Freight Railroad Safety Analysis

LUTI Committee – February 21, 2023

Denver Hazard Mitigation Plan Perspective

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

2022 Denver Hazard Mitigation Goals

Goal 1: Protect people, property, natural resources and reduce economic impacts from identified hazards

Purpose of the Freight Safety Analysis

- Build upon city-wide hazard mitigation efforts
- Build upon prior studies completed by CCD in 2016 and in Calgary, AB in 2019
- Provide guidance to CCD agencies by evaluating risk factors presented by freight railroad operations, particularly those carrying hazardous cargo.
- Develop recommendations for risk mitigation and prevention
- Improve the safety around railroad operations, for facilities that cross or are adjacent to railroad tracks, and for adjacent buildings

Today's Meeting

- Review key findings of the 2023 draft study
- Seek your input on the draft study
- How do we move forward?

Background

Freight Railroad Traffic - Hazardous Materials

2021 Hazardous Material Train Cars

- **4 percent of all freight train cars** in Denver carry hazardous materials
- 38 daily freight trains pass through Denver

Daily	280
Monthly	8,524
Yearly	102,280

Est. 2025 Hazardous Material Train Cars w/ Uinta Basin Rwy

- **14 percent of all freight train cars** in Denver carry hazardous materials
- 45 daily freight trains pass through Denver

Daily	1,061
Monthly	31,954
Yearly	383,440

Rail Accident Statistics

Denver Car-Train Crash
[at Kalamath & Bayaud]

June 20, 2013
Denver Post

Freight Railroad Accidents

How Denver Ranks Vs. Cities of Similar Size*

Total Railroad Accidents/Incidents

*Non-metro city limit populations of 630,000 to 750,000

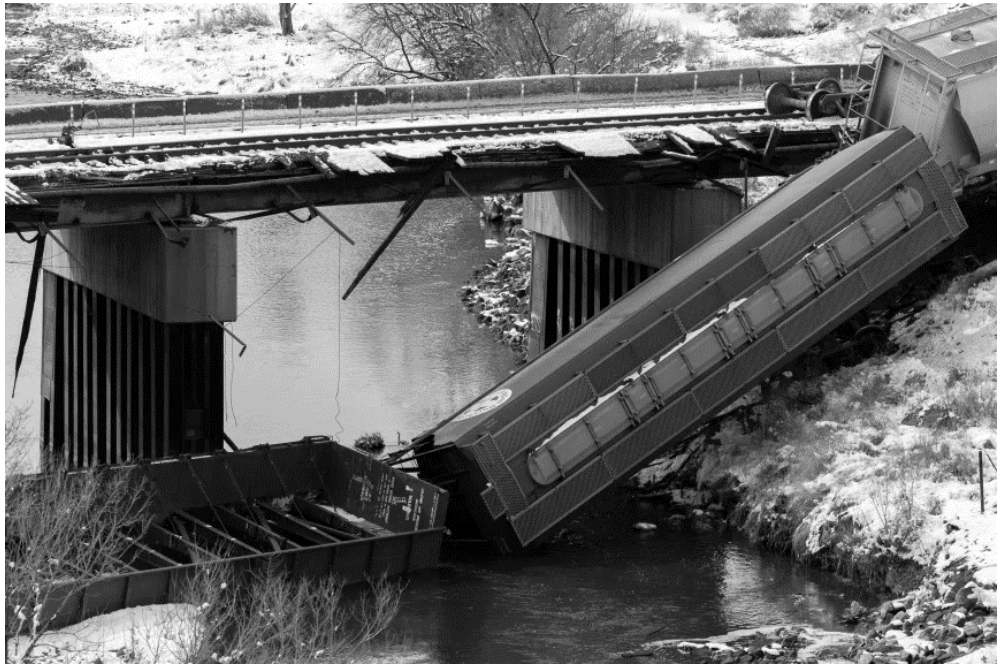
	City	State	Total number of accidents over the last 5 years	Total number of grade crossings
1	Memphis	TN	26	302
2	Seattle	WA	17	248
3	Nashville	TN	14	200
4	**Denver**	**CO**	**12**	**212**
5	Detroit	MI	10	190
6	Portland	OR	8	229
7	El Paso	TX	8	89
8	Oklahoma City	OK	5	138
9	Las Vegas	NV	1	22
10	Washington D.C.		1	7

