0.04118	
Alternate	0.00325	0.00677	0.01285	0.02288	

Crossing ID 245392G Milepost:0003.653	Train Speeds (mph)	Highway Traffic Characteristics	Costs in 1000 \$
Description BNSF - S SANTA FE DR	Thru 30.0 Switch 1.0	Base Alternate Lanes 3 3	Base Alternate
Paved? TRUE Urban? TRUE	Max TT Speed 30.0	AADT 43,000 43,000	Grade Crossing Devices
GCX Base Type Gates Supp. Safety One-way street GCX Alt Type New technology 1 Supp. Safety Barrier curbs No. Main Tracks 2 No. Other Tracks 0 Traffic Management False	Dally Trains Day Through 12.0 Night Through 12.0 Day Switch 0.0 Night Switch 0.0 Accidents Past Years	Auto TOD Uniform Uniform Auto % dir Balanced Balanced % Trucks 10.0 10.0 Truck TOD Uniform Uniform Truck % dir Balanced Balanced % Bus 0.0 0.0	O&M 2.5 5.0 Other 0.0 1.0 Capital 280.0 Supplementary Safety O&M 0.0 5.0 Other 0.0 1.0 Capital 10.0
Measures? Rail T-O-D Passenger Uniform Switch Uniform	Yr1 0 Yr2 1 Yr3 0 Yr4 1 Yr5 0	Bus TOD Uniform Uniform Bus % dir Balanced Balanced	Higway Improvements Lanes 300.0
Canada Canada		Predicted Annual Accidents Base Alternate Fatal 0.00586 0.00325 Injury 0.01219 0.00677 PDO 0.02313 0.01285	

Holly Street Crossing - MP 635.63, CDOT Hazard Rating 0.05

Holly Street is in the north part of Denver and in the UPRR Limon subdivision (see Photo C-4). The primary operating railroad at the Holly Street grade crossing is UPRR. The hazard rating for this location is low (0.05) because of low highway and train traffic volumes. However, this crossing has seen two at-grade incidents over the last 5 years. Appendix D provides specific accident reports. There are industry access roads without any signage in this area.





Possible Safety Treatments

Traffic Control Systems

Add pavement markings on Holly Street and on the industry road, add warning lights and blank-out signs, relocate signs, raise the curb, repair asphalt, and add a two-quadrant gate system. Reduces risk from 20 percent to 9 percent.

Estimated cost is ~\$ 360,000

Viewing Considerations

Relocate electric pole (if gate is installed)

Estimated cost is ~\$10,000

Results

Figure C-4 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents. The prediction is based on a statical percentage, which is founded upon current traffic flows. When this number in traffic volume increases, the percentages also increase of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

Jolee Mohr

CODOT

User.

Dataset: Region ID:

Figure C-4. Holly Street Crossing

Report 2.1 Version 1.0



Denver Region Name 0.50 Technology Factor 0.50 0.50 Percent Benefit from Closure 0.00

SUMMARY OF PREDICTED ANNUAL A	CCIDENTS	Calculated:	11/22/2022	9:53:51PM	
	Fatal	Injury	PDO	Total	
Base	0.01027	0.03048	0.16375	0.20451	
Alternate	0.00375	0.01157	0.07555	0.09087	

CROSSING DATA FOR THE DENVER REGION

Crossing ID 804614H Milepost:0635.634	Train Speeds (mph)		Highway Traffic Charac	teristics	<u>Costs I</u>	In 1000 \$	
Description UP - HOLLY STREET		0.0 5.0 Lane	Base 2	Alternate 2	E	lase Alterna	ate
Paved? TRUE Urban? TRUE	Max TT Speed 10	0.0 AAD	r 250	250	Grade Cro	ssing Devices	5
GCX Base Type Crossbucks Supp. Safety None GCX Alt Type Gates Supp. Safety None No. Main Tracks 0 No. Other Tracks 1	Night Through 0 Day Switch 8	.0 .0 %Tn .0 Truck	% dir Balanced	Uniform Balanced 10.0 Uniform Balanced	O&M Other Capital Supplem O&M Other	0.2 0.1 0.0 0.0 1.6 entary Safety 0.0 0.0	.0 .6
Traffic Management False	Accidents Past Years	% Bu	S 0.0	0.0	Capital	0.0	
Measures? <u>Rail T-O-D</u> Passenger Uniform Switch Uniform	Yr1 0 Yr2 Yr3 0 Yr4 Yr5 0	0 Bus1		Uniform Balanced	Higway II Lanes	mprovements 0.0	
CHILDI CHILDING			Predicted Annual Acc	<u>idents</u>			
		Fai Inju PD	al 0.01027 ry 0.03048	0.01157			

C-8

Dahlia Street North of 51st Street Crossing – MP 3.18, CDOT Hazard Rating 0.01

Dahlia Street is in the north part of Denver and in the BNSF Denver Rock Island subdivision (see Photo C-5). The primary operating railroad at the Dahlia Street grade crossing is BNSF. This crossing is located within the industry area of North CCD and has seen one at grade incident without fatalities. Appendix D provides specific accident reports. This crossing only has crossbucks (signage at highway-rail intersections that indicate trains have the legal ROW) and a yield sign.



Photo C-5. Dahlia Street North of 51st Street Crossing

Possible Safety Treatments

Traffic Control Systems

Add pavement markings, warning lights, and a two-quadrant gate system. Reduces risk from 10 percent to 5 percent.

Estimated cost is ~\$220,000

Viewing Considerations

Viewing considerations are not applicable.

Results

Figure C-5 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents. The prediction is based on a statical percentage, which is founded upon current traffic flows. When this number in traffic volume increases, the percentages also increase of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

Jolee Mohr

CODOT

Dataset: Region ID:

Figure C-5. Dahlia Street North of 51st Street Crossing



Region Name	Denver		
Technology Factor	0.50	0.50	0.50
Percent Benefit from Closure	0.00		

SUMMARY OF PREDICTED ANNUAL ACCIDENTS			Calculated:	11/22/2022	9:55:41PM	
Fatal		Injury	PDO	Total		
	Base	0.00663	0.01853	0.07691	0.10207	
	Alternate	0.00243	0.00711	0.03581	0.04535	

Crossing ID 057066K Milepost:0003.183	Train Speeds (mph)	Highway Traffic Characteristics			Costs in '000 \$			
Description BNSF - DAHLIA NO 51ST	Thru Switch	10.0	Lanes	Base 2	Alternate 2		Base	Alternate
Paved? TRUE Urban? TRUE	Max TT Speed	10.0	AADT	1,500	1,500	Grade (Crossing (Devices
GCX Rase Type Crossbucks	Dally Tooley		Auto TOD	Uniform	Uniform	M.SO	0.2	0.2
CON DUCK Type	<u>Daily Trains</u>	0.1	Auto % dir	Balanced	Balanced	Other	0.0	0.0
Supp. Stately	Day Through	0.0				Capital		1.6
Contract type	Night Through	0.0	% Trucks	9.0	9.0	·		
Supp. Safety None	Day Switch	0.0	Truck TOD	Uniform	Uniform		ementary	Sarety 0.0
No. Main Tracks 0	Night Switch	U.U	Truck % dir	Balanced	Balanced	O&M	0.0	
No. Other Tracks 1						Other	0.0	0.0
Traffic Management False	Accidents Past Years	% Bus	0.0	0.0	Capital		0.0	
Measures? Rail T-O-D	Yr1 1 Yr2	0	Bus TOD	Uniform	Uniform	Higway Improvements		
Passenger Uniform	Yr3 0 Yr4	0	Bus % dir	Balanced	Balanced	Lanes	,	0.0
Switch Uniform	Yr5 0		Predic	ded Annual Acci	dents			
					Alternate			
			Fatal	0.00663				
			Injury	0.01853				
			PDO	0.07691	0.03581			

Monaco Street Crossing - MP 635.136, CDOT Hazard Rating 0.04

Monaco Street is in the north part of Denver and in the UPRR Limon subdivision (see Photo C-6). The primary operating railroad at the Monaco Street grade crossing is UPRR. This road crossing is located within the CCD industrial area and has seen one at grade incident without fatalities. Appendix D provides specific accident reports. There is limited signage and crossing safety devices located at this crossing.

Photo C-6. Monaco Street Crossing



Possible Safety Treatments

Traffic Control Systems

Add pavement markings, warning lights, a two-quadrant gate system. Reduces risk from 10 percent to 5 percent.

Estimated cost is ~\$220,000

Viewing Considerations

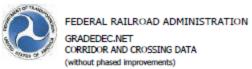
Relocate telephone poles

Estimated cost is ~\$10,000

Results

Figure C-6 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents. The prediction is based on a statical percentage, which is founded upon current traffic flows. When this number in traffic volume increases, the percentages also increase of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

Figure C-6. Monaco Street Crossing



User:	Jolee Mohr
Dataset:	Initial dataset
Corridor ID	5

Denver				Avg. No. Trains Per Day	Train Time-of-Day Distribution
			Passenger	0.0	Uniform
).50 plso	0.50	0.50	Freight	8.0	Uniform
		1.50 0.50	1.50 0.50 0.50	Passenger 1.50 0.50 0.50 Freight	Per Day Passenger 0.0 .50 0.50 Freight 8.0

CORRIDOR SUMMARY OF PREDICTED ANNUAL ACCIDENTS

Calculated: 21-Jun-2022 12:01 pm

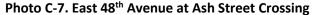
	Fatal	Injury	PDO	Total
Base .	0.007661	0.020564	0.074132	0.102357
Alternate	0.004762	0.013469	0.058760	0.076991

CROSSING DATA FOR THE DENVER CORRIDOR

Milepost 635.14	Crossing II	0 804609L	Accidents in 5 Years	Accidents in 5 Years 1		Predicte	ted Annual Accidents		
Description UP - MONACO STREET			Highway Tr	Highway Traffic Characteristics Base			Base 0.00081 0.00889	Alternate 0.00028 0.00311	
Paved? True	Urban? True		H'way Lanes	4	4.0	Injury PDO	0.03339	0.01169	
GCX Base Type Safety Sup. Type	Passive None		Dist from hway AADT	0.10 200	0.1 200	Total	0.04308	0.01508	
GCX Alt Type	Lights		Auto TOD Dist	Uniform	Uniform		Costs in 1000 Base	<u>S</u> Alternate	
Safety Sup. type	None 2		Auto % direction	Balanced 10.0	Balanced 10.0	Grade Crossi O&M	ng Devices 0.2	1.8	
No. RR Tracks	rain Speeds (mph)		Percent Trucks Of this, % trailers	0.0	0.0	Oth. Loyde Capital	0.0	0.0 74.8	
Max Timet	able	10.0	Truck TOD Dist Truck % direct		Uniform Balanced	Supplementary Safety			
Passenger Freight	Ī	10.0 8.0	Percent Bus	0.0	0.0	O&M Oth. Loyde	0.0 0.0		
Switch		3.0	Bus TOD Dist Bus % direction	Uniform Balanced	Uniform Balanced	Capital		0.0	
			Costs in '000 \$ of Hwa	y Improvement	0.0				

East 48th Avenue at Ash Street Crossing - MP 2.12, CDOT Hazard Rating 0.03

East 48th Avenue is in the north part of Denver and in the BNSF Brush subdivision (see Photo C-7). The primary operating railroad at the East 48th Avenue grade crossing is BNSF. This road crossing is located within the CCD industrial area and has seen one at grade incident without fatalities. Appendix D provides specific accident reports. There is limited signage and crossing safety devices at this crossing.





Possible Safety Treatments

Traffic Control Systems

Add median; add pavement markings on all quadrants; add warning lights, blank-out signs, and no-right turn signs; relocate signs; raise the curb; repair asphalt; and add a two-quadrant gate system. Reduces risk from 10 percent to 5 percent.

Estimated cost is ~\$560,000

Viewing Considerations

Relocate telephone poles

Estimated cost is ~\$10,000

Results

Figure C-7 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents. The prediction is based on a statical percentage, which is founded upon current traffic flows. When this number in traffic volume increases, the percentages also increase of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

Joiee Mohr CODOT

Dataset: Region ID:

Figure C-7. East 48th Avenue at Ash Street Crossing



Region Name Denver
Technology Factor 0.50 0.50 0.50
Percent Benefit from Closure 0.00

	SUMMARY OF PREDICTED ANNUAL AC	Calculated:	11/22/2022	9:57:06PM		
Fatal		Injury	PDO	Total		
	Base	0.00679	0.01884	0.07657	0.10220	
	Alternate	0.00249	0.00724	0.03568	0.04541	

Crossing ID 057059A Milepost:0002.118	Train Speeds (mph)	Highway Traffic Characteristics			Costs In 1000 \$			
Description BNSF - 48TH AT ASH	Thru Switch	10.0	Lanes	Base 2	Alternate 2		Base	Alternate
Paved? TRUE Urban? TRUE	Max TT Speed	10.0	AADT	3,000	3,000	Grade	Crossing E	Devices
GCX Base Type Crossbucks	Dally Trains		Auto TOD	Uniform	Uniform	O&M	0.2	0.2
Supp. Safety None	Day Through	0.1	Auto % dir	Balanced	Balanced	Other	0.0	0.0
GCX Alt Type Gates	Night Through	0.0				Capital		1.6
Supp. Safety None	Day Switch	0.0	% Trucks	6.0	6.0	Suppl	ementary :	Safety
No. Main Tracks 0	Night Switch	0.0	Truck TOD	Uniform	Uniform	O8M	0.0	0.0
No. Other Tracks 2	_		Truck % dir	Balanced	Balanced	Other	0.0	0.0
Traffic Management False	Accidents Past Years	% Bus	0.0	0.0	Capital		0.0	
Measures? Rall T-O-D	Yr1 0 Yr2	0	Bus TOD	Uniform	Uniform			
Passenger Uniform	Yr3 1 Yr4	0	Bus % dir	Balanced	Balanced	_	y Improve	ments 0.0
Switch Uniform	Yr5 0		Don do		44-	Lanes		0.0
			Predic	ted Annual Acci	Alternate			
			Fatal	0.00679	0.00249			
			injury	0.01884	0.00249			
			PDO	0.07657				
			F50	337007	2.23000			

West Mississippi Avenue Crossing – MP 4.62, CDOT Hazard Rating 0.03

West Mississippi Avenue is in the south part of Denver and on the BNSF Pikes Peak subdivision (see Photo C-8). The primary operating railroad at the West Mississippi Avenue grade crossing is BNSF. This road crossing is located within the CCD industrial area and has seen one at grade incident without fatalities. Appendix D provides specific accident reports. There is limited lighting and signage at this crossing.





Possible Safety Treatments

Traffic Control Systems

Add median; add pavement markings on all quadrants; add warning lights, blank-out signs, and no-right turn signs; relocate signs; raise the curb; repair asphalt; and add a two-quadrant gate system. Reduces risk from 10 percent to 5 percent.

Estimated cost is ~\$560,000

Viewing Considerations

Relocate power poles

Estimated cost is ~\$50,000

Results

Figure C-8 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents.. The prediction is based on a statical percentage, which is founded upon current traffic flows. When this number in traffic volume increases, the percentages also increase of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

Jolee Mohr

CODOT

9

User:

Dataset:

Region ID:

Figure C-8. West Mississippi Avenue Crossing



Region Name Denver 0.50 0.50 Technology Factor 0.50 Percent Benefit from Closure 0.00

SUMMARY OF PREDICTED ANNUAL ACCIDENTS			Calculated:	11/22/2022 9	:58:21PM	
Fatal		Injury	PDO	Total		
	Base	0.00594	0.01710	0.08033	0.10337	
	Alternate	0.00264	0.00760	0.03570	0.04593	

CROSSING DATA FOR THE DENVER REGION

Train Speeds (mp	Highwa	Highway Traffic Characteristics			Costs in '000 \$		
Thru Switch	10.0	Lanes	Base 4	Alternate 4		Base	Alternate
Max TT Speed	10.0	AADT	13,500	13,500	Grade 0	Crossing D	Devices
Dally Tester		Auto TOD	Uniform	Uniform	M8O	1.8	0.5
	0.1	Auto % dir	Balanced	Balanced	Other	0.0	0.0
					Capital		1500.0
		% Trucks	8.0	8.0	0		
*		Truck TOD	Uniform	Uniform			O.O
Negrit Switch	0.0	Truck % dir	Balanced	Balanced			0.0
Analdania Dani Va		O/ Due	0.0	0.0		0.0	0.0
					Capital		0.0
					Higway	y Improve	ments
	·	DUS 75 UII	Data idea	Dalativeu	Lanes		0.0
113 0		Predic	ded Annual Acci	dents			
			<i>B</i> ase	A/ternate			
		Fatal	0.00594	0.00264			
		Injury	0.01710	0.00760			
		PDO	0.08033	0.03570			
5 N	Switch Aax TT Speed Daily Trains Day Through Might Through Day Switch Might Switch Accidents Past Yes Yr 1 0 Yr 2	Max Max	Max TT Speed	Max TT Speed 10.0 Lanes 4	Max TT Speed 10.0 Lanes 4 4 4 AAX TT Speed 10.0 AAX TT Speed 10.0 AADT 13,500 13,500 Auto TOD Uniform Balanced Balanced Balanced Balanced Accidents Past Years Yr 1 0 Yr 2 0 Bus TOD Uniform Uniform Yr 5 0 Bus Milr Balanced Balanced Balanced Balanced Predicted Annual Accidents Base Alternate Fatal 0.00594 0.00264 Injury 0.01710 0.00760	Max TT Speed 10.0 AADT 13,500 13,500 Grade (1)	Max TT Speed 10.0 Lanes 4 4 4 AADT 13,500 13,500 Grade Crossing I

Page 1 of 1

East 47th Avenue and York Street Crossing – MP 2.98, CDOT Hazard Rating 0.68

York Street is in the north part of Denver and in the UPRR Greeley subdivision (see Photo C-9). The primary operating railroad at the York Street grade crossing is UPRR. This road crossing is located within the CCD between a residential and industrial use area and has seen one at grade incident without fatalities. Appendix D provides specific accident reports. There is limited signage and crossing safety devices at this location. However, CCD recently finished construction of a pedestrian crossing at this location.





Possible Safety Treatments

Traffic Control Systems

Add four quadrant gates, fencing along the ROW, and a wrong-way sign on York Street; extend the median; add pavement markings, warning lights, and a pedestrian gate; and relocate signs. Reduces risk from 10 percent to 0.8 percent.

Estimated cost is ~ \$500,000

Viewing Considerations

Remove old telephone pole on southeast corner on island (York Street and 47th Avenue)

Estimated cost is ~\$10,000

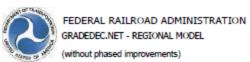
Results

Figure C-9 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents. The prediction is based on a statical percentage, which is founded upon current traffic flows. When this number in traffic volume increases, the percentages also increase of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

CODOT

Dataset: Region ID:

Figure C-9. East 47th Avenue and York Street Crossing



Denver						
0.50	0.50	0.50				
0.00						
	0.50	0.50 0.50	0.50 0.50 0.50	0.50 0.50 0.50	0.50 0.50 0.50	0.50 0.50 0.50

SUMMARY OF PREDICTED ANNUAL ACCIDENTS			Calculated:	11/29/2022 10:	54:48PM	
Fatal		Injury	PDO	Total		
	Base	0.01056	0.02570	0.06936	0.10563	
	Alternate	0.00084	0.00206	0.00555	0.00845	

Crossing ID 804422R Milepost:0002.980	Train Speeds	s (mph)	Highwa	y Traffic Charac	teristics	Cos	sts In '000	\$
Description UP - YORK STREET	Thru Switch	20.0 10.0	Lanes	Base 3	Alternate 3		Base	Alternate
Paved? TRUE Urban? TRUE	Max TT Speed	20.0	AADT	4,100	4,100	Grade	Crossing i	Devices
GCX Base Type Gates	Dally Trai	ins	Auto TOD	Uniform	Uniform	M&O	2.5	
Supp. Safety None	Day Through	5.0	Auto % dir	Balanced	Balanced	Other	0.0	
GCX Alt Type Gates	Night Through	5.0 0.0	% Trucks	5.0	5.0	Capital		280.0
Supp. Safety 4 quad - 60' medians No. Main Tracks 2	Day Switch Night Switch	0.0	Truck TOD	Uniform	Uniform	Suppi O&M	ementary 0.0	
No. Other Tracks 1	Ngilowiai	0.0	Truck % dir	Balanced	Balanced	Other	0.0	
Traffic Management False	Accidents Pas	st Years	% Bus	0.0	0.0	Capital		0.0
Measures? Rall T-O-D	Yr1 0	Yr2 0	Bus TOD	Uniform	Uniform	Moun	ur Immenue	omonte
Passenger Uniform	Yr3 1	Yr4 0	Bus % dir	Balanced	Balanced	Lanes	y Improve	0.0
Switch Uniform	Yr5 0		Dredi	cted Annual Acci	rients	Laires		0.0
			Ficu		Alternate			
			Fatal	0.01056	0.00084			
			Injury	0.02570	0.00206			
			PDO	0.06936	0.00555			

Alameda Avenue Crossing - MP 3.69, CDOT Hazard Rating 0.0716

Alameda Avenue is in the central part of Denver and in the BNSF Pikes Peak subdivision (see Photo C-10). The primary operating railroad at the Alameda Avenue grade crossing is BNSF, but UPRR also operates at the crossing. This road crossing is located within the CCD mixed use area and has seen one at grade incident without fatalities. Appendix D provides specific accident reports. There is limited signage and crossing safety devices at this location.





Possible Safety Treatments

Traffic Control Systems

Add four quadrant gates, median, pavement markings, warning lights and bells, pedestrian gates, and ROW fencing. Reduces risk from 10 percent to 0.5 percent.

Estimated cost is ~\$550,000

Viewing Considerations

Install cantilever for traffic semaphores (arms, flags, or poles that are held in certain positions to signal drivers) and railroad warning lights and bells.

Estimated cost is ~\$100,000

Results

Figure C-10 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents. The prediction is based on a statical percentage, which is founded upon current traffic flows. When this number in traffic volume increases, the percentages also increase of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

Jolee Mohr

CODOT

User:

Dataset: Region ID:

Figure C-10. Alameda Avenue Crossing



Region Name Deriver
Technology Factor 0.50 0.50 0.50
Percent Benefit from Closure 0.00

SUMMARY OF PREDICTED ANNUAL AC	CCIDENTS	Calculated:	11/29/2022 10	:59:47PM	
	Fatal	Injury	PDO	Total	
Base	0.00614	0.01757	0.08025	0.10397	
Alternate	0.00027	0.00078	0.00358	0.00464	

Crossing ID 245460F Milepost:0003.694	Train Speeds (m)	_	Highwa	y Traffic Charac	teristics	Cos	ts In '000	<u>\$</u>
Description BNSF - ALAMEDA AVE	Thru Switch	10.0 1.0	Lanes	Base 5	Alternate 5		Base	Alternate
Paved? TRUE Urban? TRUE	Max TT Speed	10.0	AADT	33,400	33,400	Grade	Crossing i	Devices
GCX Base Type Flashing lights	Daily Trains		Auto TOD	Uniform	Uniform	M&O	1.8	0.5
Supp. Safety None	Day Through	0.1	Auto % dir	Balanced	Balanced	Other	0.0	0.0
GCX Alt Type Gates	Night Through	0.0	% Trucks	2.0	2.0	Capital		1500.0
Supp. Safety 4 quad - 60' medians No. Main Tracks 0	Day Switch Night Switch	0.0	Truck TOD	Uniform	Uniform	Suppi O&M	ementary 0.0	Sarety 0.0
No. Other Tracks 1	regit Switch	0.0	Truck % dir	Balanced	Balanced	Other	0.0	0.0
Traffic Management False	Accidents Past Ye	ars	% Bus	0.0	0.0	Capital		0.0
Measures? Rall T-O-D	Yr1 0 Yr2	0	Bus TOD	Uniform	Uniform	House	v Improve	monte
Passenger Uniform	Yr3 1 Yr4	. 0	Bus % dir	Balanced	Balanced	Lanes	ly intiprove	0.0
Switch Uniform	Yr 5 0		Predic	ded Annual Acci	dents	Larco		0.0
					Alternate			
			Fatal	0.00614	0.00027			
			Injury	0.01757	0.00078			
			PDO	0.08025	0.00358			

East 50th Avenue Crossing - MP 1.843, CDOT Hazard Rating 0.0086

East 50th Avenue is in the north part of Denver and in the BNSF Brush subdivision (see Photo C-11). The primary operating railroad at the East 50th Avenue grade crossing is BNSF. This road crossing is located within the CCD industrial use area and has seen one at grade incident without fatalities. Appendix D provides specific accident reports. There is limited signage and crossing safety devices at this location.





Possible Safety Treatments

Traffic Control Systems

Add two quadrant gates, pavement markings, warning lights, and signage. Reduces risk from 10 percent to 5 percent.

Estimated cost is ~\$370,000

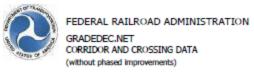
Viewing Considerations

Viewing considerations are not applicable.

Results

Figure C-11 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents. The prediction is based on a statical percentage, which is founded upon current traffic flows. When this number in traffic volume increases, the percentages also increase of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

Figure C-11. East 50th Avenue Crossing



User: CARLOS GALLEGOS Dataset: Initial dataset

Corridor ID 8

Corridor Name	Denver C	county			Avg. No. Trains Per Day	Train Time-of-Day Distribution
				Passenger	0.0	Uniform
Technology Factors	0.50	0.50	0.50	Freight	0.3	Uniform
Signal Synchronization?	False			Switch	0.0	Uniform

CORRIDOR SUMMARY OF PREDICTED ANNUAL ACCIDENTS

Calculated: 21-Jun-2022 12:00 pm

	Fatal	Injury	PDO	Total
Base	0.006603	0.018429	0.076349	0.101380
Alternate	0.000416	0.001216	0.006108	0.007740

CROSSING DATA FOR THE DENVER COUNTY CORRIDOR

Milepost 1.84	Crossing ID 245288M	Accidents in 5 Years		1	Predicte	d Annual Acc	idents
Description BNSF - 8	50TH AVE	Highway Tr	affic Characteristic Base	<u>Alternate</u>	Fatal Injury	Base 0.00045 0.00588	Alternate 0.00001 0.00015
Paved? True	Urban? True	H'way Lanes	2	2.0	PDO	0.02178	0.00055
GCX Base Type Safety Sup. Type	Passive None	Dist from hway AADT	0.10 1.000	0.1 1,000	Total	0.02810	0.00071
GCX Alt Type	Gates	Auto TOD Dist	Uniform	Uniform	2	Costs In 1000 Base	<u>S</u> Alternate
Safety Sup. type	4 quad - no detection	Auto % direction	Balanced	Balanced	Grade Cross	ng Devices	
No. RR Tracks	2	Percent Trucks	5.0	5.0	O&M Oth. Loyde	0.2	1.8
<u>Tr</u>	ain Speeds (mph)	Of this, % trailers Truck TOD Dist	0.0 Uniform	0.0 Uniform	Capital		74.8
Max Timeta		Truck % direct	Balanced	Balanced	Supplementa	ry Safety	
Passenger	10.0				M8O	0.0	0.0
Freight	8.0	Percent Bus	0.0	0.0	Oth. Layde	0.0	
Switch	3.0	Bus TOD Dist	Uniform	Uniform	Capital		0.0
		Bus % direction	Balanced	Balanced			
		Costs in '000 \$ of Hwa	y Improvement	0.0			

48th Avenue, West of Forest Street Crossing - MP 2.69, CDOT Hazard Rating 0.021

48th Avenue is in the north part of Denver in the BNSF Brush subdivision (see Photo C-12). The primary operating railroad at the 48th Avenue grade crossing is BNSF. This road crossing is located within the CCD industrial use area and has seen one at grade incident without fatalities. Appendix D provides specific accident reports. There is limited signage and crossing safety devices at this location.





Possible Safety Treatments

Traffic Control Systems

Add two quadrant gates, pavement markings, warning lights, and signage. Reduces risk from 10 percent to 5 percent.

Estimated cost is ~ \$370,000

Viewing Considerations

Viewing considerations are not applicable.

