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Diagnostic Review Process in Utah

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Poll!

Who has been part of a Diagnostic?



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Trivia!

If you added up all the train tracks on Earth, how many times could you travel to the moon and back?



Twice

Fun fact: the US has the most track of any country in the world, and twice of all of Europe combined!

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Diagnostics

What are they?

- Safety-focused review
- Technical team of experts
- Gather data
- Informative discussion
- Safety-focused decisions



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Diagnostics

Safety around railroad crossings is not a new issue

Scene of Appalling Tragedy in Salt Lake County



disaster . . . Here 22 persons lost their lives in the crash of a Denver & Rio Grande Western freight train and a Jordan school bus. Circle indicates location of bus clinging to side of train. Dotted line shows path taken by bus, small "x" where bus stopped at railroad crossing, large "X" point of impact.

RESIDENTS OF GARFIELD MEET DEATH

SALT LAKE CITY, Feb. 8 (U.P.) — A Western Pacific passenger train crashed into an automobile at a crossing here last night, killing five occupants of the machine.

Dead are:

- Roy W. Johnson, 45.
- Lewis W. Criddle, 34, and his wife, Nadine, 30.

machine 500 feet away and that the driver had plenty of time to stop before reaching the crossing. "We didn't have a chance to miss them. They just kept on coming," Morton declared. The auto, after being struck, continued down a 15-foot embankment.

Two of the bodies were found ahead of the machine, another 10 feet away, and the other two, a man and a woman were hanging partially out of the front seat.

Nine police officers and two ambulances were rushed to the scene, but the victims had already been pronounced dead by Dr. Mazel Skofield, a passing motorist. The bodies were removed to the morgue where identification was made through personal effects.

The accident occurred at Redwood road near North Temple street, in the outskirts of Salt Lake City.



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Safety around railroad crossings continued



<https://www.youtube.com/watch?v=2bdeSr4hVEk>

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Utah Admin Rule R930-5

Establishment and Regulation of At-Grade Railroad Crossings

Talks about things like...

- UDOT oversees all Public Highway-Rail Grade Crossings
- Selection of Projects
- Maintenance responsibilities
- Funding & Design
- Defines when Diagnostics are required



Diagnostics

When do you request?

- Development within 1000 feet of a crossing
- New driveway within 250 feet of a crossing
- Changes at or near a crossing
- Increased volume over crossing
- Safety-related concerns
- Not as common requests:
 - Private to public crossing
 - At-grade to grade-separated crossing
 - Addition of tracks



Diagnostics

Who can request?

1. Highway Authority
 - a. UDOT
 - b. City/County
2. Railroad



Diagnostic Team

A group of knowledgeable representatives of the parties of interest in a grade crossing or group of grade crossings (see 23 CFR Part 646.204).

- MUTCD Section 1C.02 (2023)

- UDOT Chief Railroad Engineer, or Designee
- Railroad
- Highway Authority
- Invitees with an interest which may include the FRA





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Diagnostic Team Duties

- Make recommendations to the Department for needed safety improvements at a Crossing
 - Traffic control warning devices
 - Approach improvements
 - Pedestrian facilities
 - Removal of sight obstructions
 - Street lighting
 - New Crossing
- Review requests to reclassify a Crossing from private to public
- Recommend a study to evaluate the need for grade separation
- Any other safety-related changes



Diagnostics

Why?

Section 8A.03 Traffic Control Systems and Practices at Grade Crossings

Support:

01 Because of the large number of significant variables to be considered, no single standard system of traffic control devices is universally applicable for all grade crossings.

Standard:

02 **Before any new grade crossing traffic control system is installed or before modifications are made to an existing system, approval shall be obtained from the highway agency with jurisdiction, the regulatory agency with statutory authority (if applicable), and the railroad company and/or transit agency.**

03 **The Diagnostic Team members shall make a recommendation, documented in an engineering study (see Section 8A.05), on new grade crossing traffic control systems and on proposed changes to an existing grade crossing traffic control system. The Diagnostic Team recommendation shall be made based on the Diagnostic Team's site visits, meetings, conference calls, or a combination of some or all of these methods.**

04 **Except as provided in Paragraph 7 of this Section, operational changes made to a grade crossing traffic control system shall be evaluated by a Diagnostic Team.**