City & County of

Accidental Deaths in Perspective in Denver

Cause	2020	2021
Drug Overdoses	323	411
Suicides	152	156
Homicides	87	96
Roadway Vehicle Accidents (Normally averages 70+ per year, but was lower in 2020 due to start of COVID pandemic)	57	84
Work-Related Injury/Accident	5	12
Freight Railroad Accidents 2020: 3 from trespassing, 1 at a road crossing. 2021: 3 from trespassing, 0 at road crossings.	4	3

Road and Railroad Risk Analysis

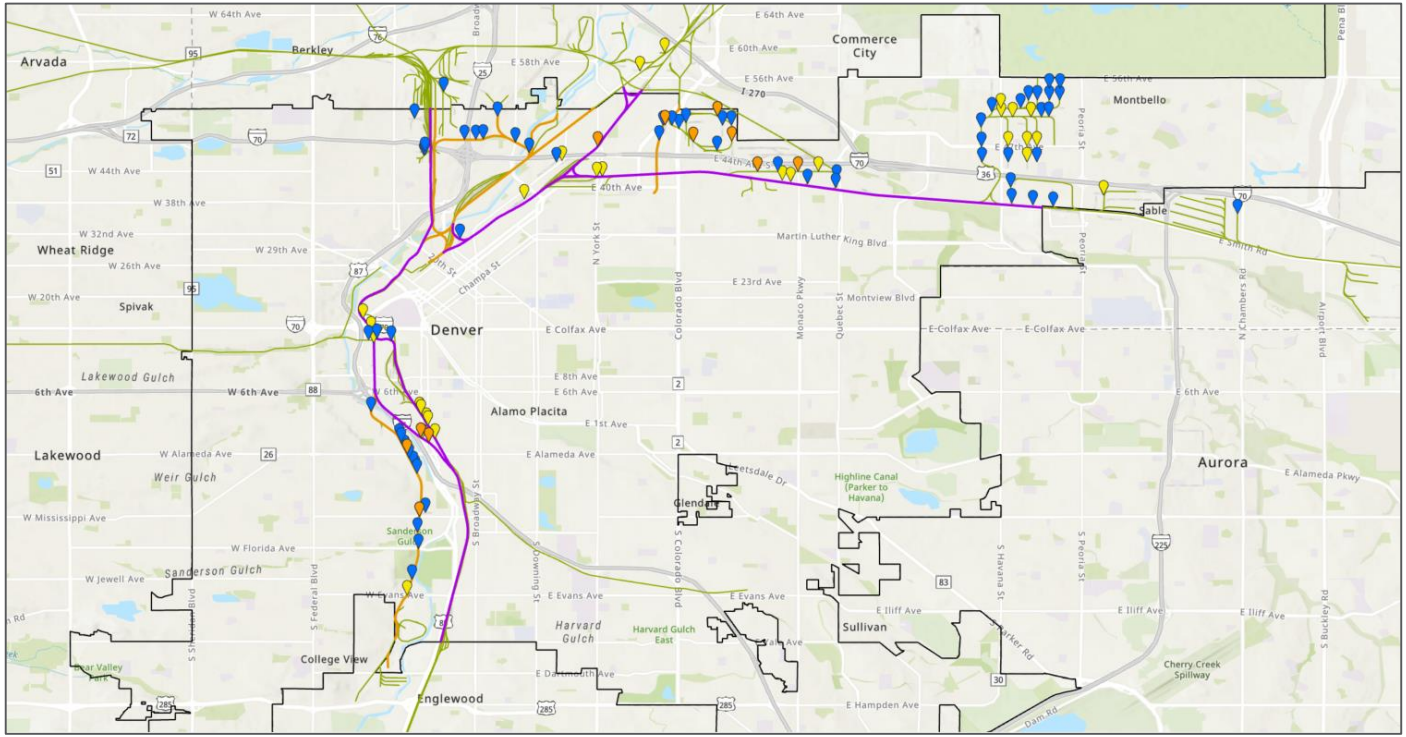


Train partially derails into river in Denver, blocking South Platte River Trail

February 12, 2022
Denver Post

Two types of accidents
- Railroad Equipment
- Crossings

Grade Crossing Accident Risk by Location



Road and Railroad Risk Mitigations: Menu of Options

- Signs, signals, & gates – cars & bike/ped
- Improve overhead street lighting
- Add delineators or medians
- Resurfacing, restriping, add curb & gutter
- Driveway & roadway relocation, consolidation, or closure
- Realign at-grade crossings
- Fencing, walls, or other barriers
- Grade-separate crossings