Results

Figure C-12 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents. The prediction is based on a statical percentage, which is founded upon current traffic flows. When this number in traffic volume increases, the percentages also increase of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

Jolee Mohr CODOT

Figure C-12. 48th Avenue, West of Forest Street Crossing



 Region Name
 Deriver

 Technology Factor
 0.50
 0.50

 Percent Benefit from Closure
 0.00

User:

Dataset: Region ID:

SUMMARY OF PREDICTED ANNUAL A	CCIDENTS	Calculated:	11/29/2022 11:0	3:52PM	
	Fatal	Injury	PDO	Total	
Base	0.00676	0.01880	0.07683	0.10239	
Alternate	0.00248	0.00723	0.03579	0.04550	

Crossing ID BEGGRANNON BNSF -	Milepost:0002.6		Thru	1 Sper	eds (mph)	10.0		y Traffic Charac Base	Alternate	Cos	ts in 1000 Base	<u>\$</u> Alternate
Paved? TRUE	Urban? TRUE		Switch Max TT S	peed		1.0	AADT Auto TOD	2,500 Uniform	2,500 Uniform	Grade O&M	Crossing I	
GCX Base Type Supp. Safety GCX Alt Type	Crossbucks None Gates		Day Throu Night Thro	ıgh	<u>Trains</u>	0.1	Auto % dir	Balanced	Balanced	Other Capital	0.0	0.0
Supp. Safety No. Main Tracks	None 0 2		Day Switc Night Swit	h		0.0	% Trucks Truck TOD Truck % dir	6.0 Uniform Balanced	6.0 Uniform Balanced	M.SO	ementary 0.0 0.0	Safety 0.0 0.0
No. Other Tracks Traffic Managemen Measures? Rail	t Fals	Si	Accid	lents F	Past Year Yr 2	E 0	% Bus Bus TOD	0.0 Uniform	0.0 Uniform	Other Capital	y Improve	0.0
Passenger Switch	Uniform Uniform		Yr 3 Yr 5	0	Yr4	1	Bus % dir Predik	Balanced ded Annual Acc	Balanced dents	Lanes	y improve	0.0
							Fatal Injury PDO	Base 0.00676 0.01880 0.07683	0.00723			

13th Avenue and Umatilla-MP 2.69, CDOT Hazard Rating 28

13th Avenue and Umatilla is in the La Alma-Lincoln Park neighborhood of Denver in the BNSF Brush subdivision (see Photo C-13). The primary operating railroad at the 13th Avenue grade crossing is BNSF. This road crossing is located within the CCD industrial use area and has seen zero at grade incidents, but it is a high traffic area. Appendix D provides specific accident . There is limited signage and crossing safety devices at this location.

Photo C-13. 13th Avenue and Umatilla



Possible Safety Treatments

Traffic Control Systems

Add four-quadrant gates, pavement markings, warning lights, and signage. Add pedestrian crossing gates and sidewalks. Reduces risk from 0.6 percent to 0.1 percent.

Estimated cost is ~\$500,000

Viewing Considerations

Remove or reduce vegetation to improve road traffic visibility.

Estimated cost is ~\$20,000

Results

Figure C-13 shows the base (current) predicted accidents at the studied road crossing and the alternate (post-construction) predicted accidents. The prediction is based on a statical percentage, which is founded upon current traffic flows. When this number in traffic volume increases, the percentages also increase of potential accidents will also increase. The greater number of safety appliances added, the safer the overall crossing will be.

Figure C-13. 13th Avenue and Umatilla



Region Name	Denver		
Technology Factor	0.50	0.50	0.50
Percent Benefit from Closure	0.00		

SUMMARY OF F	PREDICTED ANNUAL	ACCIDENTS	Calculat	ted: 3 <i>/</i> 6 <i>/</i> 2023 1:41:1	5PM	
*		Fatal	Injury	PDO	Total	
	Base	0.00089	0.00191	0.00383	0.00663	
	Altemate	0.00016	0.00034	0.00069	0.00119	

Crossing ID 246254T Milepost0001.864	<u>Trai</u>	Spe	eds (mpl	Ŋ	<u>Highwa</u>	ry Traffic Charact	<u>teristics</u>	Cos	sts in '000	5
Description BNSF - W 13TH AVE	Thru Switch			30.0 1.0	Lanes	<i>Ba</i> se 2	Alternate 2	7.5	<i>Ba</i> se	Alternat
Paved? TRUE Urban? TRUE	Max TT S	peed		30.0	AADT	6,400	6,400	Grade	Crossing I	Devices
GCX Base Type Gates Supp. Safety None GCX Alt Type Gates Supp. Safety 4 quad - no detection	Day Thro Night Thro Day Swite	ough	<u>Trains</u>	12.0 12.0 0.0	Auto TOD Auto % dir % Trucks	Uniform Balanced 11.0 Uniform	Uniform Balanced 11.0 Uniform	O&M Other Capital Suppl	2.5 0.0 lementary	5.0 0.0 280.0 Santety
No. Main Tracks 2 No. Other Tracks 2	Night Swi	ch		0.0	Truck TOD Truck % dir	Balanced	Balanced	O&M Other	0.0	0.0 0.0
Traffic Management Fals:	Accid	lents (Past Yea	rs .	% Bus	0.0	0.0	Capital		0.0
Measures? <u>Rail T-O-D</u> Passenger Uniform	Yr1 Yr3	0	Yr2 Yr4	0	Bus TOD Bus % dir	Uniform Balanced	Uniform Balanced	Hgws Lanes	ay improve	ents 0.0
Switch Uniform	Yr5	U			<u>Pre di</u>	cted Annual Acci	dents_			
					Fatal Injury PDO	Base 0,00089 0,00191 0,00383	Alternate 0.00016 0.00034 0.00069			



APPENDIX D. FRA ACCIDENT REPORTS



APPENDIX D – FRA ACCIDENT REPORTS

Figure D-1. South Kalamath Street Crossing (1 of 3)

	TION (FRA)	HIGHW	DENTA	NCIDENT	REPORT		OMB Approval No. 213	0-0500
1.Name of Reporting Railroad	TION IF ISO	7,00	NO ENTR	HOIDEN	1a. Alphabetic Co	de	1b. Railroad Accident/Incide	
Union Pacific Railroad Compa	any [UP]				UP		1121GP026	
2.Name of Other Railroad or Other E	entity Filling for Equips	nent Involved in Train	Accident	Incident	Za. Alphabetic C	ode	2b. Railroad Accident/Incide	nt No.
3. Name of Railroad or Other Entity	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Maintenance (wegle	r anarys		Sa. Alphabetic C	cde	3b. Railroad Accident/Incide	ent No.
Union Pacific Railroad Compa		311.00		_	UP		1121GP026	
 U.S. DOT Grade Crossing ID No. 		70 37030000			5. Date of Apold	ent/incident	6. Time of Accident/Incident	
		92102	20E		1 1 1	N. 100 (10)	1:40 AM	PMV
7, Nearest Railroad Station		8. Subdivision	in in the	22,500	9. County	100	10. State	Code
SOUTH DENVER		COLORAL	-	-	DENVER		Abbr. CO	08
11. City (Fin a city) DENVER		12. Highw	way Name	or No. KA	LAMATH ST	REET	Public 🗸 P	etevin
High	hway User Involve	d		MARCE ON A		Rail Equipment	Involved	
13. Type				17. Equipm	nent	4. Car(s) /moving		
C Truck-trailer F. Bus	J. Other Mc	otor Vehicle		1 Tox		5. Car(s) (Manchis 6. Light loco(s) (r		2000
A. Auto D. Pick-up truck G. Sch			Code	2. Tra 3. Tra		7. Light loco(s) (No. of Section 2.	Code
	toroycle M. Other	2.41	K			B Other (specif		1
	Arection (geograph) Iorth 2 South 3 Eas		Code 2	18. Position	n of Car Unit in Tr	ain		
16. Position 1. Stalled or stuck on				19. Circum	stance			283
2. Stopped on Crossi		on crossing by gates	Code	1 St 9350		ighway user 2 Reil	equipment struck by highway o	Cock
3. Moving over crossi			3	1,76316	Seature of Struck I	grandy door 2, reali	examine across of infriesty (1
20a. Was the highway user and/or		d	Code	20b. Was f	there a hazardous	materials release by	0	Code
in the impact transporting haz 1. Highway User 2. Rail Eq		1. Madhar	4		Hinhway Heer	2. Rall Equipment	2 Both 4 Neither	4
20c. State here the name and guan				1,	riginaly Osci	E. Petr Equipment	a. bosi 4. Netice	
21. Temperature 22. V	Asibility (single entry)	,	Code	Z3. Weath	her (single entry)			Code
(specify if minus) 64 °F 1.0	Dawn 2 Day 3 Dur	sk 4. Dark	2	1, Clea	er 2. Cloudy 3. R	ain 4. Fog 5. Sleet	6. Snow	2
	er Train-Pulling 6. Cut or Train-Pulling 7. Yen in 8. Ligh			Pushing C	Equipm lode	pe Used by Rail ant Involved Yard 3. Siding 4. Ind	Code 28. Track Number	
27. FRA Track 28. Number of	20, 1908	mber of Cars 3			condeal speed If as	reliable) Code	31, Time Table Direction	Code
Class (1-9,X) Locomotiv	2	76	R. Rec			13 mph E	1. North 3. East 2. South 4. West	1
32. Typo of		7. Crossbucks 10. Fla	agged by o		(See reve	Crossing Warning	34. Roadway Conditions A. Drv B. Wet C. Snow/Slush	
Crossing 2. Cantilever FLS 5. Warning 3. Standard FLS 6.	7	Watchman 12 No			mayecto	Code	D.ice E. Sand,Mud.Dirt,Oil,Gravel	Code
Crossing 2. Centilever FLS 5.	Audible 5	9. Watchman 12. No	one	1		Code	D.loe E. Sand,Mud.Dirt,Oil,Gravel F. Water (Standing, Moving.)	Code
Crossing 2 Centilever FLS 5.	Audible 5	98. Crossing V	warning In		đ	Code 37. Crossin	D.ice E. Sand,Mud.Dirt,Oil,Gravel F.Water (Standing, Moving.) g (Burninated by Street	Α
Code(s) 2 Cantilever FLS 5.	Audible 5	38. Crossing V	way Signal	ls	đ	Code 37. Crossin Lights o	D.loe E. Sand, Mud.Dirt, Cil, Gravel F. Walter (Standing, Moving.) g Illuminated by Street r Special Lights	A
Crossing 2 Camilever FLS 5 3 Standard FLS 6 Code(s) 01 03 S5 Location of Warning 1 Both Sides 2 Side of Vehicle Approach 3 Opposite Side of Vehicle App	Audible 5	38. Crossing V with Highw 1. Yes 2	Warning In way Signal 2. No 3.	ls . Unknown	d '	Code 37. Crossin Lights o 1. Yes	D.loe E. Sand, Mud Dirt, Oi, Gravel F. Walter (Standing, Moving.) g Illuminated by Street r Special Lights 2. No. 3. Unknown	Α
Code(s) 2 Cantilever FLS 5.	Audible S 07	38. Crossing V with Highw 1. Yes 2	Warning In way Signal 2. No 3. Front of 1	ls Lunknown Train 41. I	d Highway User 1. Went around th	Code 37. Crossin Lights o 1. Yes 5. Oth c gate 6. We	D. be E. Sand, Mud.Dirt, Ol, Gravel F. Walse (Standing, Minving.) g (Burninsted by Street r Special Lights 2. No. 3. Unknown or (specify) nt around the uniporary barris	Cod
Crossing 2 Cantilever FLS 5.	Audible S 07 woach C and Struck Code	38. Crossing V acde 1. Yes 2 ser Want Behind or in or was Struck by Sec	Warning In way Signal 2 No 3 Front of 1 cond Train	Is LUnknown Train 41.1	d Highway User	Code 37. Crossin Lights o 1. Yes 5. Oth c gate 6. We en proceeded (if	Dice E. Sand, Mud.Dirt, Oil, Gravel F. Waler (Standing, Minung.). g Illuminated by Street r Special Lights 2, No. 3, Unknown er (pocety) are accounted that the property barri- yes, see instructions)	Cod 1
Crossing 2 Camillever FLS 5.	Audible 5 07 proach Code 1. Yes 2.	3. Watchman 12. No 38. Crossing V with Highe 1. Yes 2 see West Behind or in or was Struck by Sec	Warning In Warning In way Signal 2. No 3 Front of T cond Train	Is LUnknown Train 41. I Code 2	d Highway User 1. Went around th 2. Stopped and th 3. Did not stop 4. Stopped on cro	Code 1 37. Crossin Lights o 1. Yes 5. Oth c gate 6. We an proceeded 0f 7. We	D. be E. Sand, Mud.Dirt, Ol, Gravel F. Walse (Standing, Minving.) g (Burninsted by Street r Special Lights 2. No. 3. Unknown or (specify) nt around the uniporary barris	A Cod
Crossing 2 Camillever FLS 5.	Audible S 07 proach mider 40. Hichway U and Struck	38. Crossing V and Highw 38. Crossing V with Highw 1. Yea 2 ser Went Behind or in or was Struck by Sec No. 3. Unknown 43. View of Track O	Warning In way Signal 2. No 3. i Front of 1 cond Train	Is Unknown Train 41. I Code 2	d Highway User Nent around th Stopped and th	Code 1 37. Crossin Lights o 1. Yes 5. Oth c gate 6. We an proceeded 0f 7. We	Dice E. Sand, Mud.Dirt, Ol, Gravel F. Walter (Standing, Minoring) g (Burninsted by Street r Spacial Lights 2. No. 3. Unknown er (spacify) m around thru temporary barri yes, see instructions) ent thru the gate cide (Attempted suicide	Cod 1
Crossing Warning 2. Cantilever FLS 5. 3. Standard FLS 6. Code(s) 3. Standard FLS 6. Code(s) 35. Location of Warning 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle App 38. Highway User's Age 1. Male 38. 42. Driver Passed Standing Highway Vehicle	Audible 5 07 proach Code 1. Yes 2.	3. Watchman 12. No 38. Crossing V with Highw 1. Yea 2 ser Went Bethind or in or was Struck by Sec No. 3. Unknown 43. View of Track O 1. Penna	Warning In Way Signal 2. No. 3 a Front of 1 cond Train	Is Unknown Train 41. I Code 2 by (prim	d Highway User Went around th Stopped and th Did not stop ery sopped on cro ery spetrockini Respondent Train	Code 37. Crossin Lights o 1. Yes 6. Oth c gate 6. We an proceeded 7. We ssing 8. Su	Dive E. SandMud.Dirt.Ol. Gravel E. SandMud.Dirt.Ol. Gravel F. Walter (Standing, Minving.) g (Burninated by Street r Special Lights 2. No. 3. Unknown ar (specify) m aroundthru temporary barri yas, see instructions) int thru the gate cidel/Attempted suicide 7. Other (specify)	Code Code Code
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FORM FRA F 6180.57 (Rev. 08/10)

* NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180 55A OMB Approval expires 7/31/2023

Figure D-1. South Kalamath Street Crossing (2 of 3)

	TION (FRA)	ACCI	DENT/INC	CIDENT	CROSSING REPORT			OMB Approval No. 213	0-0500
1 Name of Reporting Railroad	V. 77				1s. Alphabetic C	ode		1b. Railroad Accident/Incide	nt No.
BNSF Railway Company (BNS	SF)				BNSF			PR0421201	
2 Name of Other Railroad or Other E	intity Filling for Equipme	ant Involved in Train A	Nocident/Inc	cident	2a. Alphabetic C	lode		2b. Railroad Accident/Incide	nt No.
3. Name of Railroad or Other Entity		Asimienance Asimiera	entri i		3s. Alphabetic (ade		3b. Railroad Accidentifindide	nt No.
BNSF Railway Company [BNS 4. U.S. DOT Grade Crossing ID No.	F]				5. Date of Accor	la antificación de	40	PR0421201	
4. D.S. DOT Grade Crossing ID No.		77			5. Date of Actor	day	VEST .	6. Time of Accident/Incident	
		245394	4V		0 4	1 3	2021	1:30 AM	PM
7. Nearest Railroad Station		8. Subdivision			9. County			10. State	Code
SOUTH DENVER		PIKES PEA			DENVER			Abbr. CO	08
11. City (Vine city) DENVER		12. Highwe	ay Name or	No. KA	LAMATH AV	Œ		Public V Pr	tvate
High	way User Involved	E)				Rail Ed	quipment	Involved	
13. Type			1	7, Equipm			(moving	A. Train pulling- RCL	
C. Truck-Insiler F. Bus.		or Vehicle			en (knils pulling)	C. I deshad	() (stienain) loco(s) //r		
A Auto D. Pick-up truck G. Sch			Code		in funds pashing	W	locata) (t	The second residence of the second	
	croyate M. Other (s		A		in (alanding)	8. Othe			1
	insclion (geographics orth 2 South 3 East	The second secon	Code 3	B. Position	n of Car Unit in Ti	rain	1		
16. Position 1. Stalled or stuck on		n crossing by traffic		19. Circum	stance				Code
Stopped on Crossi	D. MINISTER OF	r crossing by gates	Gode 3	1. Rate	quipment struck l	righway us	or 2. Raile	equipment struck by highway u	
Moving over crossis Was the highway user and/or r				are street	there a hazardou	. modernick	and the last		
in the impact transporting haz-			Code	Sno- skae i	mere a nazaroou	s maneriors	петваве ру		Code
1. Highway User 2. Rail Eq		Neither	4	45	Highway User	2. Rall Eq.	ipment :	3. Both 4. Neither	4
20c. State here the name and quant	lify of the hezardous me	denial released, if any	(0)		
21. Temperature 22. V	Islatiny (single-entry)	Samuel Co	Code	23. West	her (single only	í	110000000000000000000000000000000000000	8700	Code
(apacity if minus) 37 °F 1.6	Dawn 2 Day 3 Duck	4. Dark	4	1. Clea	ar 2 Cloudy 3 I	tein 4: For	5 Sleet	6 Snow	1
(single entry) 3. Commute 4. Work Trai	501 DEC 1980		ger Train-Po	ushing C	Sode Equipm	ent Involve		10 (CARACES	
27. FRA Track 28. Number of	29. Numb	The second secon		A	1 1. Main 2. corded speed if a		ding 4, Ind Code	31. Time Table Direction	3000
Class (1-9.X) Locomoth	AB	ser of Cars 30.	Consist Sp R. Record	speed (Rec		vavable)	Code	31. Time Table Direction 1. North 3. East	Code
Class (1-9.X) Locomoth Units	20.14000	0.007833	Consist S	speed (Rec	corded speed if a	vavlable) 22 mpl	Code	31. Time Table Direction 1. North 3. East 2. South 4. West	103.0
Class (1-9 X)	Wig wags 7. Hwy. traffic signals 8. Audible 8.	124 Crossburks 10 Fing Stop signs 11 Oth Watchman 12 Non	Consist Sp R. Riscore E. Estima gged by one er (specify	ipeed (Recorded interest in the contract in th	33. Signale	vavlable) 22 mpl	Code R Warning	31. Time Table Direction 1. North 3. East 2. South 4. West 34. Roadway Conditions A. Dr. 8. West C. SnowNush D.los II. Sand Must Ont Off, Grown!	Code 2
Class (1-9 X)	Wig wags 7. Hwy. traffic signals 8. Audible 8.	124 30. 124 30. 124 Crossburks 10. Fing Stop signs 11. Othe Walchman 12. Non 67	Consist Sy R. Riscond E. Estimal gged by cre er (specify re	speed (Recorded Intelligence In	33. Signale (See rev Instruction	valable) 22 mpl d Grossing ense sude to ens and coo	Code R Warning r res) Code	31. Time Table Direction 1. North 3. East 2. South 4. West 34. Roardway Conditions A. Driv 8. West C. Snow/Stush D. los II. Send Must, Ont, Oil, Ginewi F. Water (Sharteing, Moving)	Code
Class (1-9 X)	Wig wags 7. Hwy. traffic signals 8. Audible 8.	124 30. 124 Transition of Constitution 10. Flag Stop signs 11. Other Watchman 12. Non 67 36. Crossing W	Consist Sy R. Riscord E. Estima gged by cre er (specify re	speed (Recorded Intelligence In	33. Signale (See rew instructe	valable) 22 mpl d Grossing ense sude to ens and coo	Code R Warning res) Code IV. Crossing	31. Time Table Direction 1. North 3. East 2. South 4. West 34. Roadway Conditions A. Dr. 8. West C. SnowNush D.los II. Sand Must Ont Off, Grown!	Code 2
Class (1-9.X)	Wig seage: 7, Hwy. traffic signals 9, Audible 9 06 0 roach 1	124 Crossbacks 10 Flag Stop signs 11 Oth Watchman 12 Non 87 36 Crossing W with Highwa 1, Yes 2	Consist S R. Recard E Estimate aged by one er (specify the surviving Inter- try Signate No 3. U	peed (Recorded interest intere	33. Signale (See revinstruction	vaslable) 22 mpl d Grossing ense sude forms and coo	Code Warning Code (IV. Drossing Lights or	31. Time Table Direction 1. North 3. East 2. South 4. West 34. Reactively Conditions A. Dr. 8. West C. SnowNush D.tos II. Stand Must,Ont,Ost,Gorwel F. Water (Snarding, Moving) 9 (Huminated by Street Special Lights 2. No. 3. Unknown	Code 2
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Figure D-1. South Kalamath Street Crossing (3 of 3)

DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION (FRA)				NCIDEN	CROSS				OMB A	approval No. 2130	0-0600
1.Name of Reporting Retroed		Aud	THE PARTY OF	HOIDER	_	abetic Co	de		_	oed Accident/Inciden	
BNSF Railway Company [BNSF]					BNS	SF.			PR05	19202	
2 Name of Other Railroad or Other Entity Filling for Ed	juipment in	volved in Train.	Accidenti	Incident	Za. Alph	isbetic Co	de		2b. Raile	oad Accident/Incide	rt No.
3. Name of Railroad or Other Entity Responsible for T BNSF Railway Company [BNSF]	rack Mainti	enance /wyle	any)		100000000000000000000000000000000000000	habstic Co	de	- 8		oed Accident/Incider	rt No.
4. U.S. DOT Grade Crossing ID No.					5 Date		m/incident	-	-	of Apoldent/Incident	
	T	24539	4V			5 o	day 1	019	10:25	AMIT	PM V
7. Nearest Railroad Station	-	B. Subdivision			9. Cour		13 4	017	10. Stat		Dode
SOUTH DENVER		PIKES PAR	RK		DE	NVER			3	Abbr. CO	08
11. City (Manuscript) DENVER		12. Highw	ay Name	or No. K	ALAMA	TH AV	E			Public 7 Pr	vate
Highway User Invi	olved	777						ipment	Involved		
A Auto D. Pisk-up trusk G. School Bus H. Per	er Motor Vel testnan er (specif	1000	Code	2. T 3. T	roin Surad roin Surad rain Jadan	te puerking) natrigi	7. Light k 8. Other	(standin cos) (r	g) B sowing) C standing) D	Train pulling-RCL Train pushing-RCL Train standing-RCL EMU Locomotive(s) DMU Locomotive(s)	Code
	ephoe()	202	Code	16. Posti	on at Car I	Unit in To	ir.	40			-Mr
16. Position 1. South of crossing 4. Trap			1	19. Circu	metanos			1			Jacon.
		sing by gates	Code 3	000000000000000000000000000000000000000		t struck hi	ghway user	2. Rail	equipment:	struck by highway u	Code
20s. Was the highway user and/or rail equipment m	nlved		1 0	20h Wai	Stere a h	ezamous	materials re	jease by	8		Code
in the impact transporting hazardous materials?	1		Code							0.0000000	4
Highway User 2 Rall Equipment 3. Bot State here the name and quantity of the hazards			4	- 3	. Highway	User 1	Rail Equip	mert	3. Both 4	l. Neither	
200. State here the name and quartery of the restance	Las materia	reminett, r an	y								
21 Temperature 22 Visibility (single o	ntry)		Code	23. Wes	other (sing	gla entry)					Code
(specify if minus) 50 °F 1 Dawn 2 Day 3	Dusk 4.0	ark	4	1.0	ear 2 Clo	udy 3.Ra	an 4 Fog	5. Sleet	6. Snow		1
Consist 2: Passenger Train-Puling 6: (single early) 3: Commuter Train-Puling 7:		A Spec M	MoW Equi gar Train	ρ. E.D. Pushing	Ati 25. Code	Equipme	pe Used by milinvolved and 3. Side		Code	MAIN 1 TRAC	
27. FRA Track 28. Number of 29.	Number of		J. Consist	Speed (R	ecorded sy	peed if aw	skable)	Code		Table Direction	Code
Class (1-9,X) Locomotive 4 Units 4		124	R. Rec E. Estir				4 mph	E		orth 3. East outh 4. West	1 1
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35. Location of Warning		36. Crossing V			led		97.		#urninate	ed by Street	
Both Sides Side of Vehicle Approach	Code 3	with Higher 1, Yes 2		u Unknown		1 5	ode	17000	Special U 2. No 3.		Code
 Opposite Side of Vehicle Approach Highway 39. Highway User's Gender 40. Highway 					Highway	User		5. Op			1
User's and S	aruck or was	s Struck by Sec	ond Train	Code		ed and the distop	n proceeds	d (F)	res, see ins		God 5
4.7.500	2 No. 3	. Unknown		2	4. Stoppe	ed on cros	seng	- NO MAN	CARRY LANGUE		
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2. Female 1 1. Yes 42. Driver Pleased Standing Cod highway Vehicle 1. Yes 2. No 3. Unknown 2 Casculfies to. Killed Injur 46. Highway Rail Crossing Users 0 48. Railroad Employees 0 52. Passengers on Train 0 6	e 43. \(\)	New of Track O 1. Perman 2. Standar Briver was 1. Killed 2. Injuly lighway Vehicle set dollar davas	bsoured broading rechanged as University (September 2) (Property 1979)	ay (or) nure d equipment Damage n Train rawr craw)	4. Stopps mary other 3. Pass at 4. Topo	ruction) ing Train ionaphy 3 \$2,500 2	5. Vegetati 6. Highere 45. Was I 1. Yes 48. Total I (inclus 51. Is a R Incide	on y Vehicle Viver in t Z. No Number o log drive ell Equipe	7. Otho 8. Not (he Vehicle (c) Vehicle (Obstructed ? Decupants	Code L
2. Female 1 1. Yes	e 43. V	New of Track O 1. Perman 2. Standa Inver was 1. Killed 2. Inju lighway Vehicle set, dallar danse foral Number of noticate passeng No.	bsoured broading rechanged as University (September 2) (Property 1979)	ay (or) nure d equipment Damage n Train rawr craw)	4. Stopps mary obser 3. Passo at 4. Tope	ruction) ing Train ionaphy 3 \$2,500 2	5. Vegetati 6. Highere 45. Was I 1. Yes 48. Total I (inclus 51. Is a R Incide	on y Vehicle Wer in t Z. No Yumber o Nig drive ell Equipe of Report	7. Otho s 8. Not (he Vehicle (d) Vehicle (d) ment Assid	Obstructed ? Decupants	Code
2. Female 1 1. Yes 42. Criver Passed Standing Cod Highway Vehicle 1. Yes 2. No 3. Unknown 2 Casualties to Killed Injur 46. Highway Rail Crossing Upers 0 0 49. Railroad Employees 0 0 652. Passengers on Train 0 0	e 43. V	New of Track O 1. Perman 2. Streets Inver was 1. Killed 2. Inju lighway Vehicle iet doller dema roal Number of include passent No roals alway if ne	bscured branch structured 3, Ut Property age) People o gers and branch structure in the str	ny (ari nure diequipme diequipme Damage n Train raer crew) 53b. Spo	4. Sopporturary other 3. Passint 4. Topo	suction) ing Train ing apply 3 \$2,500 2 Block	5. Vegetati 6. Highers 40. Was I 1. Yes 48. Total I (inches 51. In a R Incide 1. Yes	on y Vehicle Viver in t Z. No Number of Ang drive his Equips of Report ; Z. No	7. Otho 8. Not 0 he Vehicle (of Vehicle (r) ment Associate Being File	Chalmuched ? Coupenits lent /	Code 1
2. Female 1 1. Yes	e 43. V	New of Track O 1. Pormai 2. Standa Inver was 1. Killed 2. Inju lighway Vehicle set, distlar dama foral Number of mickale passeng No make atward 2 one E WAY STREET	bscured branch Struking self-temperatured 3. Util Property agre) People of gers and branch Struking Williams Wi	ny (ori nure diequipment Damage n Train rast crew) 53b. Spo tkong bila	4. Sapparary of ser 3. Passent 4. Tope	ruchen) ing Train sgraphy 3 \$2,500 2 Block ND WASS	5. Vegetati 6. Highwo 45. Was I 1. Yes 48. Totall (Inches 1. Yes Incide 1. Yes	on y Verticle Yiver in t Z. No Number o No drive ell Equip of Region ; 2. No	7. Othe 8 Not 1 he Vehicle (1) 17 Vehicle (1) 17 Vehicle (1) 18 Vehicle (1) 18 Vehicle (1) 19 Vehicle (Chalcuched Coupants Incl. I	Code 1 Code 2
2. Female	e 43. V	New of Track O 1. Perman 2. Standar Inverses 1. Killed 2. Inju lighesy Vehicle set dollar davas trail Number of include passency No roals alread 2. Ne E WAY STREET Str. pursuant to 1	bscured branch Struking nei transper og nei transper og Property grei People o gers and de cassary). In these will a Synature position be position to the position of the posi	ny (ori nure disquipment Demage n Train roan crew) 53b. Spo Books bila	4. Sangermany of ser 3. Passint 4. Topic cial Study	ruction) ing Train sgraphy 3 \$2,500 2 Block ND WAS S	5. Vegetari 6. Highway 45. Was I 1. Yea 48. Total I (inches 51. In a R Incide 1. Yea TRIACK BY 1	on y Verticle Yiver in t Z. No Number o No drive ell Equip of Region ; 2. No	7. Othe 8 Not 1 he Vehicle (1) 17 Vehicle (1) 17 Vehicle (1) 18 Vehicle (1) 18 Vehicle (1) 19 Vehicle (Chalcuched Coupants Incl. I	Code 1 Code 2