Diagnostic Process Overview



Diagnostic Review

What we do in Utah

Virtual Diagnostic

Field Diagnostic



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Virtual Diagnostic



Share project scope



Share project background data



Share railroad data



Share highway data



Identify additional data needs for on-site diagnostic meeting



Discuss safety requirements



Diagnostics: Factors for Consideration

MUTCD Section 8A.05

Highway Agency Responsibility

- Road Geometrics
- Stopping Sight Distance
- Clearing Sight Distance
- The Proximity of Nearby Roadway Intersections
- Adjacent Driveways
- Traffic Volume Across The Grade Crossing
- Extent of Queuing Upstream or Downstream From The Grade Crossing
- Pedestrian And Bicycle Volumes
- Number of School Buses or Hazardous Material Haul Vehicles
- Crash History At or Near The Location

Railroad Responsibility

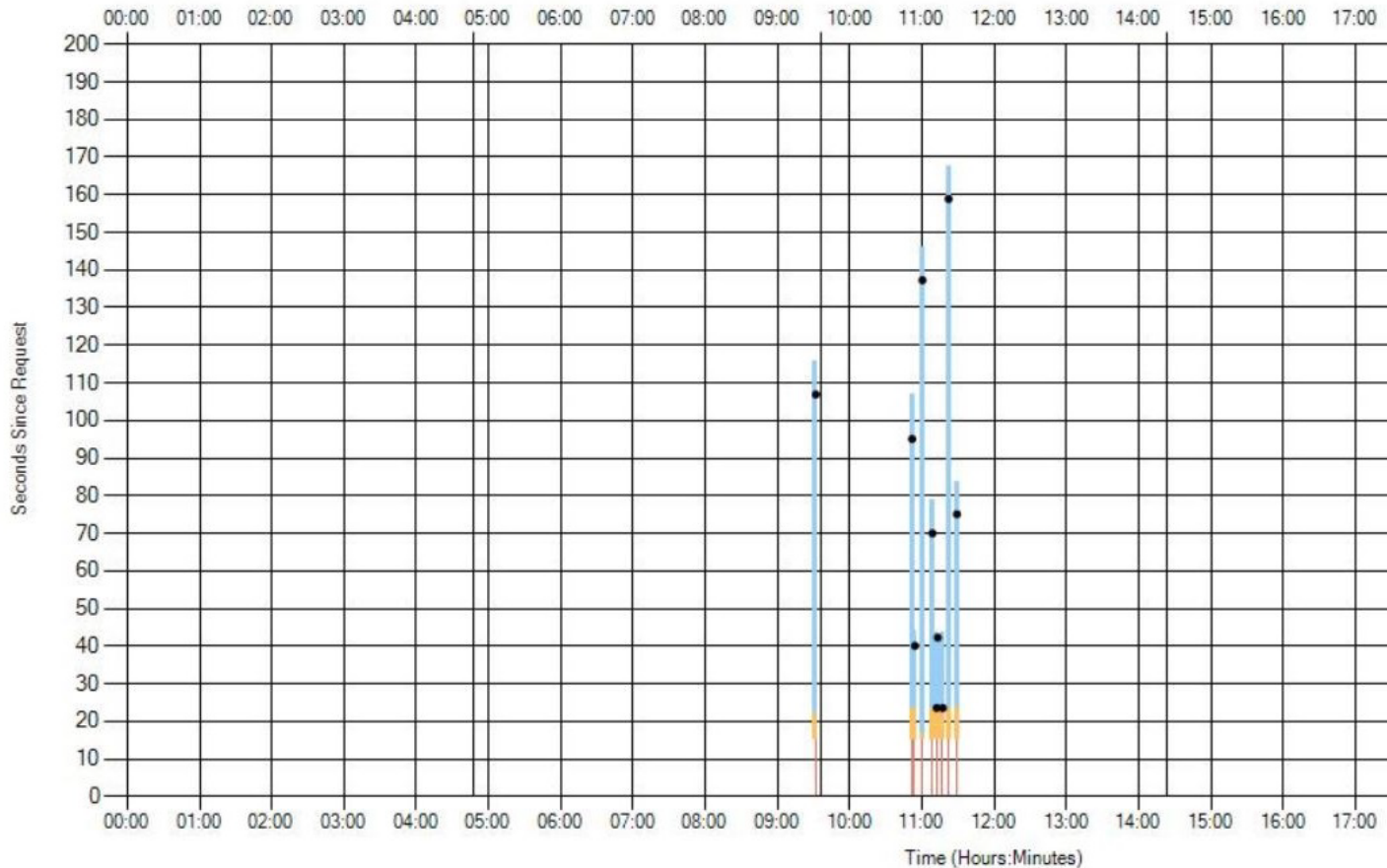
- Operation of Passenger Trains
- Train Volume
- Presence of Nearby Passenger Station Stops
- Maximum Allowable Train Speeds
- Variable Train Speeds
- Accelerating And Decelerating Trains
- Multiple Tracks
- High-speed Train Operation