Road and Railroad Risk Mitigation Options

Example of Safety Devices
NE Denver at Dahlia/Smith Rd

1. RTD track (back)
2. UP track (nearer)
3. Barrier safety wall middle of tracks
4. Auto safety crossing gates
5. Pedestrian safety fencing
6. Pedestrian safety gate

Grade Crossing Mitigation Examples

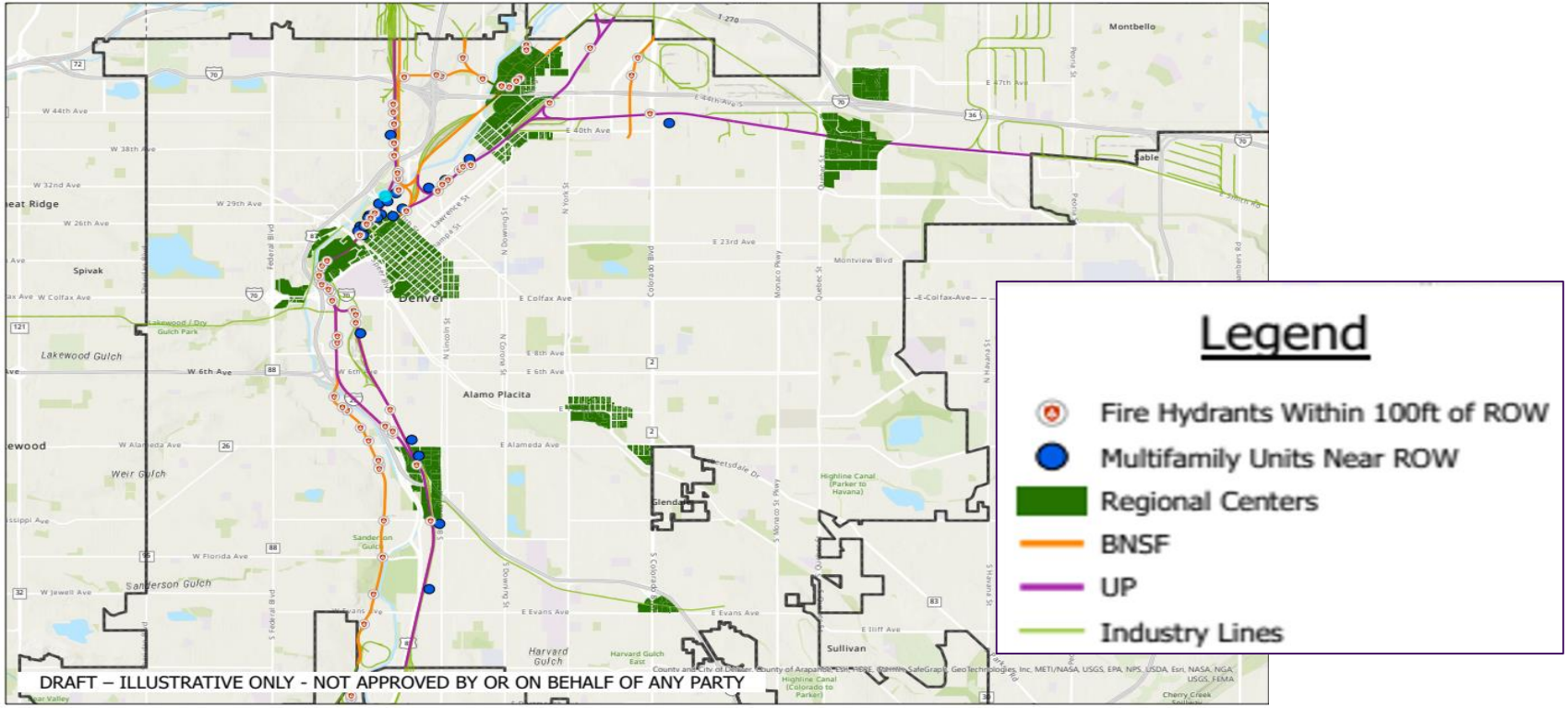
Two-gate with roadway channelization

Quad-gate installation

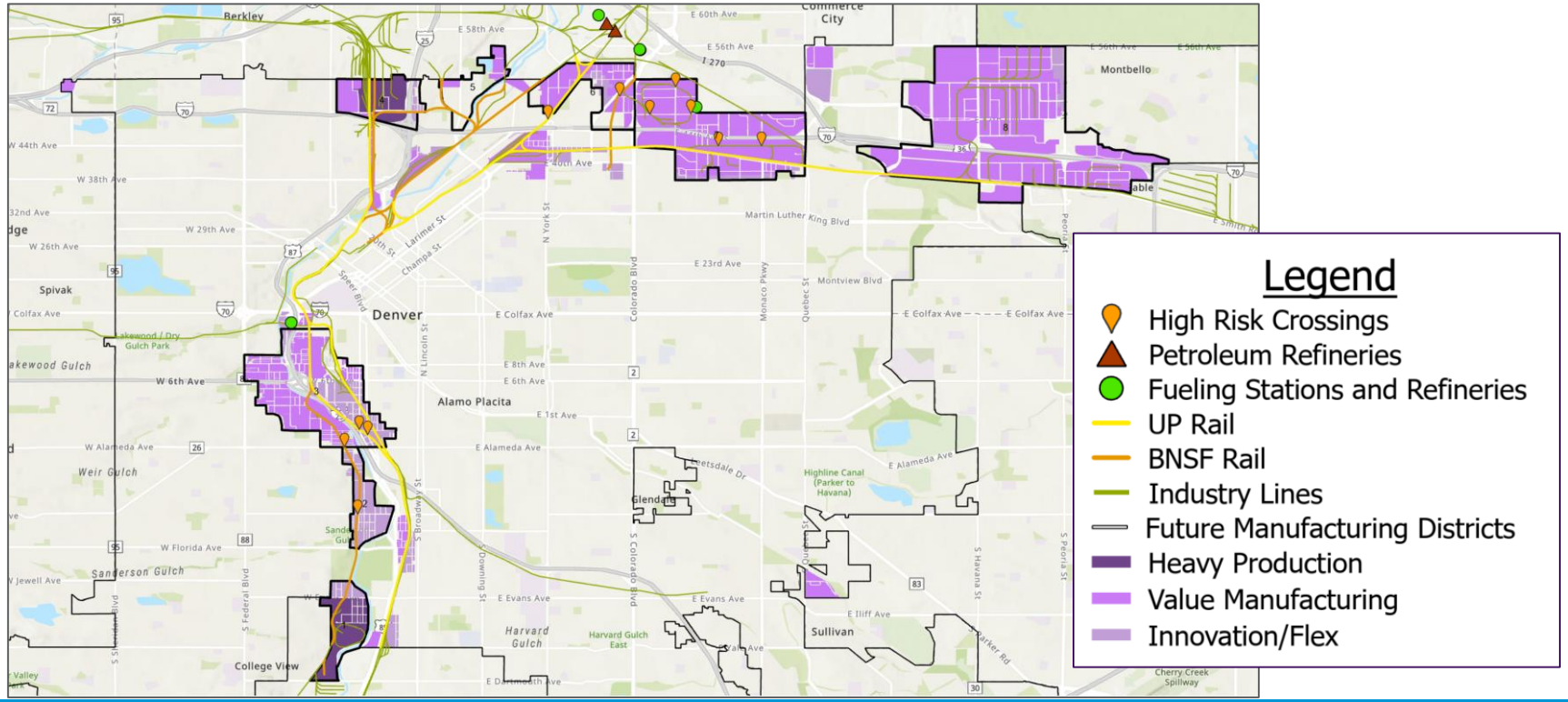
- Perform diagnostic evaluation to select appropriate treatments
- Evaluation with benefit/cost that accounts for lifecycle of the treatment

Land Use Risk Analysis

Future Growth and Freight Railroad Proximity



Manufacturing Districts & Railroads



Land Use Risk Mitigation Options

Land Use Risk Mitigations: Menu of Options

- Fire/EMS staffing densities, locations
- Fire/EMS equipment
- Fire hydrant positioning
- Fire/Emergency access
- Fire & sound "proofing"
- Building reinforcement
- Emergency egress plans & evacuation drills
- Site planning
- Others