D-3

Figure D-2. Quebec Street Southbound Frontage Road Crossing (1 of 2)

DEPARTMENT OF TRANSPORTA					CROSSING			OHB A	persual No. 2120	0500
FEDERAL RAILROAD ADMINISTRATION 1.Name of Reporting Railroad	N (FRA)	ACC	IDENT/I	NCIDENT	1a. Alphabetic Co				pproval No. 2130 and Accident/Inciden	
Regional Transit District- Commu	iter [RTDC]				RTDC	oue		14563		t No.
2.Name of Other Railroad or Other Entity		t involved in Train /	Accident	Incident	2a. Alphabetic C	ode		2b. Railro	ad Accident/Inciden	t No.
3. Name of Railroad or Other Entity Resp		intenance (ringle	entry)		3a. Alphabetic C	ode		3b. Railro 14563	oad Accident/Inciden	t No.
Regional Transit District- Commu 4. U.S. DOT Grade Crossing ID No.	iei [KIDC]				RTDC 5. Date of Accide	ent/incident			of Accident/Incident	
•		80463	5B		month	day yo	_		•••	514 C
7. Nearest Railroad Station		8. Subdivision	JD		0 6 2 9. County	6 20)20	2:27 10. State	AM	PM V
CENTRAL PARK		A LINE			DENVER				Abbr. CO	08
11. City (If in a city) DENVER		12. Highw	ay Name	or No. O	UEBEC STREE	T			Public √ Pri	rate
Highwa	y User Involved					Rall Equi				
13. Type				17. Equipr		4. Car(s) 5. Car(s)			Train pulling- RCL Train pushing- RCL	
C. Truck-trailer F. Bus A. Auto D. Pick-up truck G. School B	J. Other Motor Bus K. Pedestrian	Vehicle			rain (units pulling) rain (units pushing			oving) C.	Train standing- RCL	Code
B. Truck E. Van H. Motorcy		ecity)	Code		rain (standing)	7. Light loc		out the state of	EMU Locomotive(s) DMU Locomotive(s)	l p
	ion (geographical)	•	Code	18. Positio	on of Car Unit in Tr	8. Other ain	(specify	, -	DINO ESCONDEVE(S)	
	2. South 3. East		1				1			
16. Position 1. Stalled or stuck on cros 2. Stopped on Crossing		crossing by traffic crossing by gates	Code	19. Circun						Code
3. Moving over crossing	3. Diocaco di 1	dossing by going	3	1. Kall 6	equipment struck n	ignway user	2. Hall e	quipment	struck by highway us	er 1
20a. Was the highway user and/or rail e in the impact transporting hazardo			Code	20b. Was	there a hazardous	materials rel	ease by			Code
Highway User 2. Rall Equipm		leither	4	1.	. Highway User	2. Rall Equips	ment 3	8. Both 4.	. Neither	4
20c. State here the name and quantity of			у							
	felesis ested									
	lity (single entry) 1 2. Day 3. Dusk 4	Dark	Code 2		ther (single entry) ar 2. Cloudy 3. R		Cleat	E Spour		Code I 2
24. Type of Equipment 1. Freight Train	5. Single					am 4. rog s	. oreer	e. onew		
	ain-Pulling 6. Cut of				25. Track Ty	/pe Used by R ent involved	Rall	Code	26. Track Number	or Name
	ain-Pulling 7. Yard/S				Code	rard 3. Sidin		ıstry 1	TRACK 1	
4. Work Train 27. FRA Track 28. Number of	8. Light id 29. Numbe	co(s) C. Commu			D 1. Main 2. Y		Code		Table Direction	
Class (1-9,X) Locomotive		ror cars 30	R. Rec		coroca speca ii ai				orth 3. East	Code
4 Units	0	4	E. Estin	nated	33 Discolar	48 mph Crossing Wa	R		outh 4. West	1
1. Gates 4. Wig Crossing	wags 7. C	rossbucks 10. Flag	gged by o	rew			aming	A. Dry	way conditions	
2. Cantilever FLS 5. Hwy Warning	_			lfy)		rse side for ns and codes)	B. Wet C.Snow/s	Slush	
3. Standard FLS 6. Aud		atchman 12. Nor	ne				Code	D.ice E. Sand,i	Mud,Dirt,Oil,Gravel	Code
Code(s) 01 03 35. Location of Warning	05 0	36. Crossing W				1 27	1		(Standing, Moving) d by Street	A
1. Both Sides	, Code	with theban						Special Lig		Code
 Side of Vehicle Approach Opposite Side of Vehicle Approach 		1. Yes 2.	. No 3.	. Unknown			1. Yes	2. No 3. I	Unknown	1
38.Highway 39.Highway User's Gender					Highway User			r (spech	fy) nru temporary barrica	
User's Age 1, Male Code	1	was Struck by Sec		- 1	 Went around th Stopped and th 		(fy	es, see ins	tructions)	Code
Age 1. Male Code 2. Female 1	1. Yes 2. No	3. Unknown			Did not stop Stopped on cro	ssina		nt thru the (gate oted suicide	1
42. Driver Passed Standing	Code 4	3. View of Track Of	bscured t		many obstruction)					Code
Highway Vehicle 1. Yes 2. No 3. Unknown	1	1. Permar			3. Passing Train				r (specify)	8
	led Injured 4	4. Driver was			t 4. Topography	45. Was Dr				Code
Casualties to:		1. Killed 2. Injur				1. Yes				
46. Highway-Rail Crossing Users 1	0 -	 Highway Vehicle (est. dollar dama) 		Damage	\$0	48. Total N (Includit	umber o ng driver		occupants 0	
49. Railroad Employees 0	0 5	D. Total Number of				51. Is a Ra		nent Accide		Code
52. Passengers on Train 0	0	(include passeng	ers and t	rain crew)	38		2. No	being File		2
	ieo Taken? ✓ Yo ieo Used? ✓ Yo			53b. Spec	cial Study Block					
54. Namative Description (Be specifi	c, and continue on s	eparate sheet if neo								
INDIVIDUAL RODE BICYCLE AROUND CO INDIVIDUAL IS UNKNOWN.	ROSSING WARNING I	DEVICES INTO THE	ACTIVE (CROSSING A	AND WAS STRUCK	BY NORTHBO	UND TRA	LIN 4058/57;	4020/19, TRIP 185. AG	E OF
55. Typed Name and Title		56	. Signatu	re				57. Date		
NOTE: This report is part of the reporting in any suit or action for damages growing							admitte	d as evide	nce or used for any p	ourpose

FORM FRA F 6180.57 (Rev. 08/10)

**NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A

OMB Approval expires 6/30/2021

Figure D-2. Quebec Street Southbound Frontage Road Crossing (2 of 2)

DEPARTMENT OF TRANSPOR				HWAY-RAI		CROSSING			OMB A	pproval No. 2130-	0500
1.Name of Reporting Railroad	thore is no			OOIDENIN	HOIDERT	1a. Alphabetic C	ode			ad Accident/Incident	
Regional Transit District- Con	nmuter []	RTDC				RTDC			11249		
2.Name of Other Railroad or Other R	Entity Filling	for Equips	ent involved in Tra	sin Accident/	Incident	2a. Alphabetic (Code		2b. Raliro	ad Accident/Incident	No.
3. Name of Railroad or Other Entity	Responsib	le for Track	Maintenance (ra	ngle entre)		3a. Alphabetic	Code		3b. Railro	ad Accident/Incident	No.
Regional Transit District- Con	nmuter [F	TDC]		g,,		RTDC			11249	9	
4. U.S. DOT Grade Crossing ID No.						5. Date of Acci	dent/incident		6. Time o	f Accident/Incident	
			8046					2019	9:43	AM	
7. Nearest Railroad Station CENTRAL PARK			8. Subdivisio	on ORRIDOR	TIME	9. County DENVER			10. State	Nbbr. CO	Code 08
44.00- (86				nhway Name							
DENVER				imay Name	O 140. Q1	UEBEC STRE				Public / Privi	ate
	nway Use	er involve	1					ulpment (moving	Involved	Train pulling- RCL	
13. Type C. Truck-trailer F. But		J. Other Mc	ton Mahinia		17. Equipr	ment ain (units pulling		(standing		Train pushing- RCL	
A Auto D. Pick-up truck G. Sci		K. Pedestri				ain (units pushin	C I I I I I I I I I I I I I I I I I I I	oco(s) (it		Train standing- RCL	Code
	torcycle	M. Other		Code	3. Tn	ain (standing)		loco(s) (s	condition)	EMU Locomotive(s) DMU Locomotive(s)	l D
	irection	(geographic		. Code	18. Positio	on of Car Unit in T		(specify	, -	DMO Editoriotive(s)	-
		uth 3. Eas		1				1			
16. Position 1. Stalled or stuck on				Code	19. Circun	nstance					Code
Stopped on Cross Moving over cross	-	5. Blocked	n crossing by gate	2	1. Rall e	equipment struck	highway use	r 2. Ralle	equipment s	truck by highway use	r 1
20a. Was the highway user and/or		ent levelue		-	20h Was	there a hazardou	e materiale e	alanca bu			
in the impact transporting haz			•	Code	200. Was	there a mazardou	s materials i	clease by			Code
1. Highway User 2. Rall Ed	quipment	3. Both 4	. Neither	4	1.	. Highway User	2. Rall Equi	pment :	3. Both 4.	Neither	4
20c. State here the name and quar	itity of the h	azardous n	aterial released, if	any							
·		ingle entry)		Code		ther (single entry	-				Code I 1
(specify if minus)		ay 3. Dus		4		ar 2. Cloudy 3.	Rain 4. Fog	5. Sleet	6. Snow		
24. Type of Equipment 1. Freight 1				nt/Inspect. ca		25. Track 1	ype Used by	/ Rall	Code	26. Track Number of	r Name
2. Passeng			of cars A. Spe 1/Switching B. Pass	c. MoW Equ		Code Equipo	nent Involved	1			
4. Work Tra			t loco(s) C. Com				Yard 3.8id	ling 4. Indi	ustry 1	MAIN TRACK	1
27. FRA Track 28. Number of	of		ber of Cars			corded speed if a	vallable)	Code	31. Time	Table Direction	Code
Class (1-9,X) Locomot	ive (R. Rec			37 mph	R	1	rth 3. East	1
4 Units 32. Type of		''	4	E. Estir	mated	33 Clonels	d Crossing \		_	uth 4. West way Conditions	1
1. Gates 4.	Wig wags	7	Crossbucks 10.	Flagged by o	crew	33. Olynaid	d Crossing (warning	A. Dry	way Conditions	
Crossing 2. Cantilever FLS 5.	Hwy. traffi	c signals 8	Stop signs 11.	Other (spec	ily)		erse side for ons and code		B. Wet C.Snow/S	Slush	
Warning 3. Standard FLS 6.	Audible	9	. Watchman 12.	None			J. J	Code	D.Ice		Code
Code(s) 01 03	3 (05	06					1		Mud,Dirt,Oll,Gravel Standing, Moving)	A
35. Location of Warning		•	36. Crossin	g Waming in	terconnecte	ed	37		Illuminated	d by Street	
Both Sides Side of Vehicle Approach		, 0	ode with Hig	hway Signal	s	1	Code	Lights or	Special Lig	ihts	Code
 Opposite Side of Vehicle App 	proach	1	1. Yes	2. No 3.	. Unknown		1		2. No 3. l		1
38.Highway 39.Highway User's Ge	ender 40.		ser Went Behind or			Highway User 1. Went around t	he cate		er (spec/t	y) ru temporary barricad	ie.
User's Age 1. Male	Code	and Struck	or was Struck by S	second Train		2. Stopped and t			es, see insi		Code
		1. Yes 2.	No 3. Unknown			 Did not stop Stopped on cr 	nesina		nt thru the g	gate oted suicide	4
42. Driver Passed Standing		Code	43. View of Traci	k Obscured t	_	nary obstruction)	ousing .	0. 001	era en raiemp	aco socioc	Code
Highway Vehicle		ı	1. Pen	manent Struc	ture	3. Passing Trai	n 5. Vegeta	tion	7. Other	(specify)	
1. Yes 2. No 3. Unknown			2. Star 44. Driver was	nding railroa	d equipmen	t 4. Topography			s 8. Not 0 he Vehicle?		S Code
Casualties to:	Killed	Injured	1. Killed 2. I	njured 3. U	niniured	- 1		s 2.No	ie venicie:		
46. Highway-Rall Crossing Users	1	0	47. Highway Veh						f Vehicle O	ccupants	
	1	U	(est. dollar da	mage)		\$0		ding driver		0	
49. Railroad Employees	0	0	50. Total Number						nent Accide Being Filed		Code
52. Passengers on Train	0	0	(include pass	engers and t	rain crew)	70		s 2. No			1
			Yes No		53b Spec	dal Study Block					
53a. Special Study Block	Video Ta										
53a. Special Study Block	Video Us	ed? √	Yes No	necessary)	220.00						
53a. Special Study Block	Video Us pecific, and ONE-WAY	continue o	Yes No r separate sheet if ST CROSSING WAI				G FOULING	MAINTRA	CK 1. TRAIN	4046/45, 4022/21, TRIP	231,
53a. Special Study Block 54. Narrative Description (Be s INDIVIDUAL WALKED NB AGAINST	Video Us pecific, and ONE-WAY	continue o	Yes No r separate sheet if ST CROSSING WAI		TS/BELLS IN		G FOULING	MAINTRA	CK 1. TRAIN		231,

FORM FRA F 6180.57 (Rev. 08/10)

**NOTE THAT ALL CASUALTIES MUST BE PEPORTED ON FORM FRA F 6180.55A

OMB Approval expires 6/30/2021

Figure D-3. South Santa Fe Drive Crossing (1 of 2)

DEPARTMENT OF TRANSPOR				GHWAY-RA									
FEDERAL RAILROAD ADMINISTRA	TION (FRA	0		ACCIDENT	INCIDENT	_		_				proval No. 2130-0	
1.Name of Reporting Railroad BNSF Railway Company [BN	SEI					1a. Alp	habetic Co ISF	de			1120	d Accident/Incident I 1201	No.
2.Name of Other Railroad or Other 8		for Equipr	ment involved in	Train Acciden	t/incident		habetic Co	ode				d Accident/Incident I	No.
3. Name of Railroad or Other Entity		e for Track	Maintenance	(ringle entry)			phabetic Co	ode				d Accident/Incident I	No.
BNSF Railway Company [BNS	iF]					BNS		ent/incident			1120	201 Accident/Incident	
4. U.S. DOT Grade Crossing ID No.			1 04				month	day 30	ar	6. TIM	ie or /	Accident/Incident	
				5392G		_		3 2	020	12:53		AM F	PM V
7. Nearest Railroad Station SOUTH DENVER			8. Subdivi	PEAK		9. Cot	unty ENVER			10. 8		br. CO	Code 08
11. City (If in a city) DENVER				Highway Nam	e or No.								
DENVER	hway Use	r Involve	d	•	5.	ANTAI	FE AVE	Rall Equi	nment	Involv	arl	Public / Priva	ite
13. Type	ilway ose	i ilivoive			17. Equip	ment		4. Car(s)				rain pulling- RCL	
C. Truck-trailer F. Bus		J. Other M	otor Vehicle		1. Ti	rain (un	its pulling)	5. Car(s)				rain pushing- RCL rain standing- RCL	
A. Auto D. Pick-up truck G. Sch		K. Pedestr	ian	Code			its pushing)	6. Light loc 7. Light lo				MU Locomotive(s)	Code
		M. Other		A		rain (st		8. Other			E.D	MU Locomotive(s)	1
	Irection (cal) t 4. West	Code 2	18. Positio	on of Car	Unit in Tra	sin	7				
16. Position 1. Stalled or stuck on	crossing 4			raffic	19. Circur	nstance							Code
2. Stopped on Crossi		. Blocked	on crossing by g	ates Code	1. Rall	equipme	nt struck hi	ighway user	2. Rall e	quipme	nt stn	uck by highway user	
Moving over cross Was the highway user and/or				3	205 185-			materials rei					_
in the impact transporting haz			•	Code	200. Was	uiere a i	nazaroous	materials re-	ease by				Code
1. Highway User 2. Rail Ed				4	1	. Highwa	y User 2	2. Rall Equip	ment 3	3. Both	4. N	leither	4
20c. State here the name and quan	tity of the h	azardous r	naterial released	i, if any									
21. Temperature 22. V	/Isibility (S	Ingle entry)	Code	23. Wea	ther /s/r	ngle entry)						Code
50 45	Dawn 2. D			2	1			ain 4. Fog 5	. Sleet	6. Sno	w		1
24. Type of Equipment 1. Freight 1				aint/inspect.	car D. EN	//U							
Consist 2. Passeng				pec. MoW Eq		/U 25	_	pe Used by I ent Involved	Rall	Co	ode 2	26. Track Number or	Name
			d/Switching B. Pa			Code				ıstry 1		MAIN 2 TRACK	
4. Work Tra 27. FRA Track 28. Number of			ht loco(s) C. C		n-Pushing st Speed (Re	_		and 3. Sidir	Gode		\perp	able Direction	
Class (1-9,X) Locomot	ve		mber of Cars		corded	covaca :	speed if av					h 3. East	Code
4 Units	5		124	E. Est	imated			25 mph	E	_		th 4. West	3
32. Type of 1. Gates 4.	Wig wags	7	7. Crossbucks 1	D. Flagged by	crew	33	3. Signaled	Crossing W	aming	A. Dry		ay Conditions	
Crossing 2. Cantilever FLS 5.	Hwy. traffic	signals 8	3. Stop signs 1	1. Other (spe	ecity)			rse side for is and codes)	B. We C.Sno	et ow/Slu	ısh	
Warning 3. Standard FLS 6.	Audible	9	9. Watchman 1	2. None					Code	D.Ice		d,Dirt,Oil,Gravel	Code
Code(s) 01 03	3 (6	07						1			tanding, Moving)	A
35. Location of Warning 1. Both Sides				sing Waming		ed						by Street	
2. Side of Vehicle Approach			Joue	Highway Sign				ode	Lights or 1. Yes				Code
 Opposite Side of Vehicle App 38.Highway 39.Highway User's Ge 				s 2.No		Highway		2		z. No er (sp			1
User's		-	or was Struck b			1. Went	around the		6. Wer	t aroun	d/thru	temporary barricad	e
	Code				Code	StoppDid n		en proceeder		es, see nt thru ti			Code
55 2. Female 42. Driver Passed Standing	2		. No 3. Unknow		2		ped on cros	ssing	8. Suk	cide/Atte	empte	ed suicide	5
42. Driver Passed Standing Highway Vehicle		Code	43. View of Tr	ack Obscured ermanent Stri		mary obs		5. Vegetatio	_	7.01	ther (s	specify)	Code
1. Yes 2. No 3. Unknown		2	2.8	tanding railro				6. Highway	Vehicles	8. No	ot Ob:		8
Casualties to:	Killed	Injured	44. Driver was 1. Killed 2	2. Injured 3. (Ininiured		2	45. Was D 1. Yes		ne Vehic	le?		Code
46. Highway-Rail Crossing Users	0	,	47. Highway V				Z	48. Total N		f Vehick	e Occ	cupants	-
	0	1	(est. dollar				\$2,500	_	ng driver			1	
49. Railroad Employees	0	0	50. Total Numb	ber of People issengers and			La	51. is a Ra inciden	ii Equipri t Report			.,	Code 2
52. Passengers on Train	0	0				-1-1-5	2	1. Yes	2. No				L
53a. Special Study Block	Video Tal Video Us		Yes No		53b. Spe	cial Stud	y Block						
	pecific, and	continue o	n separate shee				e marion or or	0.000	o see o	PACE TO	VI 100	WATER TO THE PARTY OF	n.
DRIVER WAS HEADED THE WRONG	WAT DOW	N A ONE W	AT STREET AND	DROVE INTO	THE SIDE OF	ATRAIN	THAT WA	S OCCUPYIN	GIMEC	RUSSEN	G. NO	HAZMAT RELEASE	a).
55. Typed Name and Title				56. Signal	ture					57. D	ate		
NOTE: This report is part of the rep in any suit or action for damages or									e admitte	d as ev	idenc	e or used for any pu	rpose

FORM FRA F 6180.57 (Rev. 08/10) *NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A OMB Approval expires 6/30/2021

Figure D-3. South Santa Fe Drive Crossing (2 of 2)

DEPARTMENT OF TRANSPOR		o.			L GRADE					OMB Approval No. 2130	-0500
1.Name of Reporting Railroad							abetic Co	de		1b. Railroad Accident/Incident	t No.
BNSF Railway Company [BNS 2.Name of Other Railroad or Other E		for Equipment	Involved in Train 4	celdant	Incident	BNS	abetic Co	de		PR1018202 2b. Railroad Accident/Incident	t No.
				ccident	incident					20. Kalifold Accident incident	t No.
3. Name of Railroad or Other Entity P		e for Track Ma	intenance (ringle e	mby)			abetic Co	de		3b. Railroad Accident/Incident PR1018202	t No.
BNSF Railway Company [BNS 4. U.S. DOT Grade Crossing ID No.	rj .					5. Date		nt/incident		6. Time of Accident/Incident	
•			245392	G		1 "	onth 2	day 1 2	018	8:30 AM	PM 🗸
7. Nearest Railroad Station			8. Subdivision			9. Coun		5 2	010	8:30 AM 10. State	Code
SOUTH DENVER			PIKES PEA	K			NVER			Abbr. CO	08
11. City (If in a city) DENVER			12. Highwa	y Name	or No. SA	ANTA FE	E AVE			Public ✓ Priv	rate
High	iway Use	r involved								Involved	
13. Type		J. Other Motor			17. Equipr	ment ain (units		4. Car(s) 5. Car(s)			
C. Truck-trailer F. Bus A. Auto D. Pick-up truck G. Sch		J. Other Motor K. Pedestrian	venice			ain (units ain (units				noving) C. Train standing- RCL	Code
		M. Other (spe	city)	Code	l	ain (stan			co(s) (S (specify		1
		geographical)	•	Code	18. Positio	n of Car U	Jnit in Tra		(specify	y E DINO ESCONDENC(3)	+-
		uth 3. East 4		4	40.0				50		
 Position 1. Stalled or stuck on Stopped on Crossir 			rossing by traffic rossing by gates	Code	19. Circun		i eterrele bil		2 8-11-	equipment struck by highway use	Code
3. Moving over crossing			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	3	1. Rail 6	equipment	Struck III	gnway user	2. Rail e	equipment struck by nighway use	er 2
20a. Was the highway user and/or r				Code	20b. Was	there a ha	azardous	materiais re	lease by		Code
in the impact transporting haz: 1. Highway User 2. Rail Eq.			elther	2	1.	Highway	User 2	. Rall Equip	ment 3	3. Both 4. Neither	4
20c. State here the name and quant	_										
21. Temperature 22. V	Isibility (S	Ingle entry)		Code	23. West	ther (sing	sie entry)				Code
55 45		ay 3. Dusk 4	. Dark	3	1			in 4. Fog	5. Sleet	6. Snow	2
24. Type of Equipment 1. Freight To	rain	5. Single (Car 9. Maint/in	spect. c	ar D. EM	IU J.		pe Used by	D-11	Code 26. Track Number (
		lling 6. Cut of c				U		nt Involved	Mail	Code 26. Track Number (or Name
(single entry) 3. Commute 4. Work Trai		ling 7. Yard/Sv 8. Light lo	vitching B. Passeng co(s) C. Commut		- 1	Code 1 1. N	Main 2. Y	ard 3. Sidi	na 4. Indu	ustry 1 MAIN 1 TRAC	K
27. FRA Track 28. Number of		29. Number	C. Commu		Speed (Re	_			Code	31. Time Table Direction	Code
Class (1-9,X) Locomotiv	/e 2			R. Rec				24 mph	l _R	1. North 3. East	1
4 Units 32. Type of			84	E. Estir	mated	33.	Signaled	Crossing W		2. South 4. West 34. Roadway Conditions	1
1. Gates 4. Crossing	Wig wags		ossbucks 10. Flag	_			-	se side for	•	A. Dry B. Wet	
2. Cantilever FLS 5. Warning	-				lly)			s and code	5)	C.Snow/Slush D.Ice	
3. Standard FLS 6. Code(s) 01 03	_		atchman 12. Non	•					Code	E. Sand, Mud, Dirt, Oil, Gravel	Code
Code(s) 01 03 35. Location of Warning	0	7	36. Crossing Wa	amino io	terconnects			37	Crossins	F.Water (Standing, Moving) Illuminated by Street	A
1. Both Sides		. Code	with Uleburn	_		eu .			_	Special Lights	, Code
 Side of Vehicle Approach Opposite Side of Vehicle App 	mach	2	1. Yes 2.	No 3	. Unknown		1 2	ode	1. Yes	2. No 3. Unknown	1
38.Highway 39.Highway User's Ge		Highway User	Went Behind or in F	ront of	Train 41.	Highway I				er (specify)	
User's		and Struck or i	was Struck by Seco	nd Trair		1. Went a		gate n proceede		nt around/thru temporary barrica res, see instructions)	
Age 1. Male 0 32 2. Female]	Code	1. Yes 2. No	3. Unknown		Code	3. Did not	stop		7. Wer	nt thru the gate	7
42. Driver Passed Standing	- 1		3. View of Track Ob	scured	_	4. Stoppe nary obstru		sing	8. Suk	cide/Attempted suicide	Code
Highway Vehicle			1. Permane		-			5. Vegetati	on	7. Other (specify)	
1. Yes 2. No 3. Unknown		2	2. Standing	g raliroa	d equipmen	t 4. Topog	graphy			8. Not Obstructed he Vehicle?	S Code
Casualties to:	Killed	Injured	1. Killed 2. Injure				2	1. Yes	2. No		1
46. Highway-Rail Crossing Users	0	1 47	. Highway Vehicle I		Damage	19	\$2,500		Number of	f Vehicle Occupants	
49. Railroad Employees	0	0 50	(est. dollar damag I. Total Number of F		n Train			51. Is a R	all Equipm	nent Accident /	Code
52. Passengers on Train	0	0	(include passenge	ers and	train crew)		2		nt Report 2. No	Being Filed	2
53a. Special Study Block	Video Tal		-		53b. Spec	dal Study I	Block				
	ecfic, and	continue on se	parate sheet if nec								
VEHICLE WENT THROUGH THE GAT	E AND STR	UCK THE TRA	IN RESULTING IN IT	OURY T	O TRESPASS	SER. CREW	V WAS NO	T DRUG/AL	COHOLT	ESTED.	
55. Typed Name and Title			56.	Signati	re					57. Date	
NOTE: This report is part of the repo			eport pursuant to th	e accide	ent reports s				e admitte		urpose
	awing out o	rany matter m	entioned in said rep	ort" 4	9 U.S.C. 20	1903. See	49 C.F.R	. 225.7 (b).			