Preemption Details

Geneva Rd. @ 200 S (Lindon) - SIG#6057
Wednesday, September 20, 2023 12:00 AM - Thursday, September 21, 2023 12:00 AM

Preempt Number: 1



Highway Data

- Crossing concept exhibit
- Roadway incident data
- Traffic/queuing analysis for crossings within 200 feet of intersections or where potential for queuing exists
- Traffic signal operations information (ATSPM data for nearby traffic signals)

Railroad Data

- Current train traffic
- FRA Inventory Report
- FRA Accident Reports
- Near miss data (broken gates, vehicle on track, unsafe motorist/pedestrian and blocked crossing reports, etc.), if available
- Railroad signal design information (for crossings with flashing-lights, gates and/or cantilevers)

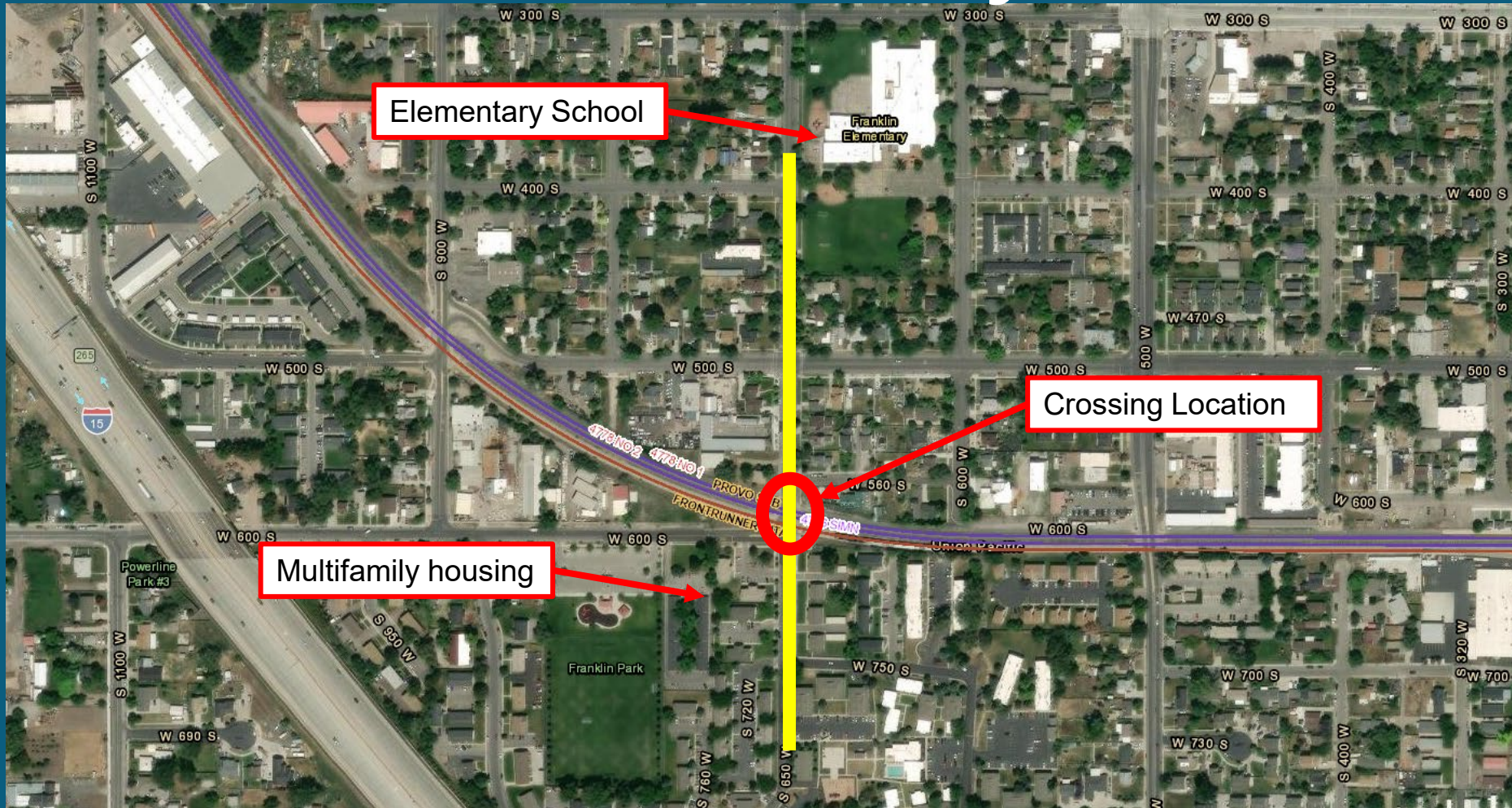
3. Name of Railroad or Other Entity Responsible for Track Maintenance <i>(single entry)</i> Union Pacific Railroad Company [UP]				3a. Alphabetic Code UP		3b. Railroad Accident/Incident No. 051SU008	
4. U.S. DOT Grade Crossing ID No. 805689K				5. Date of Accident/Incident month day year 0 5 2 6 2015		6. Time of Accident/Incident 4:00 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>	
7. Nearest Railroad Station SALT LAKE CITY		8. Subdivision SALT LAKE SUB		9. County SALT LAKE		10. State Abbr. UT Code 49	
11. City <i>(if in a city)</i> SALT LAKE CITY		12. Highway Name or No. 300 NORTH		Public <input checked="" type="checkbox"/> Private <input type="checkbox"/>			
Highway User Involved				Rail Equipment Involved			
13. Type C. Truck-trailer F. Bus J. Other Motor Vehicle A. Auto D. Pick-up truck G. School Bus K. Pedestrian B. Truck E. Van H. Motorcycle M. Other <i>(specify)</i> Code K				17. Equipment 1. Train <i>(units pulling)</i> 5. Car(s) <i>(standing)</i> A. Train pulling- RCL 2. Train <i>(units pushing)</i> 6. Light loco(s) <i>(moving)</i> B. Train pushing- RCL 3. Train <i>(standing)</i> 7. Light loco(s) <i>(standing)</i> C. Train standing- RCL 8. Other <i>(specify)</i> E. DMU Locomotive(s) Code 1			
14. Vehicle Speed <i>(est. mph at impact)</i>		15. Direction <i>(geographical)</i> 1. North 2. South 3. East 4. West Code 3		18. Position of Car Unit in Train 6			
16. Position 1. Stalled or stuck on crossing 4. Trapped on crossing by traffic 2. Stopped on Crossing 5. Blocked on crossing by gates Code 3 3. Moving over crossing				19. Circumstance 1. Rail equipment struck highway user 2. Rail equipment struck by highway user Code 2			
20a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? 1. Highway User 2. Rail Equipment 3. Both 4. Neither Code 4				20b. Was there a hazardous materials release by 1. Highway User 2. Rail Equipment 3. Both 4. Neither Code 4			
20c. State here the name and quantity of the hazardous material released, if any							