Safety Fencing & Barrier Examples

Anti-climb fencing to prevent trespassing

Rail deflection wall systems

Emergency Response Training

Security & Emergency Response Training Center (SERTC), Pueblo CO

Rail Crude Oil Fire Training Exercise, August 2016

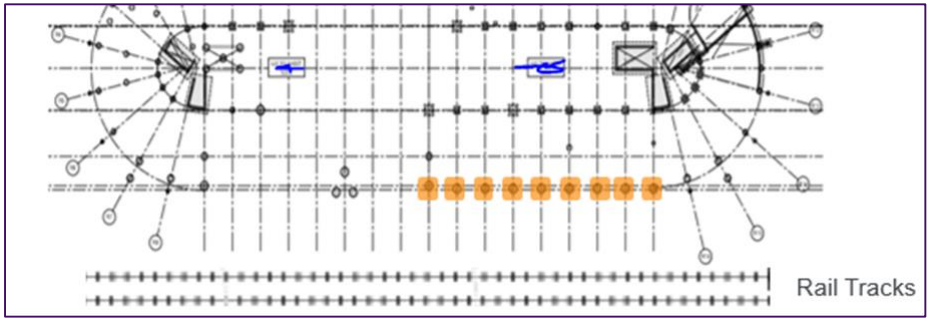
DFD Rail Tank Car Training Apparatus

Denver Post

August 28, 2020

Site & Building Examples

Site planning with non- or low-occupancy uses near tracks



Structural Reinforcement w/ enhanced concrete columns

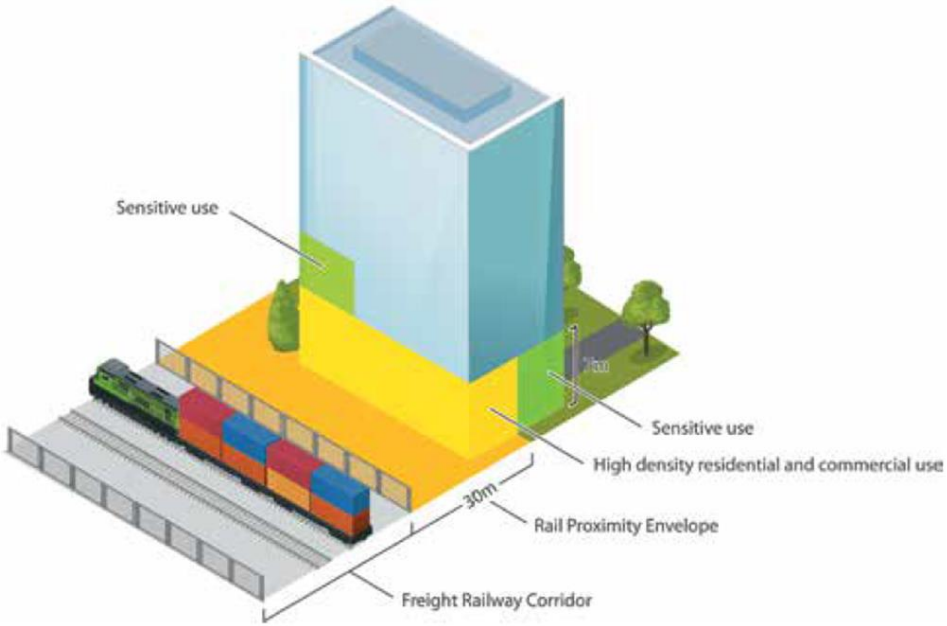
Calgary, Alberta Canada Example

Centre City example

High density residential and commercial buildings that are 121m in width or less are allowed inside the Envelope without further studies. A sensitive use on the frontage facing the rail is not subject to the Safety Policy, but would need a noise study.

A sensitive use outside the Envelope, or not fronting onto the corridor, does not require any further information related to rail proximity.

Illustration 2: Example of **Rail Proximity Envelope** for Centre City



Overall Findings

- **Risk is relative:**
  - Railroad-related fatalities are lower than many other fatality types that the City seeks to reduce
- **Vision Zero:**
  - Freight Railroad risk mitigation is part of citywide goals
- **Roadway/rail crossing improvements:**
  - benefit/cost analysis to identify appropriate mitigations
- **Land use risks**
  - Some mitigation currently occurs due to existing requirements (fire lanes) and good development practices (parking structures)

Overall Findings

- Consider further mitigations in **high-risk locations**
  - Understand where existing and future higher density development and high railroad incident rates co-exist
- **Partner** with freight railroads
  - to **pursue grant funding** to mitigate both everyday/low risk and rare-event/higher-risk locations

Outstanding Questions and Issues

- More cost analysis and understanding of implications for development
  - Findings do not analyze costs and impacts, including effects on the public realm, city budget, and private development
- Clarity needed on implementation by responsible parties
- More peer city research needed
- Need more stakeholder input

Questions?