"NOTE THAT ALL OASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A

OMB Approval expires \$/30/2021

Figure D-4. Holly Street Crossing (1 of 2)

DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION (FRA)			L GRADE	CROSSING			OMB A	oproval No. 213	0-0500
1.Name of Reporting Railroad				1a. Alphabetic C	ode		th Raile	ad Accident/Incider	t No
Union Pacific Railroad Company [UP]				UP	oue		1118D		it No.
2.Name of Other Railroad or Other Entity Filling for Equipmen	t involved in Train	Accidentil	ncident	2a. Alphabetic (ode			ad Accident/Incider	rt No
		nccidenti	meraent				zo. Raino	ad Accident incides	
3. Name of Raliroad or Other Entity Responsible for Track Ma	Intenance (ringle)	entry)		3a. Alphabetic	Code		3b. Raliro	ad Accident/Incider	it No.
Union Pacific Railroad Company [UP]				UP			1118D	V006	
4. U.S. DOT Grade Crossing ID No.				5. Date of Acci	ient/incident		6. Time o	f Accident/Incident	
	804614	4H		1 1	1 3 2	2018	7:30	AM	PM√
7. Nearest Railroad Station	8. Subdivision	_		9. County			10. State		Code
DENVER	LIMON SU			DENVER			,	Abbr. CO	08
11. City (if in a city) DENVER	12. Highwa	ay Name	or No. H(OLLY ST				Public 🗸 Pr	vate
Highway User Involved						•	involved		
13. Type			17. Equipn	nent		(moving		Train pulling- RCL Train pushing- RCL	
C. Truck-trailer F. Bus J. Other Motor	Vehicle		1. Tra	ain (units pulling ain (units pushin	5. Car(s)	(standing	g) D. povinci C	Train standing- RCL	
A. Auto D. Pick-up truck G. School Bus K. Pedestrian		Code			7 110001	oco(s) (3	standing D.	EMU Locomotive(s)	Code
B. Truck E. Van H. Motorcycle M. Other (sp.	city)	A	3. Tra	ain (standing)		(specif)		DMU Locomotive(s)	3
14. Vehicle Speed 15. Direction (geographical)		Code	18. Positio	n of Car Unit in T	rain				
(est. mph at Impact) 25 1. North 2. South 3. East		1				1			
16. Position 1. Stalled or stuck on crossing 4. Trapped on 2. Stopped on Crossing 5. Stopped on 2.		Code	19. Circum	stance					Code
Stopped on crossing S. Blocked on c Moving over crossing	crossing by gates	3	1. Rall e	equipment struck	highway use	r 2. Ralle	equipment s	truck by highway u	er 2
20a. Was the highway user and/or rail equipment involved			20h Was	there a hazardou	e materiale o	Jeans by			
in the impact transporting hazardous materials?		Code	200. Was	triere a riazardo	s materials it	rease by			Code
1. Highway User 2. Rall Equipment 3. Both 4. N	elther	2	1.	Highway User	2. Rall Equi	pment :	3. Both 4.	Neither	4
20c. State here the name and quantity of the hazardous mate	rial released, if any	у							
21. Temperature 22. Visibility (single entry)		Code	23. Weat	ther (single entry)				Code
(specify if minus) 36 °F 1. Dawn 2. Day 3. Dusk 4	. Dark	3	1. Cles	ar 2. Cloudy 3.1	Rain 4. Fog	5. Sleet	6. Snow		1
24. Type of Equipment 1. Freight Train 5. Single	Car 9. Maint/in	spect. ca	r D. EM						
Consist 2. Passenger Train-Pulling 6. Cut of c	ars A. Spec. M	NoW Equi	p. E.DM		ype Used by ent Involved		Code	26. Track Number	or Name
(single entry) 3. Commuter Train-Pulling 7. Yard/St				Code			l _a	DEDUCTES: 5	NE.
	co(s) C. Commu			-	Yard 3.8ld			INDUSTRY 7	15
27. FRA Track 28. Number of 29. Number	r of Cars 30	R. Reco		corded speed if a	vallable)	Code		Table Direction rth 3. East	Code
Class (1-9,X) Locomotive 1 Units 1	4	E. Estim			mph	R		oth 4. West	4
32. Type of	- '	E. E.	- Co	33. Signale	d Crossing V	Vaming	+	way Conditions	
	rossbucks 10. Flag	gged by c	rew				A. Dry	•	
Cantilever FLS 5. Hwy. traffic signals 8. 8t	top signs 11. Oth	er (speci	ffy)		erse side for ons and code	5)	B. Wet C.Snow/S	Slush	
Warning 3. Standard FLS 6. Audible 9. W	atchman 12. Nor	ne				Code	D.Ice		Code
Code(s) 07 11								Mud,Dirt,Oll,Gravel Standing, Moving)	A
35. Location of Warning	36. Crossing W	/aming in	terconnecte	ed	37	Crossing	Illuminated		
1. Both Sides . Code	with Highwa	ay Signal:	s		Code	Lights or	Special Lig	phts	Code
2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach	1. Yes 2.	No 3.	Unknown		3	1. Yes	2. No 3. l	Jnknown	2
	Went Behind or in	Front of T	rain 41.	Highway User		5. Oth	er (specif	y)	
	was Struck by Seco	ond Train		1. Went around t				ru temporary barric	ade
Age 1. Male Code		19		 Stopped and t Did not stop 	nen proceeds		es, see insi nt thru the (Code
82 2. Female 1 1. Yes 2. No	3. Unknown		2	4. Stopped on cr	ossing		cide/Attemp		3
1	View of Track Ot	bscured b	y (prim	ary obstruction)					Code
Highway Vehicle	1. Perman			3. Passing Trai				(specify)	۱.
1. Yes 2. No 3. Unknown 2	2. Standin 4. Driver was	ig railroad	i equipment	t 4. Topography			s 8. Not 0 he Vehicle?		8 Code
Casualties to: Killed Injured	1. Killed 2. Injur	red 3. Ur	ninjured	2		2. No			1
46. Highway-Rail Crossing Users 0 1	7. Highway Vehicle	Property	Damage	1.		Number o	of Vehicle O	ccupants	
	(est. dollar dama)	ge)		\$3,000		ling drive			l
49. Railroad Employees 0 0	D. Total Number of						nent Accide Being Filed		Code
52. Passengers on Train 0 0	(include passeng	ers and t	rain crew)	2		nt Report s 2. No	Demy Field	·	2
53a. Special Study Block Video Taken? ✓ Yo			53b. Spec	ial Study Block					
Video Used? You									
54. Narrative Description (Be specific, and continue on si HIGHWAY USER'S ACTIONS: DID NOT STOP. #32 WARNING DE									
l									
55. Typed Name and Title		. Signatu					57. Date		
NOTE: This report is part of the reporting railroad's accident r in any suit or action for damages growing out of any matter m						be admitte	ed as evider	nce or used for any	purpose

in any suit or action for damages growing out of any matter mentioned in said report..." 49 U.S.C. 20903. See 49 C.F.R. 225.7 (b).
FORM FRA F 6180.57 (Rev. 08/10)

*NOTE THAT ALL CASUALTIES MUST BE EPORTED ON FORM FRA F 6180.55A

OMB Approval expires 6/30/2021

Figure D-4. Holly Street Crossing (2 of 2)

DEPARTMENT OF TRANSPOR		o			IL GRADE					OMB A	pproval No. :	2130-0500
1.Name of Reporting Railroad		-				1a Alph	nabetic Co	de		1b Railn	ad Accident/In	cident No.
Union Pacific Railroad Comp	any (UP)					UP				09181		
2.Name of Other Railroad or Other B		for Equips	nent involved in Train	n Accident	Incident	2a. Alpi	habetic Co	ode		2b. Ralin	ad Accident/In	cident No.
3. Name of Railroad or Other Entity	Responsibl	e for Track	Maintenance (ring)	le entry)		3a. Alpi	habetic Co	ode		3b. Railre	ad Accident/In	cident No.
Union Pacific Railroad Compa	my [UP]					UP				09181		
4. U.S. DOT Grade Crossing ID No.							of Accide	nt/incident		6. Time o	of Accident/Incid	dent
			80461			0	9 2	5 2	018	11:40		M PM ✓
7. Nearest Railroad Station SANDOWN			8. Subdivision LIMON S			9. Cou	nty ENVER			10. State	Abbr. CO	Code 08
11. City (If in a city) DENVER			12. High	way Name	or No. H	OLLY					Public 🗸	Private
Hig	hway Use	r involve	d					Rall Equ	Ipment	involved		
13. Type					17. Equip	ment		4. Car(s)			Train pulling- R	
C. Truck-trailer F. Bus		J. Other Mo	tor Vehicle			rain (unt			(standing		Train pushing- i	
A. Auto D. Pick-up truck G. Sch	nool Bus	K. Pedestri	an	Code	2. Tr	rain (unt	ts pushing)	6. Light id			Train standing- EMU Locomotiv	
B. Truck E. Van H. Mo	torcycle	M. Other	(specify)	A	3. Tr	rain (sta	inding)		co(s) (s (specify	en nangy	DMU Locomoth	_
1.5		geographi	-	Code 1	18. Positio	on of Car	Unit in Tra	in	•			
16. Position 1. Stalled or stuck on	crossing 4				19. Circur	nstance			1			
2. Stopped on Crossi			on crossing by gates	Code			of atruck bi	obway user	2 Palls	equipment :	struck by highw	Code
3. Moving over cross				3	1.70	equipmen	it so ock iii	gilmay asci	z. Ruit	equipment.	and ck by my my	ay user 1
20a. Was the highway user and/or			1		20b. Was	there a h	azardous	materials re	lease by			Code
in the impact transporting haz				Code 2	١.			. Rall Equip			Mallhan	4
Highway User 2. Rall Ed State here the name and quant					1.	. Highway	y user .	. Rail Equi	iment .	3. BOIN 4	. Neither	
zoc. state here the name and quan	and or the in	azardous n	laterial released, il a	mly .								
21. Temperature 22. V	/isibility (s	ingle entry)		Code	23. Wea	ther (sin	gie entry)					Code
(specify if minus) 51 °F 1.1	Dawn 2. D	ay 3. Dus	ik 4. Dark	4	1. Cle	ar 2. Clo	oudy 3. Ra	ain 4. Fog	5. Sleet	6. Snow		1
24. Type of Equipment 1. Freight 1	rain	5. 8ln		/inspect. c		25	Track Tv	pe Used by	Rall	Code	26. Track Nur	mber or Name
Consist 2. Passeng (single entry) 3. Commut			of cars A. Spec. d/Switching B. Passe	MoW Equ		(U Code		nt Involved				
4. Work Tra				nger Train nuter Train	- 1		Main 2. Y	ard 3.8ldl	ng 4. Indi	ustry 4	YARD 495	;
27. FRA Track 28. Number of	of	29. Nun	nber of Cars		t Speed (Re	corded s	peed if av	allable)	Code		Table Direction	1 Code
Class (1-9,X) Locomot	ve 2			R. Red				1 mph	R	1	orth 3. East outh 4. West	3
32. Type of	-		3	E. ESU	mateu	33	Signaled	Crossing V		_	way Conditions	
	Wig wags	7	. Crossbucks 10. Fl	lagged by	crew		-	_		A. Dry	,	
2. Cantilever FLS 5.	Hwy. traffic	signals 8	. Stop signs 11. O	ther (spec	(lly)			rse side for is and code	s)	B. Wet C.Snow/s	Slush	
Warning 3. Standard FLS 6.	Audible	9	. Watchman 12. N	one					Code	D.Ice	Mud.Dirt.Oll.Gra	Code
Code(s) 07 1()]	1									(Standing, Movin	
35. Location of Warning			36. Crossing	Warning in	terconnect	ed		37.	Crossing		d by Street	
Both Sides Side of Vehicle Approach		, 0	ode With High	way Signa	ls		1 0	ode	Lights or	Special Li	phts	Code
Opposite Side of Vehicle Approach	roach	1	1. Yes	2. No 3	. Unknown		3	3		2. No 3.		2
38.Highway 39.Highway User's Ge	ender 40.	Highway U	ser Went Behind or I	n Front of	Train 41.	Highway				er (speci		
User's		and Struck	or was Struck by Se	cond Train	1		around the	e gate en proceede		nt around/tr /es. see ins	ru temporary b tructions)	
	Code	Vec 3	No. 3. Unknown	- 1	Code	3. Did no	ot stop		7. We	nt thru the		Code
38 2. Female 42. Driver Passed Standing	1	Code	43. View of Track	Obscuped	2 (nde	4. Stopp	ed on cros	sing	8. Sul	cide/Attemp	pted suicide	2
Highway Vehicle				anent Stru	-,			5. Vegetat	ine.	7. Other	r (specify)	Code
1. Yes 2. No 3. Unknown		2	2. Stand		d equipmen			6. Highway	y Vehicles	s 8. Not 0	Obstructed	8
Killed Injured 4 Ward 2 Injured 2								Code 1				
46. Highway-Rail Crossing Users	0	0	47. Highway Vehic		_		3			f Vehicle O	ccupants	
49. Railroad Employees	_	-	(est. dollar dam 50. Total Number o		n Tesla		\$3,000		ling driver	r) ment Accide	ent /	3 Code
	0	0	(include passer			1	2	Incide	nt Report	Being File		2
52. Passengers on Train 53a. Special Study Block	Video Ta	' -	Yes V No		53b. Spe	cial Study		1. Ye	2. No			
	Video Us	ed?	Yes ✓ No			J. 3100)						
54. Narrative Description (Be s HIGHWAY USER STRUCK THE LAST			n separate sheet if n NSIST. HIGHWAY U		IONS: STOPI	PED AND	THEN PRO	CEEDED. #	32 WARNI	NG DEVICE	S: YIELD SIGN	
55. Typed Name and Title			15	56. Signati	ıre					57. Date	:	
NOTE: This report is part of the rep			nt report pursuant to	the accide	ent reports :				e admitte			any purpose
in any suit or action for damages gr	owing out o	fany matte	r mentioned in said	report" 4	19 U.S.C. 20	0903. See	49 C.F.R	. 225.7 (b).				

FORM FRA F 6180.57 (Rev. 08/10)

"NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A

OMB Approval expires 6/30/2021

Figure D-5. Dahlia Street North of 51st Street Crossing (1 of 1)

DEPARTMENT OF TRANSPOR					IL GRADE								
FEDERAL RAILROAD ADMINISTRA	TION (FRA	N)	ACC	IDENT/I	NCIDENT	_						/al No. 2130	
1.Name of Reporting Railroad							habetic Co ISF	de			silroad Ac 1221202	cident/incident	t No.
BNSF Railway Company [BN 2.Name of Other Railroad or Other 8		And Freedom	and level and in Train		Da el de et		habetic Co					cident/incident	. No
2.Name of Other Railroad or Other i	entity Filling	for Equips	nent involved in Train	Accident	incident	2a. Alj	onabetic Co	ode		20. Ha	aliroad Ac	cident/inciden	INO.
Name of Railroad or Other Entity	Darnonrib	a for Track	Maintenance			20. 40	phabetic C	nda.		35 50		cident/incident	
BNSF Railway Company [BNS		e for Track	Maintenance (ringle	entry)		BN:		oue			1221202		INO.
4. U.S. DOT Grade Crossing ID No.	11							ent/incident				dent/Incident	
4. C.C. DOT GRADE GRADING ID 140.			0.5700	CIZ			month	day yo	RT	J. 11111			_
			05706	bĸ		_		2 20)21	11:37		AM ✓	PM
7. Nearest Railroad Station			8. Subdivision DENVER F	ocr r	CT AND	9. Co	-			10. St	Abbr.	00	Code
SAND CREEK						U.	ENVER				ADDF.	co	08
11. City (If in a city) DENVER			12. Highw	ray Name	orNo. D	AHLIA	NO 515	Γ			F	Public / Priv	ate
Hig	hway Use	r involve	d					Rall Equi	•				
13. Type					17. Equip			4. Car(s) 5. Car(s)				pulling- RCL pushing- RCL	
C. Truck-trailer F. Bus		J. Other Mc					its pulling) its pushing,					standing-RCL	
A. Auto D. Pick-up truck G. Sch		K. Pedestri		Code		rain (un rain (st		7. Light lo	co(s) (S	tanding)	D. EMU	Locomotive(s)	Code
	torcycle	M. Other		С				8. Other	(specify)	E. DMU	Locomotive(s)	6
_		(geograph)	:a() t 4. West	Code 2	18. Positi	on of Car	Unit in Tra	ain	1				
16. Position 1. Stalled or stuck on				L	19. Circu	netance			1				
2. Stopped on Crossi			on crossing by gates	Code			et etruck h	lahway user	2 Palle	aulome	nt struck i	by highway us	Code
Moving over cross				3	I. Rail	equipme	THE SUIDER II	gilway user	z. Rail c	dahine	III SEUCK	by nighway us	er 1
20a. Was the highway user and/or			1		20b. Was	there a	hazardous	materials rei	ease by				Code
in the impact transporting haz				Code	١.			S Dell Femile					4
Highway User 2. Rall Ed State here the name and quan				4	1	. Highwa	y user .	2. Rail Equip	ment .	. Both	4. Neith	er	
200. State here the name and quan	atty of the fi	azaroous r	iaterial releaseu, il ari	y									
21. Temperature 22. V	/Isibility (s	Ingle entry)	Code	23. Wes	ther (s)	ngle entry)						Code
50 45	Dawn 2. D			2	1		-	ain 4. Fog 5	Sleet	6 Sno	w		1
24. Type of Equipment 1. Freight 1			gle Car 9. Maint/i			_	000y 3.10	am 4. roy .	·· OICCL	0. 01101			
Consist 2, Passeng						26		pe Used by F	Rall	Co	de 26.1	rack Number	or Name
			d/Switching B. Passen			Code	Equipme	ent involved					
4. Work Tra			t loco(s) C. Commu				. Main 2. Y	ard 3. Sidin	g 4. Indu	ıstry 4	852	2	
27. FRA Track 28. Number of	of			0. Consist	t Speed (R)	corded:	speed if av	allable)	Code		ne Table		Code
Class (1-9,X) Locomot	ve 2	.		R. Rec				7 mph	E		North		4
32. Type of			0 l	E. Estir	mated	122	Olonaled	Crossing Wa		_	South one		•
1. Gates 4.	Wig wags	7	. Crossbucks 10. Fla	gged by	crew	3.	s. orginaleu	Crossing w	aming	A. Dry	, .	onulions	
Crossing 2. Cantilever FLS 5.	Hwy. traffic	c signals 8	. Stop signs 11. Ott	her (spec	lly)			rse side for is and codes		B. We	et w/Slush		
Warning 3. Standard FLS 6.	Audible	9	. Watchman 12. No	ne			insoluction	is and codes	Code	D.Ice			Code
Code(s) 07 11			ı									rt,Oll,Gravel ing, Moving)	A
35. Location of Warning			36. Crossing V	Vaming in	terconnect	ed		37.	Crossing		ated by 3		
1. Both Sides		. 0	ode with Highw	ray Signa	is			ode	Lights or	Special	Lights		Code
 Side of Vehicle Approach Opposite Side of Vehicle App 	mach			. No 3	. Unknown			2	1. Yes	2. No	3. Unkno	wn	2
38.Hignway 39.Highway User's Go		Highway U				Highwa				r (sp			
User's		and Struck	or was Struck by Sec	ond Train	١		around the				d/thru ten Instructio	porary barrica	de
Age 1. Male	Code			- 1	Code	StoppDid n		en proceeded		es, see nt thru ti		ns)	Code
	1		No 3. Unknown		2	4. Stopp	ped on cros	sing			mpted su	licide	3
42. Driver Passed Standing		Code	43. View of Track O			nary obs				_			Code
Highway Vehicle 1. Yes 2. No 3. Unknown		2	1. Permar					VegetationHighway			her (spec	•	8
1. Tes 2. No 3. Officiowii		_	44. Driver was	ng railroa	a equipmer			45. Was D				LIEU	Code
Casualties to:	Killed	Injured	1. Killed 2. Inju	red 3.U	ninjured		3	1. Yes	2. No				1
46. Highway-Rall Crossing Users	0	0	47. Highway Vehicle		/ Damage			48. Total N			e Occupa	_	
49. Railroad Employees	_		(est. dollar dama		- T		\$400		ng driver		ridant !	1	Code
	0	0	50. Total Number of (include passen)				La	51. Is a Ra Inciden	ii Equipri t Report				2
52. Passengers on Train	0	0		yers and I			3		2. No				
53a. Special Study Block		kee2	Yes ✓ No		53b. Spe	cial Stud	y Block						
ssa. opecial olddy Block	Video Ta				1								
	Video Us	ed?	Yes ✓ No	cessarvi									
	Video Us pecific, and	ed? continue o	Yes ✓ No n separate sheet if ne		L DAMAGE	. USER'S	AGE UNKN	OWN OTH	ER TYPE	OFCRO	OSSING W	ARNING: YIEL	D SIGNS
54. Narrative Description (Be s TRAIN CONSIST STRUCK THE REAR	Video Us pecific, and	ed? continue o	Yes ✓ No n separate sheet if ne		L DAMAGE	. USER'S	AGE UNKN	OWN OTH	ER TYPE	OFCRO	DSSING W	ARNING: YIEL	D SIGNS
54. Narrative Description (Be s	Video Us pecific, and OF THE TR	ed? continue o tAILER. TH	Yes VNo n separate sheet if ne ERE WAS NO TRACK 0	OR SIGNA	re					57. D	ate		

FORM FRA F 6180.57 (Rev. 08/10) *NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A OMB Approval expires 7/31/2023

Figure D-6. Monaco Street Crossing (1 of 1)

DEPARTMENT OF TRANSPOR		o				CROSSING			OMB A	pproval No. 2130-	0500
1.Name of Reporting Railroad		*				1a. Alphabetic (ode		1b. Raliro	ad Accident/Incident	No.
Union Pacific Railroad Comp	any [UP]					UP			0917D	V004	
2.Name of Other Railroad or Other B	ntity Filling	for Equipme	ent involved in Train	Accident	Incident	2a. Alphabetic	Code		2b. Railro	ad Accident/Incident	No.
3. Name of Railroad or Other Entity	Responsibl	e for Track I	Maintenance (church	e entry)		3a. Alphabetic	Code		3b. Raliro	ad Accident/Incident	No.
Union Pacific Railroad Compa	ny [UP]		,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		UP			0917D	V004	
4. U.S. DOT Grade Crossing ID No.						5. Date of Acci	dent/Incident		6. Time o	f Accident/Incident	
			80460)9L		0 9	0 8 2	017	12:15		PM 🗸
7. Nearest Railroad Station SANDOWN			8. Subdivision LIMON SI	то		9. County DENVER			10. State	Nobr. CO	Code 08
				way Name	No				,		
DENVER				way Name	M M	ONACO STR				Public / Priva	ite
	hway Use	r involved	1						Involved	Train audien DOI	
13. Type		J. Other Mot			17. Equip	ment ain (units pulling	4. Car(s) 5. Car(s)	(moving (standin		Train pulling- RCL Train pushing- RCL	
C. Truck-trailer F. Bus A. Auto D. Pick-up truck G. Sch		 Otner Mot K. Pedestria 			1. If 2. Tr	ain (units punit) ain (units pushir			noving) C.	Train standing- RCL	Code
		M. Other (:		Code	1	ain (standing)	7. Light k	oco(s) (3	standing)	EMU Locomotive(s)	6
		geographica		. Code	10 Doello	on of Car Unit in 1	8. Other	(specif)	n E	DMU Locomotive(s)	ь
20		uth 3. East		2	10. Positio	an or car onit in	ran	1			
16. Position 1. Stalled or stuck on	crossing 4	. Trapped o	n crossing by traffic		19. Circun	nstance					Code
2. Stopped on Crossi	-	. Blocked o	n crossing by gates	Code	1. Rall e	equipment struck	highway user	r 2. Rall e	equipment s	truck by highway use	
3. Moving over cross				3							•
20a. Was the highway user and/or in the impact transporting haz				Code	20b. Was	there a hazardou	is materials re	elease by			Code
Highway User 2. Rail Ed			Neither	4	1.	. Highway User	2. Rall Equip	pment :	3. Both 4.	Neither	4
20c. State here the name and quan				ny							
	/isibility (s	ingle entry)		Code	23. Wea	ther (single entr	y)				Code
(specify if minus) 88 °F 1.1	Dawn 2. D	ay 3. Dusk	4. Dark	2	1. Cle	ear 2. Cloudy 3.	Rain 4. Fog	5. Sleet	6. Snow		1
24. Type of Equipment 1. Freight T	rain	5. Singi	e Car 9. Maint./	Inspect. ca	ar D. EM		Type Used by	Pall	Code	26. Track Number of	r Name
		lling 6. Cut o		MoW Equ			nent involved		Code	26. Hack Number of	Manie
(single entry) 3. Commut 4. Work Tra			(Switching B. Passer			Code 8 1. Main 2	Yard 3. Sidi	na 4 led	ustry 2	TRACK 461	
27. FRA Track 28. Number of				uter Train		corded speed if		Code		Table Direction	
Class (1-9,X) Locomoti		29. Numi	ber of Cars 3	R. Rec		corded speed in	rvanaure)			rth 3. East	Code
1 Units	2		0	E. Estir	nated		4 mph	E	2.80	uth 4. West	3
32. Type of 1. Gates 4.	Wig wags	7	Crossbucks 10. Fix	agged by a	rrew.	33. Signal	ed Crossing V	Vaming	A. Dry	way Conditions	
Crossing 2. Cantilever FLS 5.							erse side for		B. Wet		
Warning 3, Standard FLS 6.			Watchman 12. No			Instruct	ons and code	s) Code	C.Snow/S D.Ice	llush	Code
Code(s) 07 11			- I - I - I - I - I - I - I - I - I - I	T		_		Code	E. Sand,	Mud,Dirt,Oll,Gravel	A
35. Location of Warning			36. Crossing \	Warning in	terconnects	• 1	37	Crossin	F.Water (Standing, Moving)	А
1. Both Sides			de with High						r Special Lig		Code
 Side of Vehicle Approach Opposite Side of Vehicle App 	mach	l i		2 Nn 3	. Unknown		Code 2	1. Yes	2. No 3. U	Jnknown	1
38.Highway 39.Highway User's Go		_	er Went Behind or in			Highway User	-	5. Oth	er (specif	y)	
User's		and Struck (or was Struck by Se	cond Train		1. Went around	_		nt around/th /es, see inst	ru temporary barricad	le
	Code			- 1	Code	 Stopped and t Did not stop 	hen proceeds		nt thru the g		Code
	1		No 3. Unknown			4. Stopped on co	ossing	8. Sul	icide/Attemp	ted suicide	3
42. Driver Passed Standing Highway Vehicle		Code	43. View of Track C			nary obstruction)					Code
1. Yes 2. No 3. Unknown		2		anent Struc		 Passing Traint 4. Topography 			7. Other s 8. Not 0	(specify)	8
	Killed	 	44. Driver was	ing railroa	a equipmen	it 4. Topography			he Vehicle?		Code
Casualties to:	Killed	Injured	1. Killed 2. Inju			3		2. No			1
46. Highway-Rall Crossing Users	0	0	47. Highway Vehicle		Damage	\$500	1		of Vehicle O		
49. Railroad Employees	0	0	(est. dollar dama 50. Total Number of		n Train	\$500		iing drive all Equipr	nent Accide	nt/	Code
53 Santanana at Tark	0	0	(include passen			2	Incide	nt Report	Being Filed		2
52. Passengers on Train 53a. Special Study Block	Video Ta	-	Yes No			clai Study Block	1. Ye	s 2. No			1
and a passer and a passer	Video Us		Yes ✓ No		530. ope	car olday Block					
			separate sheet if no		non arms	eren					
HIGHWAY USER DID NOT STOP PRICE	OR TO ENTI	RENG THE C	ROSSING. #32 WAR	NING DEV	ICE: YIELD	SIGN					
55. Typed Name and Title			Is	6. Signatu	re				57. Date		
NOTE: This report is part of the rep			t report pursuant to	the accide	ent reports s			be admitte			irpose
in any suit or action for damages or	owing out o	fany matter	mentioned in said n	eport" 4	9 U.S.C. 20	1903, See 49 C.F	.R. 225.7 (b).				

in any suit or action for damages growing out of any matter mentioned in said report..." 49 U.S.C. 20803. See 49 C.F.R. 225.7 (b).