21. Temperature <i>(specify if minus)</i> 56 °F		22. Visibility <i>(single entry)</i> 1. Dawn 2. Day 3. Dusk 4. Dark Code 4		23. Weather <i>(single entry)</i> 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Sleet 6. Snow Code 2			
24. Type of Equipment 1. Freight Train 5. Single Car 9. Maint./inspect. car D. EMU Consist 2. Passenger Train-Pulling 6. Cut of cars A. Spec. MoW Equip. E. DMU <i>(single entry)</i> 3. Commuter Train-Pulling 7. Yard/Switching B. Passenger Train-Pushing Code 4. Work Train 8. Light loco(s) C. Commuter Train-Pushing 1				25. Track Type Used by Rail Equipment Involved Code 1		26. Track Number or Name MAIN TRACK ONE	
27. FRA Track Class (1-9,X) 4		28. Number of Locomotive Units 3		29. Number of Cars 99		30. Consist Speed <i>(Recorded speed if available)</i> R. Recorded 3 mph R E. Estimated	
32. Type of Crossing 1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other <i>(specify)</i> Warning 3. Standard FLS 6. Audible 9. Watchman 12. None Code(s) 01 03 05 06 07				33. Signaled Crossing Warning <i>(See reverse side for instructions and codes)</i> Code 1		34. Roadway Conditions A. Driv B. Wet C. Snow/Slush D. Ice E. Sand,Mud, Dirt, Oil, Gravel F. Water <i>(Standing, Moving)</i> Code A	
35. Location of Warning 1. Both Sides 2. Side of Vehicle Approach Code 3. Opposite Side of Vehicle Approach 1				36. Crossing Warning Interconnected with Highway Signals 1. Yes 2. No 3. Unknown Code 1		37. Crossing Illuminated by Street Lights or Special Lights 1. Yes 2. No 3. Unknown Code 1	
38. Highway User's Age 28		39. Highway User's Gender 1. Male Code 1 2. Female		40. Highway User Went Behind or in Front of Train and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown Code 2		41. Highway User 1. Went around the gate 5. Other <i>(specify)</i> 2. Stopped and then proceeded 6. Went around/thru temporary barricade 3. Did not stop 7. Went thru the gate Code 4. Stopped on crossing 8. Suicide/Attempted suicide 8	
42. Driver Passed Standing Highway Vehicle 1. Yes 2. No 3. Unknown Code				43. View of Track Obscured by <i>(primary obstruction)</i> 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other <i>(specify)</i> 2. Standing railroad equipment 4. Topography 6. Highway Vehicles 8. Not Obstructed Code 8			
Casualties to:		Killed		Injured		44. Driver was 1. Killed 2. Injured 3. Uninjured	
46. Highway-Rail Crossing Users		1		0		47. Highway Vehicle Property Damage <i>(est. dollar damage)</i>	
49. Railroad Employees		0		0		48. Total Number of Vehicle Occupants <i>(including driver)</i> 0	
52. Passengers on Train		0		0		50. Total Number of People on Train <i>(include passengers and train crew)</i> 2	
						51. Is a Rail Equipment Accident / Incident Report Being Filed 1. Yes 2. No Code 2	

