

**REGIONAL TRANSPORTATION DISTRICT
HAZARD INVESTIGATION REPORT ON
19TH STREET AND STOUT STREET CONDEMNED RAIL
H1-11222022
PROCEEDING NO. 23I-0047R**

March 6, 2023

Colorado PUC E-Filings System



I. Introduction and Summary

This report provides details of the investigation undertaken by the Regional Transportation District (RTD) and identifies the causal and contributing factors that led to rail deterioration resulting in condemnation and emergency replacement of a portion of the rail at 19th and Stout streets.

On November 15, 2022, Maintenance of Way (MOW) crews determined that the condition of a curved segment of rail at 19th and Stout streets was below industry acceptable conditions for normal rail activities. An operational risk analysis by MOW management staff evaluated risk categories under two scenarios, as follows:

1. (Current Condition) Continue normal train operations; trains would continue to use normal or permitted speeds in this area including 15 mph in tangent track and 10 mph in curves. The risk assessment category was rated as "High" and 1B.
2. (Restricted Condition) Continue train operations with a 3 mph restriction approaching, through, and out of the curve with 24/7 MOW flagger control and a track maintainer conducting visual inspections after each train passed through the area. The risk assessment category was rated as "Serious" and 3B-C.

Subsequently, rail operations began to operate immediately under the above-referenced restricted conditions. Further, it was determined that emergency rail replacement was required to return to normal train movements and speeds.

RTD submitted its notification of emergency corrective action to the Colorado Public Utilities Commission on December 9, 2022, and a Corrective Action Plan (CAP) for the infrastructure on December 15, 2022. Rail replacement began on December 13, 2022, and was completed on December 21, 2022. Commission staff preliminarily approved CAP01-11222022 on December 19, 2022, and the Commission approved it on January 25, 2023.

II. Hazard Description

On November 9, 2022, MOW crews performed a routine monthly preventative maintenance inspection of track identified as segment seven; this area is commonly referred to as the downtown loop. The MOW crews noted a negative superelevation and gauge widening condition. Due to being embedded track, in order to determine the cause, further investigation necessitated removal of the flangeway material to visualize subsurface structures. The MOW inspectors documented their measurements of the track and submitted the information through normal channels, with review by MOW supervisory staff who then elevated the information to senior MOW management on November 14, 2022. The same day, the acting manager of MOW requested that crews return to 19th and Stout to perform an enhanced inspection.

On November 15, 2022, the subsequent investigation revealed rail conditions that were below industry acceptable conditions for normal rail activities. MOW crews called for an immediate 3 mph speed restriction on approach to the curve, through the curve and out of the curve (entire train consist needed to be outside the curve limits). Due to the condition noted, a portion of the rail was classified as condemned.





III. Photos and Evidence of Hazard

See **Attachment No. 1**, Maintenance of Way

IV. Investigation Activities

A thorough investigative process was implemented using the systematic cause analysis technique to identify systemic (management system) causal factors. Capital Programs, Rail Operations, Service and Planning, Asset Management and Safety staff were involved in the investigation. The investigation incorporated information from numerous sources, including:

- Interviews
- Site Inspection and Maintenance reports
- E-mail correspondence
- Policies and Procedures

V. Most Probable and Contributing Causes

The downtown loop is the oldest segment of the RTD light rail system, having opened in 1994. The most probable and contributing causes of the deteriorated rail condition at 19th and Stout streets are age, wear, and the use of magnesium chloride during snow events. This, in combination with low voltage electric current and water (electrolysis), causes increased rust and faster deterioration of the rail. In 2012, it was discovered that the E-clips that fasten the rail to the ties were particularly vulnerable to corrosion. Recognizing that the purpose of E-Clips is to ensure the rail does not move during train movement, an evaluation was conducted that concluded the existing infrastructure was sufficient to hold the rail in place and no track movement was detected during or after train movement. Subsequently, galvanized E-clips were installed, and MOW continued to regularly measure track movement and gauge to ensure safe train operation over this section of track. There had been no movement of the track detected until the November 9, 2022, monthly inspection described above.

The downtown loop track and its condition were assessed by Rail Operations, Capital Programs, and Asset Management staff as early as November 2014, and a rail replacement strategy and schedule was prepared in February 2015. Rail replacement requires significant planning, resources and collaboration with local jurisdictions. Given the amount of rail that would eventually need replacement and the anticipated length of time it would take to complete the project, a series of individual rail replacement projects were identified. Curves and intersections were prioritized for replacement over tangent track beginning as early as 2016, with rail projects continuing and scheduled through the present time. Inspection and maintenance occurred consistent with industry standards.

Attachment 2 reflects the plan to replace rail, which is being completed by scheduling replacements in segments.

The 19th and Stout streets curve was originally scheduled for replacement in Fall 2022 and specialized infrastructure was ordered and received in 2020. Earlier in 2022, MOW identified the 18th and Stout streets intersection as a location where tracks were settling and submitted a request to the Capital Programs department to add this intersection to the replacement project list. The decision to replace the rail at 18th and





Stout in 2022 was made without following the asset management bypass process. No formal risk assessment was conducted to justify the urgent replacement 18th and Stout. It was decided both replacements would not happen simultaneously and the 19th and Stout curve replacement was rescheduled to Spring 2023.

Finally, the current approach to asset management tracking and replacement for rail infrastructure and lack of organizational coordination were contributing causal factors. Asset management is done by function and not holistically by asset class. Operations and maintenance staff coexist within a singular department and are managed by the same leader and engineering (renewals, replacements, and project management) is housed within another department overseen by another leader.

The most probable and contributing causal factors for the rail condition at the 19th and Stout streets curve deteriorating to the point of condemnation are:

- 1) Gaps in internal policies, procedures, and oversight. The Asset Management System and the Safety Management System are relatively new and maturing at different rates throughout the agency. Documentation and processes need to be developed to address this challenge.
- 2) The rail replacement program is not adequate to maintain a state of good repair within the downtown loop.
- 3) Asset management tracking is done by function and not by asset class.
- 4) Cross-department coordination on rail infrastructure replacement to ensure alignment with and accountability for the Asset Management Plan and Public Transportation Agency Safety Plan is not optimized.

CAP02-11152022 has been developed to minimize the potential of the occurrence of condemned rail in the Light Rail System.

Respectfully submitted this 6th day of March 2023,

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