FORM FRA F 6180.57 (Rev. 08/10) "NOTE THAT ALL CASUALTIES MUST BE EPORTED ON FORM FRA F 6180.55A

OMB Approval expires 6/30/2021

Figure D-7. East 48th Avenue at Ash Street Crossing (1 of 1)

DEPARTMENT OF TRANSPORT		.,			IL GRADE					OMB Approval No. 2130-	0500
1.Name of Reporting Railroad	their pro-		700	TO CITTO			habetic Co	de		1b. Railroad Accident/Incident	
BNSF Railway Company [BN	SF					BN				PR0120203	
2.Name of Other Railroad or Other	Entity Filing	for Equipm	ent involved in Train	Accident	/incident	2a. Alp	habetic Co	ode		2b. Railroad Accident/Incident	No.
3. Name of Railroad or Other Entity		e for Track	Maintenance (ringle	entry)			habetic Co	ode		3b. Railroad Accident/Incident	No.
BNSF Railway Company [BN	_					BNS	_			PR0120203	
4. U.S. DOT Grade Crossing ID No							e of Accide	day y	DET	6. Time of Accident/Incident	
			05705	9A_		0	1 2	2 2	020	5:12 AM ✓	PM
7. Nearest Railroad Station DENVER TRANFER AEI			8. Subdivision BRUSH			9. Cou	inty ENVER			10. State Abbr. CO	Code 08
11. City (if in a city) DENVER			12. Highw	ray Name	orNo. 49	THAT	ASH			Public / Privo	ate 🗆
	hway Use	r involve	d					Rall Equ	Ipment		
13. Type					17. Equips	ment		4. Car(s)			
C. Truck-trailer F. Bu	5	J. Other Mo	tor Vehicle				ts pulling)	5. Car(s)			
A. Auto D. Pick-up truck G. Sc	hool Bus	K. Pedestri	an	Code	1		its pushing)			D. EMILL occupation(s)	Code
B. Truck E. Van H. Mc	torcycle	M. Other	(specify)	A	3. Tr	ain (sta	inding)	7. Light id 8. Other	co(s) (S (specify	canding)	1
		(geographic		Code	18. Positio	n of Car	Unit in Tra	ain	1		•
16. Position 1. Stalled or stuck or	crossing 4			-	19. Circun	nstance			•		Code
2. Stopped on Cross	ing		n crossing by gates	Code	1. Rall o	equipmen	nt struck hi	lghway user	2. Rall e	quipment struck by highway use	
3. Moving over cross				3							2
20a. Was the highway user and/or			i	Code	20b. Was	there a h	nazardous	materials re	lease by		Code
in the impact transporting has 1. Highway User 2. Rail E			Neither	4	1.	Highwa	y User 2	2. Rall Equip	ment 3	3. Both 4. Neither	4
20c. State here the name and quar				_	-	•	,				
21. Temperature 22.	Visibility (S	logie entryl		Code	22 West	ther (ric	ngle entry)				Code
45 45		ay 3. Dus	k 4 Dark	1			-	ain 4. Fog	Sieet	5 Snow	1
24. Type of Equipment 1. Freight		5. Sing		_		U					
Consist 2. Passeng	er Train-Pu	illing 6. Cut	of cars A. Spec. I	MoW Equ	ip. E.DN	U 25		pe Used by ent involved	Rall	Code 26. Track Number o	r Name
			/Switching B. Passen		_	Code		ard 3.8idi		ustry 4 807	
4. Work Tr 27. FRA Track 28. Number			t loco(s) C. Commi			_			Code	31. Time Table Direction	
Class (1-9,X) Locomot		29. Num	ber of Cars 30	R. Rec	t Speed (Re corded	coraeas	рееа п ач	allacie)	Code	1. North 3. East	Code
1 Units	2	!	4	E. Esti	mated			3 mph	E	2. South 4. West	2
32. Type of 1. Gates 4	. Wig wags	-	Crossbucks 10. Fla	oned by		33	. Signaled	Crossing W	aming	34. Roadway Conditions A. Dry	
Crossing			Stop signs 11. Ott					rse side for		B. Wet	
Warning 3. Standard FLS 6			. Watchman 12. No		Lify)		Instruction	ns and code:	-	C.Snow/Slush D.Ice	Code
Code(s) 07	. Addible		. watchman 12. No	lie T		-			Code	E. Sand, Mud, Dirt, Oll, Gravel	A
35. Location of Warning			36. Crossing V	Vamina ir	· ·			27	Centralina	F.Water (Standing, Moving) Illuminated by Street	А
1. Both Sides		_		_		u				Special Lights	Code
2. Side of Vehicle Approach		۱i	oue -					ode 2		2. No 3. Unknown	2
 Opposite Side of Vehicle Ap 38.Highway 39.Highway User's G 			er Went Behind or in			Highway		۷		er (specify)	2
User's			or was Struck by Sec				around the	e gate	6. Wen	it around/thru temporary barricad	ie
I I	Code				Code	2. Stopp 3. Did no		en proceede		es, see instructions) nt thru the gate	Code
2. Female	1	1. Yes 2.	No 3. Unknown		2		ed on cros	ssing		cide/Attempted suicide	3
42. Driver Passed Standing		Code	43. View of Track O	bscured	by (prin	nary obsi	truction)				Code
Highway Vehicle		۱. ا	1. Perma					5. Vegetati		7. Other (specify)	١.
1. Yes 2. No 3. Unknown		2	2. Standi 44. Driver was	ng railroa	d equipmen	t 4. Top	ography			8. Not Obstructed ne Vehicle?	8 Code
Casualties to:	Killed	Injured	1. Killed 2. Inju				3	1. Yes	2. No		1
46. Highway-Rail Crossing Users	0	0	47. Highway Vehicle (est. dollar dama		/ Damage		\$2,500	l	lumber o Ing driver	f Vehicle Occupants	
49. Railroad Employees	0	0	50. Total Number of		n Train		42,000			nent Accident /	Code
52. Passengers on Train	0	0	(include passen)	gers and	train crew)		3		t Report 2. No	Being Filed	2
53a. Special Study Block	Video Ta Video Us		Yes ✓ No Yes ✓ No		53b. Spec	dal Study	y Block				•
54. Narrative Description (Be s			res V No r separate sheet if ne	cessarvi							
USER'S AGE UNKNOWN. HIGHWAY					THEN FLE	THE SC	ENE. NO H	IAZMAT REI	EASED.		
P. Breed House on A Bree			1							les pote	
55. Typed Name and Title NOTE: This report is part of the rep	orting railro	ad's accide		Signatethe accide		tatute an	id, as such	n shall not "	e admitte	57. Date ed as evidence or used for any pu	umose
in any suit or action for damages g		of any matte	r mentioned in said re	eport" 4	49 U.S.C. 20	1903. See	e 49 C.F.R	l. 225.7 (b).		and the same of th	,
FORM FRA F 6180.57 (Rev. 0	8/10)	"NOT	E THAT ALL CASUAL	TIES MUS	T BE REPOR	RTED ON	FORM FR	A F 6180.55	٨		

*NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A OMB Approval expires 6/30/2021

Figure D-8. West Mississippi Avenue Crossing (1 of 1)

DEPARTMENT OF TRANSPOR		n			IL GRADE					ОМ	IB ADD	roval No. 2130-	0500
1.Name of Reporting Railroad	tiron (i ro	,		OIDENTI	into in Enti	_	habetic Co	de				Accident/Incident	
BNSF Railway Company [BN	SFI					BN					R02202		
2.Name of Other Railroad or Other B	intity Filling	for Equipm	ent involved in Trai	n Accident	/incident	2a. Alp	habetic Co	ode		2b. F	Railroad	Accident/Incident	No.
3. Name of Railroad or Other Entity		e for Track	Maintenance (ring	ple entry)		3a. Alp	habetic Co	ode				Accident/Incident	No.
BNSF Railway Company [BNS	iF]					BNS				_	R02202		
4. U.S. DOT Grade Crossing ID No.							e of Accide month	ent/incident	ier .	6. TI	ime of A	ccident/incident	
			2453			0		6 20)20	10:3		AM	PM 🗸
7. Nearest Railroad Station SOUTH DENVER			8. Subdivision PIKES PE			9. Cot DI	INVER			10.	State Abb	r. CO	Code 08
11. City (if in a city) DENVER			12. High	hway Name	orNo. M	TSSTSS	WO KA	LAM				Public / Priva	
	hway Use	r Involve	d				WO ILL	Rall Equi	pment	invol	ved		
13. Type					17. Equip	ment		4. Car(s)				ain pulling- RCL	
C. Truck-trailer F. Bus		J. Other Mo	tor Vehicle				ts pulling)	5. Car(s) 6. Light loc				ain pushing-RCL ain standing-RCL	
A. Auto D. Pick-up truck G. Sch		K. Pedestri		Code			ts pushing)	7. Light loc				//U Locomotive(s)	Code
		M. Other	•	D	18. Positio	rain (sta		8. Other			E. DA	//U Locomotive(s)	1
0.0	irection (lorth 2.8o	(geographic uth 3. East	-	Code 2	18. Positio	on of Car	Unit in Tra	an .	1				
16. Position 1. Stalled or stuck on 2. Stopped on Crossi	_				19. Circun	nstance							Code
3. Moving over cross	-	. Blocked o	on crossing by gates	3	1. Rall (equipme	nt struck hi	ighway user	2. Rall e	quipm	nent stru	ck by highway use	2
20a. Was the highway user and/or	rall equipm	ent involved	1		20b. Was	there a h	nazardous	materiais rei	ease by				Code
in the impact transporting haz 1. Highway User 2. Rail Ed			Malthar	Gode 4	١.,	Highwa	v User - 3	2. Rail Equip	ment 3	3 Both	4 Ne	elther	4
20c. State here the name and quan				_			,						
05 45	/isibility (s			Code	1	-	igle entry)						Code I 6
24. Type of Equipment 1. Freight T	Dawn 2.D			Jinspect. c			oudy 3. Ha	ain 4. Fog 5	. Sieet	6. Sh	iow		
Consist 2. Passeng				. MoW Equ		26		pe Used by F ent involved	tall	C	Code 2	6. Track Number o	r Name
			s/Switching B. Passe			Code		and 3. Sidin		.	2 3	3101	
4. Work Tra 27. FRA Track 28. Number of		$\overline{}$	t loco(s) C. Comr		t Speed (Re				Code	,		ble Direction	
Class (1-9,X) Locomot	ve			R. Rec	corded		peca n an	_	E	1	1. North	3. East	Code 3
1 Units	2		13	E. Esti	mated	22	Signaled	6 mph Crossing Wa		_		y Conditions	3
	Wig wags	7	. Crossbucks 10. F	lagged by	crew					A.D	Dry	, 00,10,10	
2. Cantilever FLS 5.		_			cify)			rse side for is and codes)		now/Slus	sh	
3. Standard FLS 6.	_	9	. Watchman 12. N	lone		_			Code	E. S		d,Dirt,Oil,Gravel	Code
Code(s) 05 07			122.5						1			anding, Moving)	С
35. Location of Warning 1. Both Sides			36. Crossing ode with High	waming ir Iway Signa		ea			Crossing Lights or			-	Code
 Side of Vehicle Approach Opposite Side of Vehicle App 	roach	ĭ		2. No 3	. Unknown		- 1		1. Yes	2. No	3. Uni	known	1
38.Highway 39.Highway User's Ge			ser Went Behind or			Highway	User around the		5. Othe			temporary barricad	
User's Age 1, Male	Code	and Struck	or was Struck by Se	econd Trair	n Code	2. Stopp	ed and the	en proceeded	(If y	es, se	e Instruc	ctions)	Code
		1. Yes 2.	No 3. Unknown		2	Did noStoop	ot stop ed on cros	ssina			the gate	e d sulcide	3
42. Driver Passed Standing		Code	43. View of Track	Obscured	by (prin	nary obs							Code
Highway Vehicle 1. Yes 2. No 3. Unknown		2		anent Stru				5. Vegetatio			Other (s		8
1. Tes 2. No 3. Chikhown	Killed	Injured	44. Driver was	ding railroa	a equipmen	it 4. 10p		6. Highway 45. Was Dr	iver in the	ne Veh	ricle?	tructed	Code
Casualties to: 46. Highway-Rail Crossing Users		IIIJarea	1. Killed 2. In 47. Highway Vehic				3	1. Yes 48. Total N		f Mahle	cie Occi	mante	1
46. Highway-kail Crossing Users	0	0	(est. dollar dan		, Damage		\$2,500	l	ng driver		cie occi	1	
49. Railroad Employees	0	0	50. Total Number					51. Is a Ra	ll Equipn t Report			I	Code
52. Passengers on Train	0	0	(include passe	ngers and			3		2. No				2
53a. Special Study Block	Video Tal Video Us		Yes ✓ No Yes ✓ No		53b. Spec	cial Study	y Block						
54. Narrative Description (Be s) USER'S AGE UNKNOWN. VEHICLE I	pecific, and	continue or	n separate sheet if r			CROSSEN	G. NO HAZ	MAT RELEAS	ED.				
55. Typed Name and Title			1	56. Signati	ure					57	Date		
NOTE: This report is part of the rep			nt report pursuant to	o the accide	ent reports s				admitte			or used for any po	urpose
in any suit or action for damages gr	owing out o	rrany matte	r mentioned in said	report" 4	49 U.S.C. 20	1903. Sei	e 49 C.F.R	c. 225.7 (b).					

FORM FRA F 6180.57 (Rev. 08/10) *NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A OMB Approval expires 6/30/2021

Figure D-9. East 47th Avenue and York Street Crossing (1 of 1)