Field Diagnostic

- Recommend - Pre-visit to observe traffic, pedestrians, train movements, compliance with traffic control devices, etc.
- Verify items in the field
 - Utility conflict
 - Drainage
 - Signs of misuse
 - Design components
- Discuss train, vehicle, and pedestrian observations (from the pre-visit)
- Striping and signage
- Sight obstruction
- Find things we might not have noticed virtually
- Interview crossing users



Case Study



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Next Steps

- Meeting minutes/draft letter sent out for review
 - Typically one week review
- Follow up meetings, if needed



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Diagnostic Report

- Letter sent to entity that requested Diagnostic
- Attached to report:
 - Meeting minutes (from all meetings)
 - FRA Inventory
 - Accident Report
 - Studies
 - Submitted Plans



Diagnostic Letter



State of Utah
SPENCER J. COX
Governor
DEIDRE M. HENDERSON
Lieutenant Governor

DEPARTMENT OF TRANSPORTATION
CARLOS M. BRACERAS, PE.
Executive Director
LISA J. WILSON, PE.
Deputy Director of Engineering and Operations
BENJAMIN G. HUOT, PE.
Deputy Director of Planning and Investment

Frederick Lutze
Deputy City Engineer
1330 East Chambers Ave.
Millicreek, UT 84106

Subject: Diagnostic Report for Central Ave – Millicreek, Utah
DOT Crossing No.: DOT # 805763M

Date: October 10, 2024

Dear Mr. Frederick Lutze,

In accordance with Utah Administrative Rule R930-5, a highway-railroad grade crossing diagnostic review was conducted on October 10, 2024, for the above-mentioned crossing.

Diagnostic review team (includes all in attendance):
Clearwater Homes: Steve Ball
Millicreek City: Frederick Lutze, Sean Murray
UDOT: Tyler Schmidt
UDOT / Horrocks: Clint Allen, Kahl Kravat
UTA: Grey Turner

Background Information:
Clearwater Homes is developing town homes in the Southeast quadrant of the crossing along Central Avenue. The development is expected to consist of 77 townhomes. The diagnostic team is considering the effect this development will have on the safety of the crossing. More specific details about the background of this project are contained in the meeting notes attached to this report.

A Diagnostic Review was performed to evaluate safety recommendations regarding existing conditions and proposed improvements near the crossing. Recommendations from the Diagnostic Team are summarized below. See the attached meeting minutes for a more detailed list of action items.