1. Name of Responsing Railroad Company [UP] 2. Name of the Railroad Company [UP] 2. Name of Cime Finity Responsible for Track Maintenance (might world) 3. Name of Railroad or Other Entity Responsible for Track Maintenance (might world) 3. Name of Railroad or Other Entity Responsible for Track Maintenance (might world) 3. Name of Railroad Company [UP] 4. U.S. DOT Grade Cossing ID No. 8. Subdivision 7. Nearest Railroad foatpasy [UP] 4. U.S. DOT Grade Cossing ID No. 8. Subdivision 8. Subdivision 8. Subdivision 8. Subdivision 9. Submitted Railroad Company [UP] 1. Nearest Railroad foatpasy [UP] 1. Nearest Railroad foatpasy [UP] 1. Nearest Railroad foatpasy [UP] 1. Nearest Railroad Station 8. Subdivision 9. Submitted Railroad Company [UP] 1. Nearest Railroad Station 1. 1 1 1 1 1 1 1 2019 1. Submitted Railroad Company [UP] 1. Nearest Railroad Station 8. Subdivision 9. Submitted Railroad Company [UP] 1. Nearest Railroad Station 1. 1 1 1 1 1 1 1 2019 1. Submitted Railroad Company [UP] 1. Nearest Railroad Station 1. Submitted Railroad Company [UP] 1. Nearest Railroad Station 1. 1 1 1 1 1 1 1 2019 1. Submitted Railroad Company [UP] 1. Nearest Railroad Station 1. 1 1 1 1 1 1 2019 1. Submitted Railroad Station 1. 1 1 1 1 1 1 2019 1. Submitted Railroad Station 1. 1 1 1 1 1 2019 1. Submitted Railroad Station 1. 1 1 1 1 1 2019 1. Submitted Railroad Station 1. 1 1 1 1 1 2019 1. Submitted Railroad Station 1. 1 1 1 1 1 2019 1. Submitted Railroad Station 1. 1 1 1 1 1 2019 1. Submitted Railroad Station 1. 1 1 1 1 1 2019 1. Submitted Railroad Station 1. 1 1 1 1 1 2019 1. Submitted Railroad Station 1. 1 1 1 1 1 2019 1. 1. 1 1 1 1 1 2019 1. 1. 1 1 1 1 1 1 2019 1. 1. 1 1 1 1 1 1 2019 1. 1. 1. 1 1 1 1 1 1 1	DEPARTMENT OF TRANSPOR		n			IL GRADE					OMB A	pproval No. 2130-	-0500
Table Pacific Rational Coappany (UP) 3. Name of Rational or Other Entity Responsible for Track Maintenance (highly emp) 3. Name of Rational or Other Entity Responsible for Track Maintenance (highly emp) 3. Name of Rational or Other Entity Responsible for Track Maintenance (highly emp) 3. Name of Rational Coappany (UP) 4. U.S. DOT Grade Coating 10 No. 8. 0.4422R 1. Subset of Accelerativecient No. 1. Track of Accelerative No. 1. Track of Accele		inole (i to	,		OID EIGH	iiioib Liii	_		de		_		
Name of Raincad or Once Entity, Responsible for Track Maniferance 1		any [UP]											
Tubins Pacific Ratilroad Company (UP) 4. U.S. DOT Grace Crossing D No. 8. Observation 9. Country 10. 0 1 1 1 2019 1 13 91 13 AM ✓ PM ☐ 11. Observation 10. Observation 11. Observation 11. Observation 12. Highway User Involved 13. Type of Security 14. West the processing of Security 15. Type of Security 16. Direction (propagnitiss) 17. Nearest Ratincad Classion 18. Observation 19. Country	2.Name of Other Railroad or Other E	intity Filling	for Equipm	ent involved in Train	n Accident	/incident	2a.	Alphabetic Co	ode		2b. Raliro	and Accident/Incident	No.
8. U.S. DOT Grade Crossing (2) No. 8. Outdray			e for Track	Maintenance (ring	ile entry)				ode		ı		No.
Subdivision		2) [02]					_		nt/Incident	:			
11. City (if in a city) DENVER									lay 1	year 2019	1:18	AM√	PM
1. City (Fin a city) DENVER													1
Highway User Involved 10. Type C. Truck-trailer F, Blus J. Cher Motor Vehice A. Aub D. Pick-spruck D, School Blus K. Federstam Code B. Truck E. Vehic Breed Gest might almost 10 1, North State Stat	44 00- 00					or No	_				· /		08
13. Type C Conductivation F Ruis J Other Mater Vehicle A Auto D, Pick-us track G, School Bus K, Predestian Code B Turk E I Van H Motorcyce M K Other (pacety) A Tam pushing RCL 1. Tram (untits pushing) 6. Light locally (pacety) 1. North 2. Bouth 1. Septil 6. Tram (untits pushing) 6. Light locally (pacety) 1. Replaced (pacety) 1. Replaced (pacety) 1. Replaced (pacety) 1. Replaced (pacety) 1. Light locally (pacety) 1. Li	DENVER				iway Name	e or No. E.	AST	47TH AVE				Public / Priv	ate
C. Truck-haller F. Bust J. Other Motor Vehicle A. Auls D. Fick-up buck G. School Bus K. Pedestrian Code 1. Trans and public public G. School Bus K. Pedestrian Code 1. Trans and public foliations of the foliation of the foliatio		nway Use	r involve	1		47 Faula			_			Train pulling- BCI	
A. Auto D. Pick-up truck G. School Bus K. Pedestrian 6. Truck E. Vera H. Midrocycle M. Other (specify) 14. Vehicle Speed 7. Light locol(s) (standing) 15. Direction (specify) 15. Direction (specify) 16. Postton of Car Unit in Train 18. Occur Car Unit in Train 18. Postton of Car Unit in Train 18. Occur Car Unit in Train 18. Code 18. Schoel (specify) 19. Code 18. Restoration of Car Unit in Train 18. Code 19. Code			J. Other Mo	tor Vehicle				(units pulling)	5. Car(s)	(standing	p) B.	Train pushing- RCL	
B. Truck E. Van H. Motorcyce M. Other (poechy) A 1. Venice Speed 15. Control (pedigrational) 1. North 2. Boath 3. East 4. West 3. 18. Position of Car Unit in Train 139 16. Position 1. Stallade or stude or recising 4. Trapped on crossing by staffs 2. Obspeed on Crossing 9. Trapped on crossing by staffs 2. Obspeed on Crossing 9. Trapped on crossing by staffs 3. North Open State 1. North 2. Boath 4. West 5. Blocked on Crossing 9. Trapped on crossing by staffs 3. North Open State 1. North 2. Boath 4. West 5. Blocked on Crossing 9. Trapped on crossing by staffs 3. North Open State 1. North 2. Boath 4. North 2. December 1. North 2. December 1. North 2. Boath 4. North 2. December 1. North 2. December 1. North 2. December 1. North 2. December 3. December 2. Dece	A. Auto D. Pick-up truck G. Sch	ool Bus	K. Pedestria	an	Code	2. Tr	ain	(units pushing)					Code
15, Position 1, Statillar of stuck or morasing 4. Trapped on crossing by safe 2, disposed on crossing 2 5, Bosted on crossing 3 5, Bosted on crossing 4 5, Bosted on crossing 5 5, Bosted on crossing 6 5, Bosted 6 5, Bosted 6 5, Bosted 7 5, Bosted 6 5, Bosted 7 5, Bos	B. Truck E. Van H. Mot	torcycle	M. Other (specify)	1	3. Tr	ain	(standing)					1
2. Otoped on Crossing 3. Moving over crossing 3. Section of the impact of the properties of the pr	10					18. Positio	on of C	Car Unit in Tra	sin	139			'
3. Suspect on Uncosing 3. Bioliced on Crossing by pales 3 3. Suss the highway user randor rall equipment involved in the impact transporting hazardous materials? 1. Highway User 2. Rall Equipment 3. Both 4. Neither 2 2. Sall Equipment 3. Both 4. Neither 4 2. Suspect of the impact transporting hazardous materials released by 2 2. Sall Equipment 3. Both 4. Neither 4 2. Suspect of the impact of the hazardous materials released by 2 2. Sall Equipment 3. Both 4. Neither 4 2. Suspect of the impact of the hazardous materials released by 3. Code (appect) if minute 3. Both 4. Neither 4 2. Suspect of the impact of the hazardous materials released by 3. Code (appect) if minute 3. Both 4. Neither 4 2. Suspect of the impact of the hazardous material released by 4. Neither 4 2. Suspect of the impact of the hazardous material released by 4. Neither 4 2. Suspect of the impact of the hazardous material released by 4. Neither 4 2. Suspect of the impact of t			. Trapped o	on crossing by traffic		19. Circun	nstano	ce					Code
In the impact transporting hazardous materials? 1. Highway User 2. Rall Equipment 3. Both 4. Neither 4 20c. Glabe here the name and quantity of the hazardous material released, if any 21. Temperature 22. Visibility (single entry) Code (specify if minus) 14 "F 1. Dawn 2. Day 3. Dust 4. Dark 4 Lork 4 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Bleet 6. Snow 2 21. Temperature 22. Visibility (single entry) Code 23. Weather (single entry) Code (specify if minus) 14 "F 1. Dawn 2. Day 3. Dust 4. Dark 4 Lork 4 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Bleet 6. Snow 2 24. Type of Squipment 1. Freight Train 5. Bingle Car 3. Maint/inspect. Car D. EMJ Consist 2. Passenger Train-Pulling 6. Cut of cars A. Opec. MoW Equip. E. DMJ (shiple entry) 3. Commuter Train-Pulling 7. Yardia Wickfining 8. Passenger Train-Pushing 1 Lives 1. Lord 1. Code 25. Track Number or Name Equipment 1. Train 8. Light blood 19. Commuter Train-Pushing 1 Lives 2. No. 3. Unknown 2 Lights or Special Lights or Special Lights or Special Lights 1 Lights or Special Lights 1 Lights 2. Clode 1. Note 1 Lights 2. Dispect (Standing Moving 3. Standard FLD 6. Highway User Went Behind or in Front of Train 1 Lives 2. No. 3. Unknown 2 Lights 2. Dispect of Vehicle Approach 1 Lives 2. No. 3. Unknown 2 Lights 2 Lights 2 Lights 3. Unknown 3 Lights 2. Dispect of Vehicle Approach 1 Lives 2. No. 3. Unknown 2 Lights 2 Lights 3. Unknown 3 Lights 2 Lights 3. Lights 3. Unknown 3 Lights 3. Lights 3. Unknown 3 Lights 3. Lights 3. Lights 3. Unknown 3 Lights 4. Standard Standar		-	5. Blocked o	n crossing by gates		1. Rall	equipr	ment struck hi	ighway use	r 2. Rall e	equipment :	struck by highway use	
1. Highway User 2. Rall Equipment 3. Both 4. Neither 4 20. Obate here me name and quantity of the hazardous material released, if any 21. Temperature 22. Visibility (single entry) Code 23. Weather (single entry) Code 24. Type of Equipment 1. Freight Train S. Dingle Car 9. MainL/Inspect. car 0. EMU Consist 2. Passenger Train-Pulling 5. Out of car 3. A. Boec. MolV Equip. E. DMU (single entry) 3. Commuter Train-Pulling 1. Out of car 3. A. Boec. MolV Equip. E. DMU (single entry) 3. Commuter Train-Pulling 1. Out of car 3. A. Boec. MolV Equip. E. DMU (single entry) 3. Commuter Train-Pulling 1. Out of car 3. A. Boec. MolV Equip. E. DMU (single entry) 3. Commuter Train-Pulling 5. Out of car 3. A. Boec. MolV Equip. E. DMU (single entry) 3. Commuter Train-Pulling 1. Out of car 3. A. Boec. MolV Equip. E. DMU (single entry) 3. Commuter Train-Pulling 2. Out of car 3. A. Boec. MolV Equip. E. DMU (single entry) 3. Commuter Train-Pulling 3. Out of cars 4. Boec. MolV Equip. E. DMU (single entry) 3. Commuter Train-Pulling 5. Out of car 3. A. Boec. MolV Equip. E. DMU (single entry) 3. Commuter Train-Pulling 6. Out of car 3. A. Boec. MolV Equip. E. DMU (single entry) 3. Commuter Train-Pulling 6. Out of cars 4. Boec. MolV Equip. E. DMU (single entry) 3. Commuter Train-Pulling 6. Out of cars 4. Becomed 4. Windle Train-Pulling 6. Out of cars 4. Becomed 5. DML (single entry) 1. Main 2. Yard 3. Biding 4. Industry 1. Main 2. Yard 3. Biding 4. Biding 4. Readable 7. Divide 4. Pulling 4. Divide 4. Divide 4. Divide 4. Divide 5. Divide				1	Code	20b. Was	there	a hazardous	materials r	elease by			Code
22. Temperature (specify if minus) 14 F 1. Dawn 2. Day 3. Dust 4. Dark 4 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Bleet 6. Show 2 24. Type of Equipment 1. Freight Train 5. Bingle Car 9. MaintLinspect. car 0. EMU (single entry) 3. Commuter Train-Pulling 6. Cut of cars 4. Spec. MoN Equip. E. DMJ (single entry) 3. Commuter Train-Pulling 6. Dut of cars 4. Spec. MoN Equip. E. DMJ (single entry) 3. Commuter Train-Pulling 6. Cut of cars 5. A. Spec. MoN Equip. E. DMJ (single entry) 3. Commuter Train-Pulling 6. Cut of cars 4. Spec. MoN Equip. E. DMJ (single entry) 3. Commuter Train-Pulling 6. Cut of cars 5. A. Spec. MoN Equip. E. DMJ (single entry) 3. Commuter Train-Pulling 7. Yardiswitchings, Passenger Train-Pulling 6. Code 3. Track Type Used by Rail Equipment throwled 4. Work Train 5. Light facels 0. Commuter Train-Pulling 7. Varidiswitchings, Passenger Train-Pulling 1. Specific of Code 5. Track Number or Name Equipment 1. Freight Train 5. Light facels 0. Commuter Train-Pulling 7. Varidiswitchings, Passenger Train-Pulling 1. Main 2. Yard 3. Biding 4. Industry 1. MAIN LINE 1. Code 1. Main 2. Yard 3. Biding 4. Industry 1. MAIN LINE 1. Code 1. Main 2. Yard 3. Biding 4. Industry 1. MAIN 3. East 1. Time Table Direction 1. Main 3. Expect (single entry) 1. Specific (single entry) 1. Main 3. Expect (single entry) 1. Specific (single entry) 1. Main 3. Expect (single entry) 1. Specific (single entry) 1. Main 3. Expect (single entry) 1. Specific (single entry) 1. Main 3. Expect (single entry) 1. Specific (single entry) 1. Main 3. Expect (single entry) 1. Specific (single entry) 1. Main 3. Expect (single entry) 1. Specific (single entry) 1. Main 3. Expect (s				Neither		1	High	way User 3	2. Rall Equi	pment :	3. Both 4.	Neither	4
Specify #minus 14 *F 1. Dawn 2. Day 3. Dusk 4. Dark 4 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Bleet 6. Bnow 2						-		,					
Specify #minus 14 *F 1. Dawn 2. Day 3. Dusk 4. Dark 4 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Bleet 6. Bnow 2													
24. Type of Equipment 1. Freight Train S. Single Gar S. Maint.Inspect. car D. EMU Consist 2. Passenger Train-Pulling S. Out of cars A. Boec. MoW Equip. E. DMU 4. Work Train 8. Light locoils C. Communer Train-Pulling 7. Yardi@witching B. Passenger Train-Pulling 7. Yardi@witching 8. Light locoils C. Communer Train-Pulling 7. Yardi@witching 8. Light locoils C. Code S. Number of Cars 8. Recorded 9. Light or Gardian Witching 8. Estimated 9. Warding 7. Crossing Warming 1. Code 1. Passenger Train-Pulling 7. Vivide Code 1. Passenger Train-Pulling 7. Vivide Code 1. Passenger Train-Pulling 7. Vivide Code 1. Passenger 7. Crossing Warming Interconnected With Highway Users Code 1. Passenger 7. Crossing Warming Interconnected 1. Passenger 7. Crossing Warming Interconnected 1. Passenger 7. Crossing Warming 1. Passenger 7. Crossing Warming Interconnected 1. Passenger 7. Crossing Warming 1. Passenger 8. S. Outer (guestly) 2. Passenger 8. S. Outer (guestly) 2. S. Ou			_		1								
Consist 2. Passenger Train-Pulling 6. Cut of cars A. Spec. MolW Equip. E. DMU 3. Commuter Train-Pulling 7. Yard/Switching 8. Passenger Train-Pushing 4. Work Train A. Supht Notice 9. Commuter Train-Pushing 4. Work Train A. Supht Notice 9. Commuter Train-Pushing 4. Work Train A. Supht Notice 9. Commuter Train-Pushing 1. Main 2. Yard 3. Siding 4. Industry 1. Main 2. Yard 3.	(specify if minus)							Cloudy 3. Ra	ain 4. Fog	5. Sleet	6. Snow		2
4. Work Train 8. Light loco(s) C. Commuter Train-Pushing 1 1. Main 2. Yard 3. Biding 4. Industry 1 MAIN LINE 1 27. FRA Track Locomotive Locomotive Linits 2 2. Number of Cars 1.8 Recorded Recorded speed if available) Code 31. Time Table Direction Code 1. North 3. East 2. Bouth 4. West 2. Bouth 4. West 2. Bouth 4. West 2. Continever FLB 5. Hwy, traffic signals 8. Bitop signs 1. Gates Code (s) 1. Gates 2. Continever FLB 5. Hwy, traffic signals 8. Bitop signs 1. Conceptible Warning 3. Constant FLB 6. Audible 3. Standard FLB 6. Audible 3. West Conceptible S. West Conceptible S. West Conceptible S. Both Righway Signals 2. Golde of Vehicle Approach 1. Per Salve Side of Vehicle Approach 3. Opposite Bidded Public Approach 3. Highway 138-Righway User's Gender 40. Highway User's Went Behind or in Front of Train User's Age 1. Maile Code 3. Direction of Warming 3. Recorded Recorded speed if available) 3. Constant Gweethy Without Salve Side of Vehicle Approach 1. Yes 2. No 3. Unknown 3. In the Salve Side of Vehicle Approach 1. Yes 2. No 3. Unknown 3. In the Salve Side of Vehicle Approach 1. Yes 2. No 3. Unknown 3. Unknown 3. In the Salve Side of Vehicle Approach 1. Yes 2. No 3. Unknown 3. Unknown 3. Side of Vehicle Approach 1. Yes 2. No 3. Unknown 3. Side of Vehicle Approach 1. Yes 2. No 3. Unknown 3. Unknown 3. Side of Vehicle Approach 3. Unknown 3. Side of Vehicle Approach 3. Unknown 3. Side of Vehicle Approach 4. Highway Glopals Code 3. Unknown 3. Side of Vehicle Approach 4. West 3. Side of Vehicle Approach 1. Yes 2. No 3. Unknown 3. Side of Vehicle Approach 3. Unknown 3. Side of Vehicle Approach 3. Unknown 3. Side of Vehicle Approach 3. Unknown 3. Very Side of Track Obscured by (primary obstruction) Code 3. Did not stop 3. Unknown 4. Highway Vehicle 4. Highway Vehicle 4. Highway Vehicle 4. Highway Vehicle 5. Norter in the Vehicl	Consist 2. Passeng	er Train-Pu	iling 6. Cut	of cars A. Spec.	MoW Equ	ip. E.DN					Code	26. Track Number of	r Name
27. FRA Track Class (1-9,X) 1 Units 29. Number of Cars 30. Consisting George (Recorded Speed if available) Code 31. Time Table Direction 1. North 3. East 1 Units 29. Number of Cars 30. Consisting George (Recorded Speed if available) Code 11. North 3. East 2. Gooth 4. West 2 2 32. Type of 1. Gates 4. Wilg wags 7. Crossbucks 10. Flagged by crew Crossing 2. Cantilever FL8 5. Hay, traffic signals 8. Stop signs 11. Other (specify) (George-speed if available) 3. Glandard FL8 6. Audible 9. Watchman 12. None Code 31. Shop signs 11. Other (specify) (George-speed instructions and codes) Code 32. Glad of Vehicle Approach 3. Glandard FL8 6. Audible 9. Watchman 12. None Code 3. Opposite Side of Vehicle Approach 3. Opposite Side of Vehicle Approach 3. Highway 19.5. Highway User's Gender 40. Highway User Went Behind or in Front of Train and Structs or was Struct by Second Train 29. 2. Female 1 1. Yes 2. No 3. Unknown 2 1. Went around the gale (17 yes, see Instructions) 3. Did not stop 4. Struct by Second Train 29. 2. Shop 3. Unknown 2 2. Shop 3. Unknown 3. Shift not stop 4. Shift shows 1. New Arrange of Secondary 4. Shift shows 1. New Arrange of Secondary 4. Shift shows 1. New Arrange Secondary 4. Shift								1 Main 2 V	and 3 Sid	ling 4 Indi		MAIN LINE 1	
Class (1-9,X) 1 Locomotive Units 2 138 E. Estimated 10 mph E 2. 0 outh 4. West 2 2 32. Type of 1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew Warning 3. Other (1998) 1. Other (specify) (Deer reverse side for Instructions and codes) (Deer everse side for Instructions and codes (Deer everse side for Instructions and codes) (Deer everse side for Instructions and codes (Deer everse s													
32. Type of Crossing Uaming 1. Gates 4. Wilg wags 7. Crossbucks 10. Flagged by crew (Be reverse side for instructions and codes) 3. Ostandard FLO 6. Audible 9. Watchman 12. None (December 1) 1. Set 10. Set	Class (1-9,X) Locomoti	ve		ber or cars .				o spece ii ai		1-	1. No	orth 3. East	1
1. Gales 4. Wilg wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FL9 5. Haw, traffic signals 8. Stop signs 11. Other (specify) (Ge reverse side for instructions and codes) 3. Other (specify) 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	- Units	2		138	E. Esti	mated		22 011-4					2
Warming 2. Cantilever FLB S. Hwy, traffic signals 8. Stop signs 11. Other (specify) 3. Standard FLB 6. Audible 9. Watchman 12. None Standard FLB 6. Audible 9. Watchman 12. None Code	1. Gates 4.	Wig wags	7.	Crossbucks 10. F	lagged by	crew					A. Dry	way Conditions	
Code (s) 01 03 06 3. Audible 9. Watchman 12. None Code Code (s) 01 03 06 3. Operation of Warming St. Location St. Locati	Cantilever FLS 5.	Hwy. traffic	signals 8	Stop signs 11. O	ther (spec	lly)						Slush	
Social Code	3. Standard FLS 6.	Audible	9.	. Watchman 12. N	lone					Code		Mud Did Oil Gravel	Code
1. Both Sides 2. Side of Vehicle Approach 2. Oode 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach 1. Yes 2. No 3. Unknown 3. S. Vegetation 3. Opposite Side of Vehicle Approach 1. Yes 2. No 3. Unknown 3. S. Vegetation 40. Highway User Went Behind or in Front of Train and Struck or was Struck by Second Train 1. Went around the gate 6. Went around thru temporary barricade 2. Stopped and then proceeded (if yes, see instructions) 1. Yes 2. No 3. Unknown 2. Stopped and then proceeded (if yes, see instructions) 2. Stopped and then proceeded (if yes, see instructions) 3. Did not stop 3. Did not stop 4. Stopped on crossing 8. Suicide/Attempted suicide 7. Went thru the gate 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 1. Permanent Structure 3. Passing Train 5.	Code(s) 01 03	()6							1			В
2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach 4. Highway Jest of Standing Struck or was Struck by Second Train 4. Highway User 4. Supposed and the proceeded (if yes, see instructions) 4. Supposed and the proceeded (if yes, see instructions) 4. Supposed and the proceeded (if yes, see instructions) 4. Supposed and the proceeded (if yes, see instructions) 4. Supposed and the proceeded (if yes, see instructions) 4. Supposed Standing Struck or was Struck by Second Train 4. Supposed and the proceeded (if yes, see instructions) 4. Supposed and the proceeded (if yes, see instructions) 4. Supposed and the proceeded (if yes, see instructions) 4. Supposed and the proceeded (if yes, see instructions) 4. Supposed and the proceeded (if yes, see instructions) 4. Supposed and the proceeded (if yes, see instructions) 4. Supposed and the proceeded (if yes, see instructions) 4. Supposed and the proceeded (if yes, see instructions) 5. Vegetation of the specific operator of the past of the reporting rain of the processary of the past of the reporting rain of the report pursuant to the accident reports statute and, as such shall not 'be admitted as evidence or used for any purpose	_						ed		37			•	
38.Highway 139.Highway User's Gender User's Gender User's Gender User's Age 1. Male Code 39 2. Female 1 1. Yes 2. No 3. Unknown Code 2. Stopped and then proceeded (if yes, see instructions) 3. Did not stop 7. Went thru the gate 6. Went around the gate 6. Went around the gate 6. Went around the gate 7. Went thru the gate 7. Went thru the gate 7. Went thru the gate 8. Did not stop 7. Went thru the gate 9. Did not stop 7. Went thru thru the gate 9. Did not stop 7. Went thru thru the gate 9. Did not stop 7. Went thru thru the gate 9. Did not stop 7. Went thru thru thru thru thru thru the gate 9. Did not stop 7. Went thru thru thru thru thru thru thru thr	2. Side of Vehicle Approach			oue				- 1					- 1
User's Age 1. Male Code 39 1. Yes 2. No 3. Unknown Code 2. Stopped and then proceeded (if yes, see instructions) Code 3. Did not stop 7. Went thru the gate 8. Suicide/Attempted suicide 7. Went thru the gate 7. Went thru the gate 8. Suicide/Attempted suicide 7. Went thru the gate 7. Went thru the gate 8. Suicide/Attempted suicide 7. Code 43. View of Track Obscured by (primary obstruction) Code 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specify) Suicide/Attempted suicide 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specify) Suicide/Attempted suicide 8. Not Obstructed 8. All Dilymed 1. Willed 2. Injured 1. Topography 6. Highway Vehicles 8. Not Obstructed 8. Not Obstructed 1. Willed 2. Injured 1. Willed 2. Injured 3. Uninjured 1. Ves 2. No 1. Yes 3. N			_				High		5				3
Age 1. Male Code 39 2. Female 1 1. Yes 2. No 3. Unknown 2 4. Stopped on crossing 8. Suicide/Attempted suicide 7 7 42. Driver Passed Standing Code 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specify) 1. Yes 2. No 3. Unknown 3 2. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Not Obstructed 8 2. Standing railroad equipment 4. Topography 6. Highway Vehicles 8. Not Obstructed 8 2. Standing railroad equipment 4. Topography 6. Highway Vehicles 8. Not Obstructed 8 2. Standing railroad equipment 4. Topography 6. Highway Vehicles 8. Not Obstructed 8 2. Standing railroad equipment 4. Topography 6. Highway Vehicles 8. Not Obstructed 8 2. Standing railroad equipment 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Not Obstructed 8. Not Obstructed 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Not Obstructed 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Not Obstructed 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Not Obstructed 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Not Obstructed 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Not Obstructed 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Not Obstructed 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Not Obstructed 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Not Obstructed 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Not Obstructed 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Not Obstructed 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Standing railroad equipment 4. Topography 6. Highway Vehicle 8. Standing railroad equipment 4. Topography 6. Highway Vehicle 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 9. Standing railroad equipment 4. Topography 6. Highway Vehicle 9. Standing railroad equipment 4. Topogra							1. W	ent around the					de
All			. Var. 3	us 3 Heknown					en proceed	7. We	nt thru the	gate	
Highway Vehicle 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specity) 8. Highway Vehicles 8. Not Obstructed 8. Highway Vehicles 9. Lyes 2. No 9. Lyes 2. No 1. Yes 3. No 1. Yes 4. No 1.		1			Obscured	_			ssing	8. Sul	cide/Attemp	pted suicide	
1. Yes 2. No 3. Unknown 3 2. Standing railroad equipment 4. Topography 6. Highway Vehicles 8. Not Obstructed 8 Casualties to: Killed Injured 44. Driver was 1. Killed 2. Injured 3. Uninjured 3. Uninjured 45. Was Driver in the Vehicle? Code 1. Killed 2. Injured 3. Uninjured 3. Uninjured 3. Uninjured 45. Was Driver in the Vehicle? Code 1. Yes 2. No 1 1 46. Highway-Rail Crossing Users 0 0 47. Highway Vehicle Property Damage (est. dollar damage) \$5,000 (including driver) 1 49. Railroad Employees 0 0 50. Total Number of People on Train (include passengers and train crew) 2 51. Is a Rail Equipment Accident / Code Includent Report Being Filed 2 53a. Special Study Block Video Taken? Yes Video Used?	Highway Vehicle		,						5. Vegeta	tion	7. Other	r (specify)	. Code
Casualities to: Killed Injured 1. Killed 2. Injured 3. Uninjured 3 1. Yes 2. No 1 46. Highway-Rail Crossing Users 0 0 47. Highway Vehicle Property Damage (est. dollar damage) \$5,000 48. Total Number of Vehicle Occupants (including driver) 1 49. Railroad Employees 0 0 50. Total Number of People on Train 51. Is a Rail Equipment Accident / Code Includes passengers and train crew) 2 includes Report Being Filed 2 53a. Special Study Block Video Taken? Yes Video Used? Yes Video Used? Yes Video Used? Yes Video Used? Yes Sideo	1. Yes 2. No 3. Unknown		3	2. Stand	ding railroa	d equipmen			6. Highwa	y Vehicles	8. Not 0	Obstructed	
46. Highway-Rail Crossing Users 0 0 47. Highway Vehicle Property Damage (est. dollar damage) \$5,000 48. Total Number of Vehicle Occupants (including driver) 1 49. Railroad Employees 0 0 50. Total Number of People on Train 51. Is a Rail Equipment Accident / Code Includent Report Being Filed 1. Yes 2. No 52. Passengers on Train 0 0 (include passengers and train crew) 2 includent Report Being Filed 1. Yes 2. No 53a. Special Study Block Video Taken? Yes Video Used? Yes Solo Special Study Block 54. Namative Description (Be specific, and continue on separate sheet if necessary) HIGHWAY USER/S ACTIONS: DID NOT STOP. 55. Typed Name and Title Sc. Signature 57. Date NOTE: This report is part of the reporting railroad's accident report pursuant to the accident reports statute and, as such shall not 'be admitted as evidence or used for any purpose	Casualties to:	Killed	Injured		ured 3.U	ininjured		3			ne venicie:		
49. Raliroad Employees 0 0 50. Total Number of People on Train 52. Passengers on Train 0 0 0 (Include passengers and train crew) 2 1. Yes 2. No 53a. Special Study Block Video Taken? Yes Video Taken? The Taken? Yes Video Taken? Yes Video Taken? Yes Video Taken? The Taken? Yes Video Taken? Yes	46. Highway-Rail Crossing Users	0	0	47. Highway Vehic	le Property			1					
S2. Passengers on Train 0 0 (Include passengers and train crew) 2 Incldent Report Being Filed 1. Yes 2. No 1. Yes 2. No 2. S3a. Special Study Block Video Taken? Yes V No Video Used? Yes V No V	49. Raliroad Employees	0	0			n Train		\$5,000					Code
S3a. Special Study Block Video Taken? Yes V No S3b. Special Study Block Video Used? Yes V No S3b. Special Study Block S4. Narrative Description (Be specific, and continue on separate sheet if necessary) HIGHWAY USER'S ACTIONS: DID NOT STOP. S5. Typed Name and Title S5. Signature S7. Date NOTE: This report is part of the reporting railroad's accident report pursuant to the accident reports statute and, as such shall not "be admitted as evidence or used for any purpose.	52. Passengers on Train		_					12	Incide	nt Report			
S4. Namative Description (Be specific, and continue on separate sheet if necessary) HIGHWAY USER'S ACTIONS: DID NOT STOP. S5. Typed Name and Title S6. Signature S7. Date NOTE: This report is part of the reporting railroad's accident report pursuant to the accident reports statute and, as such shall not "be admitted as evidence or used for any purpose."		Video Ta	ken?			53b. Spec	cial St		1. Ye	s 2.No			
HIGHWAY USER'S ACTIONS: DID NOT STOP. 55. Typed Name and Title 55. Gignature 57. Date NOTE: This report is part of the reporting railroad's accident report pursuant to the accident reports statute and, as such shall not "be admitted as evidence or used for any purpose."	54. Narrative Description /Re st				ecessan/i								
NOTE: This report is part of the reporting railroad's accident report pursuant to the accident reports statute and, as such shall not "be admitted as evidence or used for any purpose			- Interest of	. Topologic and the									
											d as evide	nce or used for any p	urpose

FORM FRA F 6180.57 (Rev. 08/10) *NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A OMB Approval expires 6/30/2021

Figure D-10. Alameda Avenue Crossing (1 of 1)

DEPARTMENT OF TRANSPOR		o			IL GRADE	CROSSING			OMB A	proval No. 21	30-0500
1.Name of Reporting Railroad	allers of the					1a. Alphabetic C	ode		_	ad Accident/Incid	
BNSF Railway Company [BN	SF					BNSF	-		PR121		
2.Name of Other Railroad or Other B		for Equipmen	nt involved in Train /	Accident/	/incident	2a. Alphabetic C	ode		2b. Raliro	ad Accident/Incid	lent No.
3. Name of Railroad or Other Entity	Responsible	e for Track M	faintenance (ringle	emira)		3a. Alphabetic (Code		3b. Railro	ad Accident/Incid	ient No.
BNSF Railway Company [BNS	iF]			,,,		BNSF			PR121	9202	
4. U.S. DOT Grade Crossing ID No.						5. Date of Accid			6. Time o	f Accident/Incider	nt
			24546	0F			-	2019	10:10		PM 🗸
7. Nearest Railroad Station SOUTH DENVER			8. Subdivision PIKES PEA	AK		9. County DENVER			10. State	bbr. CO	Code 08
44 000 000 000			12. Highwi		or No.				-		
DENVER	Had	- Investment		uj	Al	LAMEDA EO I		'ront		Public 🗸 i	Private
	iway use	r involved			ez Faula			(moving)	Involved	Train pulling- RCL	
13. Type C. Truck-trailer F. Bus		J. Other Motor	e Mahicia	!	17. Equipr	ete (units outline)	5. Car(s)	(standing	g) B.	Train pushing- RC	L
A. Auto D. Pick-up truck G. Sch		K. Pedestrian		Code	2. Tr	ain (units pushing) ain (units pushing	g) 6. Light io	co(s) (m	noving) C.	Train standing- RC	
		M. Other (sp		A	1	ain (standing)	7. Light id 8. Other	oco(s) (s	tanding)	EMU Locomotive(DMU Locomotive(5)
14. Vehicle Speed 15. Direction (geographical) Code 18. Position of Car Unit in Train											
(est. mph at Impact) 10 1. N	lorth 2. Sou	uth 3. East		4				1			
16. Position 1. Stalled or stuck on 2. Stopped on Crossi				Code	19. Circun						Code
Moving over crossi	-	. Blocked on	crossing by gates	3	1. Rall 6	equipment struck i	highway user	2. Rall e	equipment s	truck by highway	user 1
20a. Was the highway user and/or		ent involved			20b. Was	there a hazardou	s materials re	lease by			Code
in the impact transporting haz	sardous mat	erials?		Code							4
1. Highway User 2. Rail Eq				4	1.	. Highway User	2. Rall Equip	oment 3	3. Both 4.	Neither	
20c. State here the name and quan	ity of the na	azardous mai	eriai released, it any	y							
21. Temperature 22. V	/isibility (s/	ingle entry)		Code	23. Wea	ther (single entry	d				Code
26 15	-	ay 3. Dusk	4. Dark	4	1	ar 2. Cloudy 3. F		5. Sleet	6. Snow		1
24. Type of Equipment 1. Freight T	Irain	5. Single	Car 9. Maint/in	nspect. c	ar D.EM	U					
		lling 6. Cut of					ype Used by ent involved		Code	26. Track Numb	er or Name
			Bwitching B. Passeng			Code			ustry 2	3101	
4. Work Tra			oco(s) C. Commu			-	Yard 3. Sidi				
27. FRA Track 28. Number of Class (1-9.X) Locomoti		29. Numbe	er of Cars 30	D. Consist R. Rec		corded speed if a	vallable)	Code		Table Direction rth 3. East	Code
1 Locomon	2	·	13	E. Estin			4 mph	E		uth 4. West	2
32. Type of	Title water	7 (Constitute 40 Ele	and bu		33. Signale	d Crossing W	Vaming		way Conditions	
1. Gates 4. Crossing 2. Cantilever FLS 5.	. Wig wags		Crossbucks 10. Flag			(See rev	erse side for		A. Dry B. Wet		
Warning 3, Standard FLS 6.			Natchman 12. Nor		my)	Instruction	ons and code		C.Snow/S D.Ice	lush	Code
3. Standard PLS 6.			I I	T	\neg	_		Code	E. Sand,N	Aud,Dirt,Oll,Gravel	C
35. Location of Warning			36. Crossing W	Vaming ir	terconnectr	ed .	37.	Crossing	F.Water (Standing, Moving) by Street	
1. Both Sides		, Cod	with Library				Code	_	Special Lig		Code
 Side of Vehicle Approach Opposite Side of Vehicle App 	rmach	1	1. Yes 2.	. No 3	. Unknown		1	1. Yes	2. No 3. U	Jnknown	1
38.Highway 39.Highway User's Ge		_	r Went Behind or in		Train 41.	Highway User	-		er (specif		
User's	ſ	and Struck or	r was Struck by Seco	ond Train		 Went around to Stopped and to 			nt around/th res, see inst	ru temporary barr ructions)	
	Code	Vac 3 N	o 3. Unknown	1	Code	3. Did not stop		7. Wer	nt thru the g	ate	Code
40 2. Female 2. Female 2. Pemale 3.	2 1		43. View of Track Ot	becured		Stopped on cro nary obstruction)	issing	8. Suk	cide/Attemp	ted suicide	3 Code
Highway Vehicle		Code	43. View of Track Of 1. Perman			3. Passing Train	5 Vegetat	ing.	7. Other	(specify)	Code
1. Yes 2. No 3. Unknown	!	2	2. Standin			t 4. Topography	6. Highway	y Vehicles	s 8. Not C		8
Casualties to:	Killed	Injured 4	 Driver was Killed 2. Injur 	red a u	Intolured			Oriver in th 2. No	he Vehicle?		Code
46. Highway-Rail Crossing Users		2 4	47. Highway Vehicle			3	_		f Vehicle O	ccupants	
	0	0	(est. dollar dama)			\$2,500	1,000	ling driver			1
49. Railroad Employees	0	-	50. Total Number of			i.e			nent Accide Being Filed		Code
52. Passengers on Train	0	0	(include passeng	ers and .		3	1	s 2. No			2
53a. Special Study Block	Video Tal		fes ✓ No fes ✓ No		53b. Spec	cial Study Block					
	pecific, and	continue on s	separate sheet if ned								
VEHICLE FAILED TO YIELD AT CRO	ISSING AND	WAS STRUCK	CBY TRAIN. NO HAZ	ZMAT RE	LEASED.						
55. Typed Name and Title			SF	6. Signatu	ITE.				57. Date		
NOTE: This report is part of the rep			report pursuant to th	the accide	ent reports s			e admitte			ny purpose
	mades		mantioned in eald or	annet */	49 H 2 C 20	1903. See 49 C.F.	P 225 7 (b)				

FORM FRA F 6180.57 (Rev. 08/10)

"NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A

OMB Approval expires 6/30/2021

Figure D-11. East 50th Avenue Crossing (1 of 1)

PEPARTMENT OF TRANSPORTATION HIGHWAY-RAIL GRADE CROSSING EDERAL RAILROAD ADMINISTRATION (FRA) ACCIDENT/INCIDENT REPORT OMB Approval No. 2130-0500													
1.Name of Reporting Railroad	arion (Free	4		200	DENTA	HOIDEN	_	phabetic Co	de		_	ad Accident/Incid	
BNSF Railway Company [BN	SF							NSF			PR10		
2.Name of Other Railroad or Other B	ntity Filling	for Equipn	ent involve	ed in Train	Accident	Incident	2a. A	iphabetic Co	ode		2b. Railro	oad Accident/Incid	dent No.
3. Name of Railroad or Other Entity	Responsibl	le for Track	Maintenan	ce (ringle	entry)		3a. A	Uphabetic C	ode		3b. Ralin	oad Accident/Incid	dent No.
BNSF Railway Company [BNS	F]						_	VSF			PR10		
4. U.S. DOT Grade Crossing ID No.							5. Da	month	ent/Incide	nt voir	6. Time o	of Accident/Incide	nt
				24528	BM		1	1 0 1	<u> </u>	2017	12:11	AM	PM V
7. Nearest Railroad Station				ubdivision				ounty			10. State		Code
DENVER			В	RUSH			I	DENVER			/	Abbr. CO	08
11. City (if in a city)				12. Highw	ay Name	or No. 50	THA	VE				Public 🗸	Private
	hway Use	er involve	d							quipment			
13. Type C. Truck-trailer F. Bus						17. Equips		nits pulling)		s) (moving s) (standing		Train pulling- RCL Train pushing- RC	
A. Auto D. Pick-up truck G. Sch		J. Other Mo K. Pedestri						inits puning) inits pushing	C 1144	tioco(s) (n	noving) C.	Train standing- R	
		M. Other			Code	3. Tr	ain (s	standing)		nt loco(s) (3	senenge)	. EMU Locomotive DMU Locomotive	1 .
L		(geographic			. Code	18. Positio	n of Ca	ar Unit in Tra		er (specif)	, -	DINO EDCORIOLIVE	(2)
	lorth 2.8o	uth 3. East	4. West		3					1			
16. Position 1. Stalled or stuck on 2. Stopped on Crossi	_		_		Code	19. Circun	nstance	•					Code
Moving over crossi	-	5. Blocked (in crossing	by gates	3	1. Rall e	equipm	ent struck h	ighway u	ser 2. Rail e	equipment :	struck by highway	user 2
20a. Was the highway user and/or		ent involve	1			20b. Was	there a	hazardous	materials	release by			Code
in the impact transporting haz	ardous mat	terials?			Code								4
1. Highway User 2. Rail Eq					4	1.	Highw	ay User	2. Rall Eq	ulpment	3. Both 4.	. Neither	4
20c. State here the name and quan	tity of the h	azardous n	naterial rele	ased, if an	У								
	/Isibility (S	ingle entry)			Code	23. Wea	ther (s	ingle entry)					Code
(specify if minus) 60 °F 1.0	Dawn 2. D	ay 3. Dus	k 4. Dark		2	1. Cle	ar 2.0	Cloudy 3. R	ain 4. Fo	g 5. Sleet	6. Snow		1
24. Type of Equipment 1. Freight T Consist 2. Passeng			gle Car	9. Maint/ir		ar D.EM lp. E.DM	-	25. Track Ty			Code	26. Track Numb	er or Name
(single entry) 3. Commut							Code	Equipme	ent Involv	ed	- 1		
4. Work Tra	iln			C. Commu			7	1. Main 2. Y	ard 3.8	ilding 4. Ind		725	
27. FRA Track 28. Number of		29. Nun	ber of Can	s 30	R. Rec		cordeo	i speed if av	allable)	Code		Table Direction orth 3. East	Code
Class (1-9,X) Locomoti	ve 1		1		E. Estir				5 mp	n R		outh 4. West	4
32. Type of							1	33. Signaled	Crossing	Warning		way Conditions	
Crossing	Wig wags			ks 10. Fla				(See reve	rse side f	or	A. Dry B. Wet		
2. Cantilever FLS 5. Warning 3. Standard FLS 6.	-		_	n 12. Nor		.ny)		Instruction	ns and co		C.Snow/s	Slush	Code
Code(s) 12	Audible		. watchina	11 12.1901			\dashv			Code		Mud,Dirt,Oil,Grave	
35. Location of Warning			36.	Crossina W	/aming in	terconnects	ed .			37. Crossing		(Standing, Moving d by Street) A
1. Both Sides				with Highw			-		ode		Special Lig		Code
 Side of Vehicle Approach Opposite Side of Vehicle App 	roach			1. Yes 2.	No 3	. Unknown		`		1. Yes	2. No 3.	Unknown	2
38.Highway 39.Highway User's Ge	ender 40.	Highway U:	ser Went B	ehind or in	Front of			ay User			er (spech		
User's		and Struck	or was Str	uck by Sec	ond Train			nt around the			it around/tr ies, see ins	nru temporary ban tructions)	
	Code 1	1. Yes 2.	No. 3, Uni	known	I	Code 2	3. Dld	not stop		7. We	nt thru the		Code 3
42. Driver Passed Standing	1	Code		of Track O	bscured I	_		oped on cros struction)	ssing	8. Sui	cide/Attemp	pted suicide	Code
Highway Vehicle		1		1. Permar	ent Struc	ture	3. Pa	ssing Train	5. Veget	tation	7. Other	r (specify)	
1. Yes 2. No 3. Unknown		2	44 Debue		ng railroa	d equipmen	t 4. To	pography		way Vehicle			8
Casualties to:	Casualties to: Killed Injured 44. Driver was 45. Was Driver in the Vehicle? Code 1. Yes 2. No 1												
46. Highway-Rall Crossing Users	0 0 60 500												
49. Raliroad Employees	0	0		Number of		n Train		\$2,000		Rail Equip		ent /	Code
52. Passengers on Train	0	0		de passeng				4		dent Report	Being File	d	2
53a. Special Study Block	Video Ta	ken?		√ No		53b. Spec	dal Stu		1.1	Yes 2. No			
54. Narrative Description (Be s)	Video Us pecific, and			√ No sheet if ne	nessand								
EASTBOUND TRUCK DID NOT STOP					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,								
55. Typed Name and Title				56	. Signatu	re					57. Date		
NOTE: This report is part of the rep				ursuant to t	he accide	ent reports s							ny purpose
in any suit or action for damages gr	owing out o	or any matte	r mentione	o in said re	port" 4	9 U.S.C. 20	19U3. S	ee 49 C.F.R	t. 225.7 (I	D).			

FORM FRA F 6180.57 (Rev. 08/10)

"NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A

OMB Approval expires 6/30/2021

Figure D-12. 48th Avenue, West of Forest Street Crossing (1 of 1)

DEPARTMENT OF TRANSPOR						GRADE					OMBA	pproval No. 213	0.0500
1.Name of Reporting Railroad	ITION (FRA	0		ACCIDE	N I /IIN	CIDENT		Alphabetic Co	vie			oad Accident/Incide	
BNSF Railway Company [BN	SFI							BNSF			PR05		antivo.
2.Name of Other Railroad or Other B	ntity Filling	for Equipm	nent involved in '	Train Acci	ident/in	ncident	2a.	Alphabetic Co	ode		2b. Ralin	oad Accident/Incide	ent No.
3. Name of Railroad or Other Entity		e for Track	Maintenance	(ringle entry	ø			Alphabetic C	ode			oad Accident/Incide	ent No.
BNSF Railway Company [BNS 4. U.S. DOT Grade Crossing ID No.	r]						_	NSF Date of Accide	entilociden			19203 of Accident/Inciden	
4. O.O. DOT Grade Grading to No.			1 057	70C 414	,			month	day	year		_	_
7. Nearest Railroad Station			8. Subdivi	064W	V		_	0 5 2 County	8	2019	11:15 10. State	AM	PM V
NORTH YARD			BRUSE				9.1	DENVER				Abbr. CO	08
11. City (if in a city) DENVER			12.1	Highway N	Name o	or No. p	4977	H-W OF FO	DEST			Public V P	rivate
	hway Use	r involve	d				4011	II-W OI TO		ulpment	involved		
13. Type						17. Equipr	ment		4. Car(s) (moving) A	Train pulling- RCL	
C. Truck-trailer F. Bus		J. Other Mo	otor Vehicle					(units pulling)		(standing		. Train pushing- RCL . Train standing- RC	
A. Auto D. Pick-up truck G. Sch		K. Pedestri		Co	ode			(units pushing	,	loco(s) (s		EMU Locomotive(s) Code
		M. Other			A			(standing)	8. Othe	r (specif)		DMU Locomotive(s) 6
10		geographic uth 3 East	t 4. West	Co	ode 1	18. Positio	on of (Car Unit in Tra	ain	1			
16. Position 1. Stalled or stuck on	crossing 4				1	19. Circun	nstan	ce		•			Code
Stopped on Crossi Moving over crossi	-	. Blocked	on crossing by g	ates	3	1. Rall e	equip	ment struck h	ighway us	er 2. Ralle	equipment:	struck by highway (
3. Moving over crossi 20a. Was the highway user and/or	•	ent levelue	4		_	20h Was	there	a hazardous	materiale	release by			
in the impact transporting haz				C	ode	200. Was	uicic	a nazaroous	materials	release by			Code
1. Highway User 2. Rail Eq					4	1.	High	way User	2. Rall Equ	ilpment :	3. Both 4	. Neither	4
20c. State here the name and quan	tity of the h	azardous n	naterial released	, if any									
21. Temperature 22. \	/Isibility (s	Ingle entry))	Cr	ode	23 West	ther	(single entry)	1				Code
50 45	Dawn 2. D			ı	4			. Cloudy 3. R		5. Sleet	6. Snow		3
24. Type of Equipment 1. Freight T				aint/inspe	-							Т	
Consist 2. Passeng	er Train-Pu			pec. MoW			IU.	25. Track Ty	pe Used b ent Involve		Code	26. Track Number	r or Name
			d/Switching B. Pa				Code				ustry 4	832	
4. Work Tra 27. FRA Track 28. Number of			t loco(s) C. C				8	1. Main 2. Y		Code		Table Direction	
Class (1-9,X) Locomoti		29. Nun	nber of Cars		onsist a . Recor		coro	ea speea ir av	allacie)			orth 3. East	Code
1 Units	1		0	E.	Estima	ated			4 mpt		_	outh 4. West	3
32. Type of 1. Gates 4.	Wig wags	7	. Crossbucks 1	D. Flagge	d by cr	ew		33. Signaled	Crossing	Warning	34. Road A. Dry	Iway Conditions	
Crossing 2. Cantilever FLS 5.									rse side fo		B. Wet C.Snow/	Charle	
Warning 3, Standard FLS 6.	Audible	9	. Watchman 1	2. None		-		Instruction	ns and cod	(Code	D.Ice		Code
Code(s) 07								1				Mud,Dirt,Oil,Gravel (Standing, Moving)	В
35. Location of Warning			36. Cross	ing Wami	ing inte	erconnecte	ed		3	7. Crossing		d by Street	
Both Sides Side of Vehicle Approach		,0	ode With H	Highway S	signals			0	ode	Lights or	Special Li	ghts	Code
3. Opposite Side of Vehicle App		1		s 2. No					2		2. No 3.		1
38.Highway 39.Highway User's Ge		_	ser Went Behind or was Struck b					way User lent around th	e gate		er (speci nt around/ti	rty) hru temporary barri	cade
User's Age 1, Male	Code	and struck	or was struck b	y secona		ode	2. St	opped and the		ded (If y	es, see ins	structions)	Code
I I I		1. Yes 2.	No 3. Unknow	n		.		d not stop opped on cro	ssing		nt thru the cide/Attem	gate pted suicide	3
42. Driver Passed Standing		Code	43. View of Tra	ack Obscu	ured by			obstruction)					Code
Highway Vehicle 1. Yes 2. No 3. Unknown		2		ermanent				Passing Train	_			r (specify)	8
1. Yes 2. No 3. Unknown	W		44. Driver was	tanding ra	alroad	equipmen	t 4.1	Topography	45. Was	ay Vehicle: Driver in ti	s 8. Not (he Vehicle:	Obstructed	Code
Casualties to:	Killed	Injured	1. Killed 2					3		es 2.No			1
46. Highway-Rail Crossing Users	0	0	47. Highway V		perty [Damage		\$2,500	1	il Number o uding driver		Occupants	1
49. Railroad Employees	0	0	50. Total Numb		ple on	Train		4-3	51. Is a	Rall Equipo	ment Accide		Code
52. Passengers on Train	0	0	(include pa	ssengers	and tra	ain crew)		3		lent Report es 2. No	Being File	d	2
53a. Special Study Block	Video Ta	_	Yes V No			53b. Spec	dal S	tudy Block					
54. Namative Description (Be si	Video Us		Yes √ No n separate sheet		can/i								
USERS AGE UNKNOWN, TRAIN STRU													
55. Typed Name and Title NOTE: This report is part of the rep	orting railro	ad's accide	nt report oursus		gnature		tatut	e and, as such	h shall not	"be admitte	57. Date ed as evide		/ purpose
in any suit or action for damages gr													- Post

FORM FRA F 6180.57 (Rev. 08/10) *NOTE THAT ALL CASUALTIES MUST BE REPORTED ON FORM FRA F 6180.55A OMB Approval expires 6/30/2021



APPENDIX E. RAIL CROSSING RISK REGISTER AND MENU OF COSTS

Risk Crit	eria				
Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
Very High	> 20%	> 20%	> 20%		
High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
BNSF - SOUTH KALAMATH STREET	30	3	1	33%	50%	42%	Action	1. Near Term	Extend median, add pavement markings on all quadrants, add warning lights, blank-out signs, relocate signs, raise curb, and repair asphalt.
RTDC - QUEBEC STREET SOUTHBOUND FRONTAGE ROAD	40	2	2	25%	10%	18%	Action	1. Near Term	Add pavement markings, move traffic signal to the north side of the rail crossing, add fencing, and add preemption to traffic signal at crossing.
BNSF - SOUTH SANTA FE DRIVE	30	2	3	23%	155%	89%	Action	1. Near Term	Extend median, add pavement markings on all quadrants, add warning lights, blank-out signs, no-right turn signs, relocate signs, raise curb, and repair asphalt.
UPRR - HOLLY STREET	10	2	4	20%	0%	10%	Action	1. Near Term	Add pavement markings on main street as well as on the industry road, add warning lights, blank-out signs, relocate signs, raise curb, repair asphalt, and a two-quadrant gate system.
BNSF - DAHLIA STREET NORTH OF 51ST STREET	10	1	5	10%	0%	5%	Opportunity	3. Mid-Term	Add pavement markings, add warning lights, add two-quadrant gate system.
BNSF - ALAMEDA AVENUE	10	1	6	4%	1%	3%	Opportunity	3. Mid-Term	Add four quadrant gates, add median, add pavement markings, add warning lights and bells, add pedestrian gates, and ROW fencing.
UPRR - MONACO STREET	10	1	7	4%	0%	2%	Opportunity	3. Mid-Term	Add pavement markings, add warning lights, add two-quadrant gate system.

,	Risk Crite	eria				
	Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
	Very High	> 20%	> 20%	> 20%		
	High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
	Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
	Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
	Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
BNSF – WEST MISSISSIPPI AVENUE	10	1	8	3%	0%	2%	Opportunity	3. Mid-Term	Add median, add pavement markings on all quadrants, add warning lights, blankout signs, no-right turn signs, relocate signs, raise curb, repair asphalt, and a two-quadrant gate system.
BNSF – EAST 48TH AVENUE AT ASH STREET	10	1	9	3%	0%	2%	Opportunity	3. Mid-Term	Add median, add pavement markings on all quadrants, add warning lights, blankout signs, no-right turn signs, relocate signs, raise curb, repair asphalt, and a two-quadrant gate system.
BNSF - 48TH AVENUE, WEST OF FOREST STREET	10	1	10	3%	0%	1%	Opportunity	3. Mid-Term	Add two quadrant gates, pavement markings, warning lights, and signage.
BNSF – EAST 50TH AVENUE	10	1	11	3%	0%	1%	Opportunity	3. Mid-Term	Add two quadrant gates, pavement markings, warning lights, and signage.
UPRR – EAST 47TH AVENUE AND YORK STREET	20	1	12	2%	7%	4%	Opportunity	3. Mid-Term	Add four quadrant gates, fencing along ROW, Wrong-Way sign on York Ln., extend median, add pavement markings, add warning lights, add pedestrian gate, and relocate signs.
RTDC - QUEBEC STREET NORTHBOUND FRONTAGE ROAD	40	0	13	7%	10%	9%	Decision	2. Far-Term	Add: 4 quad
UPRR - SANTA FE DRIVE	25	0	14	4%	5%	4%	Opportunity	3. Far-Term	Add: 4 quad
BNSF - WEST 13TH AVENUE	30	0	15	4%	28%	16%	Concern	1. Near Term	Add: 4 quad

Risk Crite	eria				
Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
Very High	> 20%	> 20%	> 20%		
High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
UPRR - KALAMATH STREET	10	0	16	4%	3%	3%	Opportunity	3. Far-Term	Add: 4 quad
UPRR - BRIGHTON BOULEVARD	10	0	17	3%	5%	4%	Opportunity	3. Far-Term	Add: Flashing lights
BNSF - WALNUT STREET	20	0	18	3%	7%	5%	Opportunity	3. Far-Term	Add: 4 quad
BNSF - WEST BAYAUD AVENUE	30	0	19	3%	7%	5%	Opportunity	3. Far-Term	Add: 4 quad
UPRR - WEST 1ST AVENUE	10	0	20	3%	2%	2%	Opportunity	3. Far-Term	Add: 4 quad
UPRR - WEST 3RD AVENUE	10	0	21	3%	1%	2%	Opportunity	3. Far-Term	Add: 4 quad
UPRR - IRONTON STREET	10	0	22	2%	11%	7%	Opportunity	2. Mid-Term	Add: Flashing lights
UPRR - BRIGHTON BOULEVARD	10	0	23	2%	5%	3%	Opportunity	3. Far-Term	Add: Flashing lights
UPRR - BRIGHTON BOULEVARD	10	0	24	2%	5%	3%	Opportunity	3. Far-Term	Add: Flashing lights
UPRR - 47TH AVENUE	10	0	25	2%	10%	6%	Opportunity	3. Far-Term	Add: Flashing lights
BNSF – WEST COLFAX AVENUE	30	0	26	2%	2%	2%	Opportunity	3. Far-Term	Add: 4 quad

,	Risk Crite	eria				
	Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
	Very High	> 20%	> 20%	> 20%		
	High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
	Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
	Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
	Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
UPRR - HAVANA STREET	10	0	27	2%	9%	6%	Opportunity	3. Far-Term	Add: Flashing lights
UPRR - 47TH AVENUE	10	0	28	2%	8%	5%	Opportunity	3. Far-Term	Add: Flashing lights
UPRR - HAVANA STREET	10	0	29	2%	8%	5%	Opportunity	3. Far-Term	Add: Flashing lights
UPRR - 47TH AVENUE	10	0	30	2%	7%	5%	Opportunity	3. Far-Term	Add: Flashing lights
UPRR - KINGSTON STREET	10	0	31	2%	6%	4%	Opportunity	3. Far-Term	Add: Flashing lights
UPRR - 45TH AVENUE	5	0	32	2%	6%	4%	Opportunity	3. Far-Term	Add: Flashing lights
UPRR - YORK STREET	15	0	33	2%	1%	1%	No Threat	3. Far-Term	None
RTDC - HAVANA STREET	40	0	34	2%	11%	6%	Opportunity	3. Far-Term	Add: 4 quad - 60' medians
UPRR - ONEIDA STREET	10	0	35	2%	3%	2%	Opportunity	3. Far-Term	Add: Flashing lights
UPRR - 36TH STREET	10	0	36	1%	2%	2%	Opportunity	3. Far-Term	Add: Flashing lights
RTDC - MONACO STREET	40	0	37	1%	5%	3%	Opportunity	3. Far-Term	Add: 4 quad - 60' medians

Risk Crite	eria				
Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
Very High	> 20%	> 20%	> 20%		
High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
UPRR - 39TH AVENUE	10	0	38	1%	1%	1%	No Threat	3. Far-Term	None
RTDC - HOLLY STREET	40	0	39	1%	3%	2%	Opportunity	3. Far-Term	Add: 4 quad - 60' medians
RTDC - STEELE STREET	20	0	40	1%	4%	3%	Opportunity	3. Far-Term	Add: 4 quad - 60' medians
RTDC - DAHLIA STREET	40	0	41	1%	9%	5%	Opportunity	3. Far-Term	Add: 4 quad - 60' medians
UPRR - 42ND AVENUE	10	0	42	1%	1%	1%	No Threat	3. Far-Term	None
UPRR - EAST 42ND AVENUE	10	0	43	1%	1%	1%	No Threat	3. Far-Term	None
UPRR - 44TH STREET	10	0	44	1%	1%	1%	No Threat	3. Far-Term	None
UPRR - JOSEPHINE STREET	20	0	45	1%	0%	1%	No Threat	3. Far-Term	None

Risk Crit	eria				
Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
Very High	> 20%	> 20%	> 20%		
High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
RTDC - ULSTER STREET	40	0	46	1%	1%	1%	No Threat	3. Far-Term	None
BNSF - EVANS AVENUE	10	0	47	1%	0%	1%	No Threat	3. Far-Term	None
UPRR - 46TH AVENUE	10	0	48	1%	1%	1%	No Threat	3. Far-Term	None
RTDC - CLAYTON STREET	20	0	49	1%	1%	1%	No Threat	3. Far-Term	None
UPRR - SANDOWN ROAD	10	0	50	1%	0%	1%	No Threat	3. Far-Term	None
UPRR - KALAMATH STREET	10	0	51	1%	1%	1%	No Threat	3. Far-Term	None
UPRR - KEARNEY STREET	10	0	52	1%	1%	1%	No Threat	3. Far-Term	None

Risk Crite	eria				
Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
Very High	> 20%	> 20%	> 20%		
High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
BNSF - W FLORIDA AVENUE	10	0	53	1%	0%	1%	No Threat	3. Far-Term	None
UPRR - EAST 47TH AVENUE	10	0	54	1%	0%	0%	No Threat	3. Far-Term	None
UPRR - LIMA STREET	10	0	55	1%	1%	1%	No Threat	3. Far-Term	None
UPRR - SANDOWN ROAD	10	0	56	1%	0%	1%	No Threat	3. Far-Term	None
UPRR - 51ST AVENUE	10	0	57	1%	1%	1%	No Threat	3. Far-Term	None
BNSF - JEWELL AVENUE	10	0	58	1%	0%	0%	No Threat	3. Far-Term	None
UPRR - DENARGO STREET	10	0	59	1%	0%	1%	No Threat	3. Far-Term	None

Risk Crit	eria				
Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
Very High	> 20%	> 20%	> 20%		
High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
UPRR - JASON STREET	10	0	60	1%	0%	0%	No Threat	3. Far-Term	None
UPRR - 37TH AVENUE	10	0	61	1%	0%	0%	No Threat	3. Far-Term	None
BNSF - DAHLIA STREET AT 47TH AVENUE	10	0	62	1%	0%	1%	No Threat	3. Far-Term	None
UPRR - EAST 53RD AVENUE	10	0	63	1%	0%	0%	No Threat	3. Far-Term	None
UPRR - EAST 45TH AVENUE	10	0	64	1%	0%	0%	No Threat	3. Far-Term	None
BNSF - JASON STREET NORTH OF MISSISSIPPI AVENUE	10	0	65	1%	0%	0%	No Threat	3. Far-Term	None
UPRR - EAST 53RD AVENUE	10	0	66	1%	0%	0%	No Threat	3. Far-Term	None

Risk Crite	eria				
Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
Very High	> 20%	> 20%	> 20%		
High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
UPRR - MOLINE STREET	10	0	67	1%	0%	0%	No Threat	3. Far-Term	None
UPRR - 45TH AVENUE	10	0	68	1%	0%	0%	No Threat	3. Far-Term	None
UPRR - EAST 37TH AVENUE	10	0	69	1%	0%	0%	No Threat	3. Far-Term	None
UPRR - 37TH AVENUE	10	0	70	1%	0%	0%	No Threat	3. Far-Term	None
UPRR - EAST 45TH AVENUE	10	0	71	1%	0%	0%	No Threat	3. Far-Term	None
UPRR - JOLIET STREET	10	0	72	1%	0%	0%	No Threat	3. Far-Term	None
UPRR - EAST 55TH AVENUE	10	0	73	1%	0%	0%	No Threat	3. Far-Term	None

,	Risk Crite	eria				
	Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
	Very High	> 20%	> 20%	> 20%		
	High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
	Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
	Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
	Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
BNSF - COLORADO BOULEVARD SOUTH OF 50TH AVENUE	10	0	74	0%	1%	0%	No Threat	3. Far-Term	None
BNSF - WARNER PLACE	10	0	75	0%	0%	0%	No Threat	3. Far-Term	None
UPRR - EAST 40TH AVENUE	10	0	76	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - WASHINGTON STREET	10	0	77	0%	0%	0%	No Threat	3. Far-Term	None
BNSF – BROADWAY -AT EAST 48TH AVENUE	10	0	78	0%	0%	0%	No Threat	3. Far-Term	None
UPRR - QUEBEC STREET FRONTAGE	10	0	79	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - UMATILLA NORTH OF 13TH AVENUE	10	0	80	0%	0%	0%	No Threat	3. Far-Term	None

,	Risk Crite	eria				
	Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
	Very High	> 20%	> 20%	> 20%		
	High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
	Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
	Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
	Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
BNSF - LOUISANA EAST OF LIPAN STREET	10	0	81	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - 51ST EAST OF LOGAN STREET	10	0	82	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - WEST BAYAUD AVENUE	10	0	83	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - WEST NEVADA PLACE	10	0	84	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - WEST ALASKA PLACE	10	0	85	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - WEST CUSTER PLACE	10	0	86	0%	0%	0%	No Threat	3. Far-Term	None
UPRR - EAST 53RD AVENUE	10	0	87	0%	0%	0%	No Threat	3. Far-Term	None

Risk Crit	eria				
Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
Very High	> 20%	> 20%	> 20%		
High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
BNSF - FOREST STREET NORTH OF E	10	0	88	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - LIPAN STREET VIRGINIA AVENUE	10	0	89	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - BYERS PLACE NAVAJO STREET	10	0	90	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - LINCOLN STREET NORTH	10	0	91	0%	0%	0%	No Threat	3. Far-Term	None
UPRR - EAST 55TH AVENUE	10	0	92	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - 50TH AVENUE AT EUDORA STREET	10	0	93	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - WEST MAPLE AVENUE	10	0	94	0%	0%	0%	No Threat	3. Far-Term	None

Risk Crite	eria				
Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
Very High	> 20%	> 20%	> 20%		
High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	Time Horizon	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
UPRR - SHOSHONE STREET	10	0	95	0%	0%	0%	No Threat	3. Far-Term	None
UPRR - RIO COURT	10	0	96	0%	0%	0%	No Threat	3. Far-Term	None
UPRR - EAST 53RD AVENUE	10	0	97	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - NATIONAL WESTERN DRIVE	10	0	98	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - 50TH AVENUE WEST OF ASH STREET	10	0	99	0%	0%	0%	No Threat	3. Far-Term	None
UPRR - EAST 49TH AVENUE	10	0	100	0%	0%	0%	No Threat	3. Far-Term	None
UPRR - EAST 35TH PLACE	10	0	101	0%	0%	0%	No Threat	3. Far-Term	None

Risk Crite	eria				
Rating Rank	GradeDec Rating	CDOT Rating	Haz Index Rating		
Very High	> 20%	> 20%	> 20%		
High	14% - 20%	14% - 20%	14% - 20%	Time Horizon	
Medium	8% - 13%	8% - 13%	8% - 13%	Near Term	< 1 Year
Low	2% - 7%	2% - 7%	2% - 7%	Mid Term	1 - 5 Years
Very Low	<= 1%	<= 1%	<= 1%	Far Term	> 5 Years

Crossing Location	Speeds	Accidents	Top Risks Rank	GradeDec Incident Rating	CDOT Hazard Rating	Average Hazard Index Rating	Risk Type	I IIMA HARIZAN	Risk Response Plan (Mitigation Strategy) Short Term (What can we do here and now?)
BNSF - 48TH AVENUE WEST OF MONROE STREET	10	0	102	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - EAST 50TH AVENUE	10	0	103	0%	0%	0%	No Threat	3. Far-Term	None
BNSF - EAST 50TH AVENUE	10	0	104	0%	0%	0%	No Threat	3. Far-Term	None

Source: HNTB, 2023

Note: Data was compiled from information collected from the FRA GradeDec.Net analysis

High-Level Estimated Crossing Improvement Costs

TRAFFIC CONTROL SYSTEMS			
Audible / Visual Warnings			
"No Left Turn" Signal	LS	S	20,000
Warning Lights	LS	\$	25,000
Relocate bells lower on cantilever	LS	S	20,000
Blank Out Sign	LS	S	5,000
Exit Signals / Gate	EA	S	175,000
Pre-Signals / Queue-Cutter Signals	EA	S	125,000
Preemption	N/A	Locat	ion Specific
Detection	N/A	Locat	ion Specific

SITE IMPROVEMENTS			
Remove Obstructions			
Trim & Maintain Vegetation	LS	\$	5,000
Remove/lower platform wall	LS	\$	20,000
Crossing Geometry			
Realign Intersection	LS	5	1,500,000
Roadway Pavement Repair / Resurface			
Reprofile Road Crossing	LS		\$120,000
Resurface Roadway/restripe	LS	\$	220,000
Replace/raise curb/repair asphalt	LS	\$	30,000
Pedestrian Pavement Repair / Resurface			
Widen walkway	LS	\$	25,000
Minor grading	LS	5	20,000
Replace track panel rubber filler / Patch asphalt voids	LS	\$	10,000
Add tactile warning mats/strips	LS	\$	5,000
Illumination			
Add Street Lights	LS	\$	20,000
Safety Barriers			
SGL TK Approach Embankment w/Retaining Wall-High Impact Barrier	LF	\$	5,129
DBL TK Embankment w/Retaining Wall-High Impact Barrier	LF	\$	9,424
Extend Median	LS	\$	25,000

SITE IMPROVEMENTS		9	
Signage & Striping			
Add pavement markings	LS	\$	10,000
Add pavement striping	LS	\$	10,000
Add signs	LS	\$	5,000
Add convex mirror	LS	\$	5,000
Remove pavement striping/marking	LS	5	5,000
Relocate signs	LS	\$	5,000
Add Wayfinding Signage	LS	\$	5,000
Remove platform tactile warning strip & add curb	LS	\$	20,000
Add HiViz LED Crosswalk Lighting	LS	\$	25,000
Fencing / Railing / Channelization			
Extend/Add cable/picket fencing	LS	\$	8,000
Add "No Pedestrian" tubular railing	LS	\$	5,000
Upgrade pedestrian channelization railing	LS	\$	50,000
Intertrack Fencing / ROW Fencing	LF	\$	25
Pedestrian Gates with Emergency Exit Gates	PAIR	\$	50,000
Driveway Closures	Ŋ/A	Ş	,,

OTHER STRATEGIES / METHODS TO ENHANCE SAFETY	4	
Upgrade to Quiet Zone Ready	LS	\$ 750,000
Grade Crossing Closure	LS	\$ 125,000

- Minor crossing upgrades \$175,000 (est.)
- Full Grade Separation \$100m (est.)
- Crash Barrier Protection (per 100') \$5,130 (per LF) (est.)
- Track Separation (Trench) \$2.5b (per 20-mile, est.)