Operations • Telephone (801) 961-4033 • Facsimile (801) 961-4336 • www.udot.utah.gov
Citra Rampton Complex • 4101 South 2700 West • Mailing Address P.O. Box 143200 • Salt Lake City, UT 84114-3200

October 10, 2024

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recommendations:

- removal of the rail and crossing panels for the abandoned spur.
- extending the Z-gates closer to active rail once the spur is removed.
- increasing the east approach median to inhibit gate arm circumvention or install quad gates.
- increase the distance between the east approach stop bar and the gate arm to meet standards.
- add RXR Markings and refresh stop bar for business access which approaches Central Avenue in the northwest quadrant.
- modify the sidewalk on the north side to provide sufficient clearance from the gate arm counterbalance.
- raise the fence along the ROW in the northwest quadrant.
- replace the thermoplastic stop sign along the sidewalk leading up to the northeast gate arm.
- adjust the gate arms on the west approach so the gap between the ends meets MUTCD and UDOT standards.


Construction commencing, plans must be submitted to, reviewed by, and approved by UDOT, UTA and Millicreek City.

If you have any questions regarding this letter, please contact me at (801) 965-4923.

Clint Allen
Clint Allen, P. E.
Railroad Engineer

Attendees:
Millicreek City: Micah Peters, Steve Ball, David Cox
Frederick Lutze, Sean Murray
UDOT: Megan Leonard, Tyler Schmidt
Clint Allen, Kahl Kravat
Grey Turner
UDOT / Horrocks: Jake Harrison, Sean Martin

Attachments:
1. Field review meeting minutes
2. Inventory and accident reports



DOT# 805763M Central Ave. Millicreek, UT
October 10, 2024

Minutes
Minutes
DOT# 805763M Central Ave. Millicreek, UT
October 10, 2024

Productions, sign-in
by (by railroad)
ground and overview
Inventory and accident reports (By UDOT/CRS)
Inventory Report: DOT # 805763M
1. 55 max mph, 25.55 avg mph, 280 Total Transit Trains
Accident Report: DOT # 805763M
1. Last reported accident in 2013

Overview and concept (by applicant)
Clearwater Homes is developing town homes in the Southeast quadrant of the crossing along Central Avenue. The development is expected to consist of 77 townhomes. An exhibit has been attached to provide an overview of the project. The diagnostic team is considering the effect that this development will have on the safety of the crossing.

Questions
Warning and safety devices are present?
W10-1 signs, W10-9P signs, Stop Bars, and RXR markings on both approaches.
1. The diagnostic team noted that the W10-1 signs are not in the spot they should be.
3 quadrant gates and lights
1. The diagnostic team noted there are lights facing both North and South on the adjacent drive approach to Central Avenue.
Westbound median
There is a Z-gate on the sidewalk in the southeast quadrant.
What is the roadway speed?
Central Avenue has a speed limit of 30 MPH.
Existing conditions meet current standards? If not, what measures should be taken to bring conditions to standard?
The existing conditions do not meet MUTCD and UDOT standards.
1. There is an abandoned spur that crosses the roadway and goes into the Northwest corner of the property. The spur is expected to be removed, but currently adds a significant amount of open

sidewalk between the Z-gate and the next rail, reducing the effectiveness of the Z-gate.
The gate arm on the east approach is placed beyond the end of the median, although the distance is not enough to allow a vehicle to circumvent the gate arm, the location does not meet required standards.
The stop bar on the east approach meets current standards but needs to be reviewed and addressed if the crossing gets modified by the city.
The business access that runs along the west side of the rail, approaching Central Avenue, has a W10-2 sign. The crossing does have a stop bar however, the stop bar is faded and needs to be refreshed.
a. It was noted during the field-diagnostic that the access has a stop sign that meets MUTCD and UDOT standards for private crossings but is smaller than what is allowable for public crossings. Replacement should be considered in light of ongoing development in the corridor.
Gate arms are reported to have been hit several times by trucks out of the business access.
It was noted during the field-diagnostic that a jersey barrier has been installed at the turn, to protect the gate arm from collision with trucks.
The team noted the counterbalance end of the west bound gate arm is hazardous to pedestrians as it crossed into the pedestrian crosswalk.
The team noted the fence along the NW ROW is shorter than to grading having been placed next to the fence.
The team noted the thermoplastic stop sign along the sidewalk the NE gate arm is degraded.
The team noted that the gate arms on the east approach have a gap which is not allowable according to MUTCD and UDOT standards.

3 | 4

2 | 4



Know the Standards and Best Practices

AREMA Communications and Signals Manual (2024)

MUTCD (2023)

Union Pacific Public Projects Manual (2021)

ITE Preemption of Traffic Signals Near Railroad Grade Crossings Recommended Practice (2021)

FHWA Highway-Rail Grade Crossing Handbook (2019)

BNSF Public Projects Manual (2025)



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