APPENDIX F. DENVER TRESPASSING RECORDS



Incident Date	Railroad	Age Group	CASFATAL	Railroad Class	AM/ PM	Event	Injury	NARR1	phyactdesc	LATITUDE	LONGITUDE
4/18/2021	UP	20-29	Non-Fatal	Class 1	PM	Assaulted by other	Cut/laceration/abrasion, injuries to multiple body part of relatively equal severity.		Walking	39.803849	-104.962583
3/20/2021	RTDC	Unknown	Fatal	Class 3	AM	Struck by on- track equipment	to multiple body part of	SOUTHBOUND TRAIN 4051/52, 4061/62, TRIP 244, STRUCK AND FATALLY INJURED A TRESPASSER JUST NORTH OF THE NORTHBOUND QUEBEC STREET CROSSINGON TRACK 2, MP 5.9. CASE CURRENTLY UNDER INVESTIGATION. AGE UNKNOWN	Standing	39.771819	-104.90207
1/17/2021	UP	30-39	Fatal	Class 1	PM	Aggravated pre- existing condition	Fatally injured, internal injuries.		Laying	39.737787	-105.010188
12/2/2020	UP	40-59	Fatal	Class 1	AM	Aggravated pre- existing condition	Fatally injured, internal injuries.		Lying down	39.71438	-104.99926
9/26/2020	RTDC	40-59	Fatal	Class 3	AM	Struck by on- track equipment		SOUTHBOUND TRAIN 4003/04, 4029/30, TRIP 114 STRUCK AND FATALLY INJURED A TRESPASSER UNDER THE SAND CREEK BRIDGE, MP 6.74. CASE CURRENTLY UNDER INVESTIGATION.	Lying down	39.77132	-104.88564
8/15/2020	BNSF	40-59	Fatal	Class 1	AM	Stabbing, knifing, etc.	Fatally injured, injuries to multiple body part of relatively equal severity.	TRESPASSER STABBED BNSF POLICE OFFICER WITH A KNIFE. TRESPASSER WAS FATALLY INJURED.	Using, other	39.778551	-104.976865
6/26/2020	RTDC	60+	Fatal	Class 3	PM	Highway-rail collision/impact	to multiple body part of	INDIVIDUAL RODE BICYCLE AROUND CROSSING WARNING DEVICES INTO ACTIVE CROSSING AND WAS STRUCK BY NORTHBOUND TRAIN 4058/57, 4020/19, TRIP 185. INDIVIDUAL AGE IS UNKNOWN.	Riding	39.772035	-104.903477
4/6/2020	RTDC	60+	Non-Fatal	Class 3	AM	Slipped, fell, stumbled, other	Bruise/contusion, injuries to multiple body part of relatively equal severity.	TRESPASSER CLIMBED ONTO THE OUTSIDE OF THE END OF SOUTHBOUND TRAIN 4014 AND FELL OFF WHILE THE TRAIN WAS TRAVELLING.	Standing	39.771876	-104.902321
1/13/2020	UP	30-39	Non-Fatal	Class 1	AM	Rubbed, abraded, etc.	Cut/laceration/abrasion, hand.		Standing	39.769262	-104.975984
10/12/2019	RTDZ	40-59	Fatal	Class 3	AM	Struck by on- track equipment	Fatally injured, unspecified	PEDESTRIAN/TRESPASSER ASSISTING IN PUSHING/PULLING GROCERY CART OVER CROSSING/TRACKS; CART BECAME STUCK ON UP TRACKS WHEN DEVICES ACTIVATED. ONE TRESPASSER EXITED TO WEST, THE FATALITY RAN TO THE EAST AND IN FRONT OF THE LIGHT-RAIL TRAIN. DOA BY DENVER PARAMEDICS.	Jumping onto	39.7147	-104.9968
10/7/2019	RTDC	Unknown	Non-Fatal	Class 3	PM	due to contact	injuries to multiple body	INDIVIDUAL (AGE UNKNOWN) WAS WASHING WINDOWS FOR ADJACENT BUILDING WHEN THE EXTENSION POLE HE WAS US ING MADE CONTACT WITH THE OVERHEAD CATENARY SYSTEM.	~	39.753429	-105.00048
5/28/2019	BNSF	20-29	Non-Fatal	Class 1	AM	Struck by on- track equipment	Amputation, toes.	TRESPASSER WAS INJURED WHEN STRUCK BY TRAIN.	Laying	39.767439	-104.991391

Incident Date	Railroad	Age Group	CASFATAL	Railroad Class	AM/ PM	Event	Injury	NARR1	phyactdesc	LATITUDE	LONGITUDE
2/6/2019	RTDC	13-19	Fatal	Class 3	AM	Struck by on- track equipment	to multiple body part of	NORTHBOUND TRAIN 4019/20, 4027/28, TRIP 243, STRUCK AND FATALLY INJURED A TRESPASSER JUST NORTH OF THE SOUTHBOUND QUEBEC STREET CROSSING ON THE QUEBEC STREET BRIDGE, MP 5.85. CASE CURRENTLY UNDER INVESTIGATION.	Lying down	39.771937	-104.902634
9/1/2018	UP	20-29	Non-Fatal	Class 1	PM	Lost balance	Cut/laceration/abrasion, injuries to multiple body part of relatively equal severity.		Climbing over/on	39.771409	-104.973419
7/11/2018	BNSF	13-19	Non-Fatal	Class 1	AM	Struck by on- track equipment	Crushing injury, hips/buttocks/pelvis.	TRESPASSER WAS INJURED AFTER CRAWLING UNDER THE TRAIN.	Crossing or crawling under	39.690422	-104.989674
3/23/2018	UP	40-59	Non-Fatal	Class 1	PM	Caught, crushed, pinched, other.	Crushing injury, lower leg.		Walking	39.764965	-104.98379
11/18/2017	RTDC	60+	Non-Fatal	Class 3	PM	Struck by on- track equipment	Amputation, thumb/finger.	INDIVIDUAL WAS AN ELDERLY FEMALE SUFFERING FROM ALZEIMERS AND DEMENTIA WHO WANDERED AWAY FROM HER CAR.	Laying	39.847466	-104.673781
10/29/2017	RTDC	Unknown	Non-Fatal	Class 3	AM	Slipped, fell, stumbled, other	Cut/laceration/abrasion, knee.	TRESPASSER TRIPPED ON RAIL CAUSING HIM TO FALL AND SCRAPE HIS KNEES. TRESPASSER WAS TAKEN TO DENVER	Walking	39.753429	-105.00048
5/5/2017	RTDC	13-19	Non-Fatal	Class 3	AM	Struck by on- track equipment	Fracture, skull/scalp.		Sitting	39.768669	-104.976657
2/27/2017	UP	20-29	Non-Fatal	Class 1	PM	Bitten by animal	Animal/snake/insect bite, external injuries.		Arresting/ apprehending/ subduing	39.76925	-104.97648
11/6/2016	BNSF	40-59	Non-Fatal	Class 1	PM	Slipped, fell, stumbled, other	Fracture, lower leg.		Climbing over/on	39.755765	-105.003186
10/2/2016	BNSF	40-59	Non-Fatal	Class 1	PM	Slipped, fell, stumbled, other	Cut/laceration/abrasion, skull/scalp.		Climbing over/on	39.76842	-104.990051
9/25/2016	BNSF	20-29	Fatal	Class 1	AM	Struck by on- track equipment	Fatally injured, injuries to multiple body part of relatively equal severity.		Laying	39.824618	-105.032857
9/13/2016	BNSF	20-29	Fatal	Class 1	AM	Struck by on- track equipment	Fatally injured, injuries to multiple body part of relatively equal severity.		Laying	39.701489	-104.990871
6/3/2016	BNSF	40-59	Non-Fatal	Class 1	PM	Struck by on- track equipment	Bruise/contusion, elbow.		Sitting	39.746895	-105.01354
2/9/2016	BNSF	20-29	Fatal	Class 1	PM	Slipped, fell, stumbled, other	Fatally injured, injuries to multiple body part of relatively equal severity.		Jumping from	39.747813	-105.012124



APPENDIX G. RAIL EQUIPMENT ACCIDENTS



INCDTNO	YR	MTH	DY	HR	MIN	AMPM	CARSHZD	TRNSPD	TYPSPD	RAILROAD	SUBDIV	MILEPOST	NARR1
PR0322103	22	3	6	3	0	AM	0	3	E	BNSF	BRUSH	541.3	Y-DEN5131-05 DERAILED 1 LOCOMOTIVE WHILE OPERATING LIGHT LOCOMOTIVES IN YARD TRACK 317 DUE TO FAILURE TO CONTROL SHOVE MOVE IN TURN RUNNING OVER A DERAIL. NO HAZARDOUS MATERIALS WERE RELEASED.
PR0222118	22	2	21	2	15	PM	0	4	Е	BNSF	BRUSH	540.4	Y-DEN1031-21 DERAILED 5 RAILCARS WHILE PULLING OUT OF YARD TRACK 138 DUE TO OVERLOADED RAILCAR WITHSCRAP METAL FALLING FROM RAILCAR. NO HAZARDOUS MATERIALS WERE RELEASED.
PR0222115	22	2	18	5	30	PM	0	4	E	BNSF	BRUSH	541.3	Y-DEN1012-18 IMPACTED THE E-CRDSCM0-03 WHILE SHOVING YARD TRACK 541 DUE TO FAILURE TO CONTROL SHOVEMOVEMENT AND RADIO COMMUNICATION FAILURE TO COMPLY. CAR COUNTS DID NOT STOP MOVEMENT PRIOR TO IMPACT. RESULTED IN A TOTAL OF 5 RAILCARS DERAILED. NO HAZARDOUS MATERIALS WERE RELEASED.
PR0222115	22	2	18	5	30	PM	0	10	E	BNSF	BRUSH	541.3	Y-DEN1012-18 IMPACTED THE E-CRDSCM0-03 WHILE SHOVING YARD TRACK 541 DUE TO FAILURE TO CONTROL SHOVEMOVEMENT AND RADIO COMMUNICATION FAILURE TO COMPLY. CAR COUNTS DID NOT STOP MOVEMENT PRIOR TO IMPACT. RESULTED IN A TOTAL OF 5 RAILCARS DERAILED. NO HAZARDOUS MATERIALS WERE RELEASED.
PR0222114	22	2	18	4	35	AM	0	3	E	BNSF	BRUSH	540.3	Y-DEN3031-17 DERAILED 6 RAILCARS WHILE PULLING IN YARD TRACK 104 DUE TO TRACK WIDE GAGE DUE TO WORNRAILS. NO HAZARDOUS MATERIALS WERE RELEASED.
PR0222108	22	2	12	7	22	AM	0	4	E	BNSF	FRONT RANGE	0.8	H-DENLAU1-11 DERAILED 7 RAILCARS WHILE SHOVING YARD TRACK 323 DUE TO EXCESSIVE LATERAL DRAWBAR FORCEON A CURVE. NO HAZARDOUS MATERIALS WERE RELEASED.
1121GP032	21	11	17	7	8	PM	0	7	R	UP	MOFFAT TUNNEL SUB	3.02	YDV71-R ESTABLISHED A RCL ZONE ON THE NORTH END OF THE YARD ZONE 2, 2B AND 3 AT 1845 AND WAS SWITCHING ON THE NORTH END OF NORTH YARD AFTER SETTING OUT A SINGLE CAR INTO TRACK 13. THE CREW THEN WENTINTO TRACK 17 THINKING THAT THEY WERE LINED INTO THEIR ZONE. CREW PULLED OUT 22 LOADS AND 4 EMPTIES. THE YDV71R WAS LINED TOWARDS THE NORTH LEAD INSTEAD OF INTO ZONE, SO ONCE CREW PULLED NORTH, THEYRAN THRU THE HIGH STAND SWITCH NEXT TO 37 BLOCK AND FAILED TO CONTROL THEIR TRAIN IN ACCORDANCE WITHSIGNAL INDICATION (RUNNING A RED BLOCK). WHEN THE CREW STARTED THEIR SHOVE, DERAILING 3 CARS AS ARESULT OF THE RUN THRU SWITCH.
0321GP007	21	3	6	5	45	AM	0	3	E	UP	MOFFAT TUNNEL SUB	3.22	MNYGR-06 CREW WAS GOING TO PUT THEIR POWER ON THEIR TRAIN. WHILE TRAVERSING THE NUMBER 4 SWITCH AT THE NORTH END, THE SWITCH MOVED UNDER THE LOCOMOTIVE RESULTING IN THE REAR OF THE LOCOMOTIVE UP7845 STARTING TO GO DOWN ANOTHER TRACK, AND DERAILING.
1220ME019	20	12	29	8	21	AM	0	5	E	UP	MOFFAT TUNNEL SUB	2.29	WHILE MOVING LOCOMOTIVES INSIDE THE CIRCLE AT NORTH YARD, TWO LOCOMOTIVES DERAILED WHILE MOVING OVERA BROKEN SWITCH POINT.
PR0920108	20	9	17	3	15	PM	0	1	E	BNSF	FRONT RANGE	0.6	Y-DEN0311-17 DERAILED 5 RAILCARS WHILE SHOVING YARD TRACK 354 DUE TO TOO RAPID ADJUSTMENT OF THROTTLE POWER. NO HAZARDOUS MATERIALS WERE RELEASED.
0920GP014	20	9	16	2	16	PM	0	8	E	UP	MOFFAT TUNNEL SUB	2.9	LDV08-16, AFTER CLEARING FIVE CROSSOVERS, THE CREW WALKED THE AIR TEST FROM THE REAR TO HEAD END ONBOTH SIDES OF THE TRAIN. ONCE THE AIR TEST WAS COMPLETED, THEY DEPARTED NORTH, ONTO DENVER BELTLINE. THE TRAIN TRAVELED APPROXIMATELY 1,388 FEET, WHEN THE TRAIN WENT INTO THE EMERGENCY, DERAILING THE BNSF490482 AND THE BNGX31136. THE CAUSE OF THE DERAILMENT WAS DETERMINED TO BE A MECHANICAL BLUEFLAG THAT HAD WEDGED UNDERNEATH AND CAUSED THE CARS TO LEAVE THE RAIL.
0720GP033	20	7	9	9	30	AM	1	5	E	UP	BRUSH BNSF	537.65	UP TRANSFER JOB YDV22-09 WAS PULLING INTO BNSF TRACK 146 AND DERAILED 6 RAILCARS DUE TO BROKEN RAIL.ASPHALT WAS RELEASED FROM ONE OF THE CARS. BNSF REPORTED \$35,000 IN TRACK DAMAGE. CAR#: CTCX 207857 ASPHALT, 20,000 GAL.
PR0720102	20	7	9	9	30	AM	0	0		BNSF	BRUSH	540.6	FOREIGN TRAIN F-TUPBN1-09 DERAILED 6 RAILCARS WHILE PULLING INTO YARD TRACK 146 DUE TO TRACK BROKENRAIL. APPROXIMATELY 20,000 GALLONS OF ASPHALT WAS RELEASED FROM 1 RAILCAR.
0620GP016	20	6	18	6	26	AM	0	2	R	UP	MOFFAT TUNNEL SUB	2.45	MNYGR-18 WAS SHOVING THEIR POWER WESTWARD ON THE SOUTH LEG OF THE WYE. TWO UNITS PASSED POD WHEN THE THIRD UNIT DERAILED AXLE 5 AND 6. APPROXIMATELY A FOOT PRIOR TO THE POD HAD BROKEN RAIL.
PR0620106	20	6	13	11	30	PM	0	1	E	BNSF	BRUSH	541.1	H-DENPUE1-13 DERAILED 9 RAILCARS WHILE SHOVING YARD TRACK 2005 DUE TO TRACK WIDE GAGE. NO HAZARDOUS MATERIALS WERE RELEASED.
PR0520113	20	5	21	6	0	PM	0	5	R	BNSF	BRUSH	540.8	Y-DEN2071-21 DERAILED 6 RAILCARS WHILE SHOVING YARD TRACK 132. NO HAZARDOUS MATERIALS WERE RELEASED. CAUSE WAS DETERMINED TO BE EXCESSIVE COUPLING SPEED.

INCDTNO	YR	MTH	DY	HR	MIN	AMPM	CARSHZD	TRNSPD	TYPSPD	RAILROAD	SUBDIV	MILEPOST	NARR1
0420GP031	20	4	28	5	13	PM	0	5	Е	UP	MOFFAT TUNNEL SUB	3.1	YDV21-28, AFTER DOUBLING 12 TRACK WITH 36 CARS TO 18 TRACK, PULLED PAST 37 BLOCK AND LINED THE SWITCH FOR THEIR MOVEMENT TOWARDS THE LOW SIDE OF TRACKS. THE FOREMAN WALKED TO THE CLEARANCE CONE AT THE NORTH END OF 2 TRACK, AND THE BRAKEMAN GOT A RIDE TO THE SOUTH END OF 2 TRACK TO PROTECT THE SHOVE. THE REAR CAR WAS A LOADED LUMBER FLAT THAT WAS NOT RIDEABLE. THE FOREMAN STARTED THE SHOVE INTO 2 TRACK AND THE BRAKEMAN TOOK OVER ONCE THE CARS WERE IN 2 TRACK. AT APPROXIMATELY 1713, WHEN THE BRAKEMAN GAVE A 15 CAR COUNT, THE FOREMAN NOTICED THE CARS HAD DERAILED AND IMMEDIATELY TOLD THEIR ENGINEER TO STOP. AFTER INVESTIGATING, IT HAS BEEN DETERMINED THE CAUSE OF THE DERAILMENT WAS A BOLTSTUCK IN THE MIDDLE OF THE FROG THAT SPLITS TRACKS 1, 2, 3 AND 4, 5, 6, 7 ON THE NORTH END. A TOTALOF 5 EMPTY RAILCARS DERAILED.
0420GP010	20	4	8	7	18	PM	0	9	R	UP	MOFFAT TUNNEL SUB	3.15	YDV21-08, LEAD LOCOMOTIVE UP1510, WAS SHOVING A CUT OF CARS INTO ONE TRACK. CARS 9 - 12 FROM NORTHEND DERAILED ON FROG AND GUARD RAIL. DERAILMENT DAMAGED LEAD FROM 1 THROUGH 7 TRACKS. 1 DRUG POSITIVE - NOT DETERMINED TO BE A CAUSAL FACTOR.
PR0320115	20	3	28	9	15	AM	0	9	R	BNSF	DENVER ROCK ISLAND	0.5	Y-DEN3051-27 DERAILED 6 RAILCARS WHILE PULLING INTO FOREIGN YARD TRACK 1 DUE TO TRACK DEFECTIVE OR MISSING CROSSTIES. NO HAZARDOUS MATERIALS WERE RELEASED.
3282002	20	3	28	9	15	AM	0	0		DRIR	STOCKYARDS	0.1	THE BNSF CREW WAS PULLING THE DRIR OUT BOUND BACK TO THEIR YARD WHEN THEY DERAILED 6 CARS. THE CREWWAS PULLING THE CARS TO THE SINGLE POINT DERAIL AND STOPPED ONLY USING THE BRAKES OF THE LOCOMOTIVETO DROP THE CONDUCTOR THERE TO CLOSE AFTER PASSING WHICH CAUSED THE CARS TO ABRUPTLY BANG INTO EACHOTHER CLOSING THE SLACK FROM ALL THE DRAFT GEARS OF THE CARS. THE POINT OF DERAILMENT WAS CLOSE TOMID CONSIST WHERE THE HIGH SIDE RAIL WAS ROLLED DUE TO THE LOADED CARS BANGING TOGETHER, THEY THEN PULLED AHEAD FOR 250+- FT WITH THE WHEELS OF THE LOCOMOTIVE SPINNING AS THERE ARE MARKS TO PROVE IT ALONG WITH SAND ON THE RAIL.
PR1219106	19	12	12	7	30	PM	0	4	E	BNSF	FRONT RANGE	2.3	RCO Y-DEN2012-12 DERAILED 1 RAILCAR WHILE INTO YARD TRACK 209 DUE TO TRACK SWITCH POINT GAPPED. NO HAZARDOUS MATERIALS WERE RELEASED.
PR0819111	19	8	27	7	0	AM	0	7	Е	BNSF	BRUSH	540.9	Y-DEN3051-26 DERAILED 3 RAILCARS WHILE SHOVING YARD TRACK 103 DUE TO CROSS LEVEL OF TRACK IRREGULAR.NO HAZARDOUS MATERIALS WERE RELEASED.
0419GP037	19	4	16	11	14	AM	0	4	Е	UP	MOFFAT TUNNEL SUB	2.45	YDV68R-16 TRANSFERRED ZONE TO THE YDV72R-16 AT 0959. AT APPROXIMATELY 1114 CREW WAS NOTIFIED THEY WERE ON THE GROUND. CREW WALKED UP TO THE HEAD END. THEY HAD ZONE 2, 2A AND 3, AND FOUND A DERAIL SOUTH SIDE OF NUMBER FIVE CROSSOVER INSIDE OF AN ACTIVE ZONE. CREW HAD PREVIOUSLY TRAVERSED THE SWITCHES. TWO ENGINES AND ONE CAR DERAILED.
PR0319104	19	3	14	2	45	AM	0	4	R	BNSF	BRUSH	541.5	K-PUEPUE1-14 DERAILED 2 LOCOMOTIVES WHILE OPERATING LIGHT LOCOMOTIVES IN YARD TRACK 316 DUE TO ICE AND SNOW BUILDUP ON TRACK. NO HAZARDOUS MATERIALS WERE RELEASED.
PR0119120	19	1	22	8	15	PM	0	4	E	BNSF	BRUSH	540.3	RCO Y-DEN2062-22 DERAILED 2 RAILCARS THAT IN TURN IMPACTED A CUT OF RAILCARS IN ADJACENT TRACK WHILESHOVING YARD TRACK 130 DUE TO A SWITCH BEING IMPROPERLY LINED UNDER RAILCARS. NO HAZARDOUS MATERIALS WERE RELEASED.
PR0119120	19	1	22	8	15	PM	0	0	E	BNSF	BRUSH	540.3	RCO Y-DEN2062-22 DERAILED 2 RAILCARS THAT IN TURN IMPACTED A CUT OF RAILCARS IN ADJACENT TRACK WHILESHOVING YARD TRACK 130 DUE TO A SWITCH BEING IMPROPERLY LINED UNDER RAILCARS. NO HAZARDOUS MATERIALS WERE RELEASED.
PR0119103	19	1	2	8	45	PM	0	6	R	BNSF	FRONT RANGE	0.7	Y-DEN2051-02 DERAILED 5 RAILCARS WHILE PULLING INTO YARD TRACK 354 DUE TO EXCESSIVE BUFFERING OR SLACK ACTION. NO HAZARDOUS MATERIALS WERE RELEASED.
1118DV009	18	11	22	9	35	PM	0	2	E	UP	GREELEY SUB	2.63	AFTER FINISHING THEIR SHOVE INTO 802 THE ZLADV-21 LINED UP TO SHOVE 803 WITH THE CONDUCTOR RIDING THE POINT AS THEY WERE SHOVING WITH 4 UNITS AND 4 CARS AND 14 LBS OF AUTOMATIC BRAKES INTO THE TRACK, THE ENGINEER NOTICED HIS SPEED DECLINING AND THROTTLED UP FROM NOTCH 2 TO NOTCH 4, AFTER GETTING A WHEEL SLIP WARNING HE THROTTLED DOWN AND BROUGHT THE TRAIN TO A STOP. THE REAR THREE LOCOMOTIVES AND SUBSEQUENT AUTORACK DERAILED. NO INJURIES.

INCDTNO	YR	MTH	DY	HR	MIN	AMPM	CARSHZD	TRNSPD	TYPSPD	RAILROAD	SUBDIV	MILEPOST	NARR1
0718DV002	18	7	3	3	43	AM	0	0	R	UP	MOFFAT TUNNEL SUB	2.36	YDE36R-02, WAS PULLING OUT OF TRACK 5 AND DERAILED THE LEADING AXLE ON CAR GBRX700009, DUE TO A BROKEN RAIL IN THE TRACK 5 SWITCH. THE CREW PROCEEDED TO SHOVE NORTHWARD INTO TRACK 8, WHICH CAUSED THE REST OF THE AXLES TO DERAIL. 2 ADDITIONAL CARS WHICH STRUCK ON ADJACENT TRACK 3. 1 DRUG POSITIVE NOT DETERMINED TO BE A CAUSAL FACTOR.
0718DV002	18	7	3	3	43	AM	0	8	E	UP	MOFFAT TUNNEL SUB	2.36	YDE36R-02, WAS PULLING OUT OF TRACK 5 AND DERAILED THE LEADING AXLE ON CAR GBRX700009, DUE TO A BROKEN RAIL IN THE TRACK 5 SWITCH. THE CREW PROCEEDED TO SHOVE NORTHWARD INTO TRACK 8, WHICH CAUSED THE REST OF THE AXLES TO DERAIL. 2 ADDITIONAL CARS WHICH STRUCK ON ADJACENT TRACK 3. 1 DRUG POSITIVE NOT DETERMINED TO BE A CAUSAL FACTOR.
0518DV021	18	5	27	4	0	AM	0	5	E	UP	MOFFAT TUNNEL SUB	2.85	YDV25-26 WAS SHOVING 87 CARS INTO TRACK 2 AND HAD TRAVERSED THE CROSSING WHEN 4 CARS DERAILED AND THE MOVE CAME TO A STOP. THE UP5487 WAS ON AN ADJACENT TRACK AND WAS DAMAGED WHEN THE TILX305078 DERAILED.
0518DV021	18	5	27	4	0	AM	0	0	E	UP	MOFFAT TUNNEL SUB	2.85	YDV25-26 WAS SHOVING 87 CARS INTO TRACK 2 AND HAD TRAVERSED THE CROSSING WHEN 4 CARS DERAILED AND THE MOVE CAME TO A STOP. THE UP5487 WAS ON AN ADJACENT TRACK AND WAS DAMAGED WHEN THE TILX305078 DERAILED.
PR0418113	18	4	19	6	5	PM	0	8	R	BNSF	BRUSH	541	Y-DEN1031-19 DERAILED 8 CARS DUE TO IMPROPER TRAIN HANDLING. NO HAZARDOUS MATERIALS WERE RELEASED.
0318DV003	18	3	4	10	30	AM	0	0	E	UP	GREELEY SUB	2.14	YDE22R-04 WAS SWITCHING ON THE SOUTH END OF THE LEAD TRACK AND HAD A HANDLE OF 13 CARS. THEY PROCEEDED INTO TRACK 406, RELEASED THREE CARS, FOLLOWED BY A CUT OF TWO CARS. SPEED WAS 3 MPH, THERE WERE FIVE HANDBRAKES TIED ON THE NORTH END OF TRACK 406, PER SUPERINTENDENT BULLETIN. SUBSEQUENTLY THE YDE54R-04 WAS SWITCHING ON THE NORTH END OF THE YARD IN TRACK 411 AND PULLING NORTH LINED OUT OF THE LEAD THROUGH TRACK 410, WHEN YDE54R-04 WENT INTO EMERGENCY. UPON INSPECTION DISCOVERED THEY WERE STRUCK BY A ROLL OUT FROM TRACK 406. IMPACT OCCURRED WHEN CAR ADMX16956 STRUCK CAR TILX257071, CAUSING A DERAILMENT OF SIX CARS.
0318DV003	18	3	4	10	30	AM	0	3	Е	UP	GREELEY SUB	2.14	YDE22R-04 WAS SWITCHING ON THE SOUTH END OF THE LEAD TRACK AND HAD A HANDLE OF 13 CARS. THEY PROCEEDED INTO TRACK 406, RELEASED THREE CARS, FOLLOWED BY A CUT OF TWO CARS. SPEED WAS 3 MPH, THERE WERE FIVE HANDBRAKES TIED ON THE NORTH END OF TRACK 406, PER SUPERINTENDENT BULLETIN. SUBSEQUENTLY THE YDE54R-04 WAS SWITCHING ON THE NORTH END OF THE YARD IN TRACK 411 AND PULLING NORTH LINED OUT OF THE LEAD THROUGH TRACK 410, WHEN YDE54R-04 WENT INTO EMERGENCY. UPON INSPECTION DISCOVERED THEY WERE STRUCK BY A ROLL OUT FROM TRACK 406. IMPACT OCCURRED WHEN CAR ADMX16956 STRUCK CAR TILX257071, CAUSING A DERAILMENT OF SIX CARS.
PR0118109	18	1	15	3	51	PM	0	5	E	BNSF	BRUSH	540.4	RCO Y-DEN1142-15 DERAILED 4 RAILCARS WHILE PULLING OUT OF YARD TRACK 146 DUE TO BROKEN RAIL. NO HAZARDOUS MATERIALS WERE RELEASED.

HNTB, 2023

Note: Data was compiled from information provided by UPRR and BNSF



APPENDIX H. TIER II FACILITIES



APPENDIX H. TIER II FACILITIES

Table H-1. Tier II Facilities

Name	Address
Thermofluids Denver	4845 Forest Street Denver, CO 80022 USA
General Shale Brick Inc. Plant #60	1845 West Dartmouth Avenue
ChemTrade Solutions	5075 East 50 th . Avenue Denver, CO 80216 USA
Mountain Cement Company	1630 35 th Street Denver, CO 80216 USA
Safeway Denver Milk Plant	4301 Forest Street Denver, CO 80216 USA
Airgas USA LLC	2455 South Platte River Drive Denver, CO 80223 USA
US Mix Co	112 South Santa Fe Drive Denver, CO 80223 USA
AMERICAN BUILDING SUPPLY	5025 Florence Street Unit D Denver, CO 80238 USA
Colorado Salt Products	3910 Joliet Street Denver, CO 80239 USA

Note: See Figure 4-2 for locations of Tier II Facilities in the main document.