RWP MANUAL

A SAFETY GUIDE FOR ROADWAY WORKERS

Revision Table

Date	Version	Description of Change
2019	0	Initial issuance
2025	1	Updates to reflect RWP requirements within 49 CFR 671

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FOREWORD

The RTD Light Rail Roadway Worker Protection (RWP) Manual is a fundamental document required by Federal Transit Administration (FTA) regulations, specifically 49 CFR Part 671 and Colorado Code of Regulations 4-723-7. These regulations mandate that transit agencies establish comprehensive safety procedures to protect personnel working on or near rail tracks. The RWP Manual serves as the primary authority outlining these essential rules, responsibilities (such as the Roadway Worker In Charge), and methods of protection.

Additionally, the Track Access Guide which serves as a crucial supplementary resource, is designed to be utilized in conjunction with the RWP Manual. It leverages site-specific survey data of the guideway to provide detailed context and identify conditions requiring additional attention when selecting outlined in the RWP Manual. When using both the Roadway Worker Protection Manual and the Track Access Guide, always remember that site conditions are dynamic. Atmospheric changes (light, precipitation, temperature) and changes in ambient noise can significantly impact safety. Always refer to the Maximum Authorized Speed (MAS) indicated; if uncertain, default to the higher speed to ensure adequate time to reach a place of safety before a train arrives. The sight distances mentioned are minimums for a 15-second warning; allow additional time when conditions dictate or when the nature of the work requires extra time to clear personnel, tools, or equipment to a place of safety.

This RWP Manual must be distributed to all transit workers who access the roadway and redistributed after each revision.

DEFINITIONS

Absolute Stop – a full or complete stop as required by LRT operating rules and procedures.

Accountable Executive – a single identifiable person who has ultimate responsibility for carrying out the Public Transportation Agency Safety Plan of a transit agency; responsibility for carrying out the transit agency's Transit Asset Management Plan; and control or direction over the human and capital resources needed to develop and maintain both the transit agency's Public Transportation Agency Safety Plan in accordance with 49U.S.C5329(d), and the transit agency's Transit Asset Management Plan in accordance with 49U.S.C. 5326.

Advanced Flagger – a qualified Flagger working with the work zone flagger for the sole purpose of warning of oncoming trains or rail equipment. Flaggers must always be within sight and audible warning of each other.

Ample Time – the time necessary for a roadway worker to be clear of the track zone or in a place of safety 15 seconds before a rail transit vehicle moving at the maximum authorized speed on that tack could arrive at the location of the roadway worker.

Ballast - Selected crushed rock placed onto the roadbed for the purpose of holding the track in line and on the surface.

Block – a length of track of defined limits, the use of which is governed by block signals or manual block system rules/procedures.

Blue Flag/Light – a portable blue flag, light or marker displayed on or at the end of a rail vehicle indicating that personnel may be under, between or on the vehicle, and the vehicle should not be moved, coupled or energized.

Collision avoidance system (CAS) – Protran system installed on rail bound work equipment meant to alert operators to other rail bound work equipment ahead or behind them.

Controller – designated employees on duty in Central Control having absolute authority over all movements on or affecting Rail Operations.

Crossing Gates – Grade crossing warning devices at an intersection where a motor vehicle street, highway, or pedestrian access crosses a rail line, inhibiting vehicular and pedestrian flow during unsafe conditions (i.e. rain presence). Crossing gates also include an arrangement of warning bells and lights.

De-Energize – to remove electrical power.

Derailing Device – Equipment designed to cause uncontrolled or unauthorized moving rail equipment to leave the rails.

Double Red Flag – red flags placed in pairs. One red flag placed on the signal side of the track; the second red flag will be placed in the center of the track between the rails. A section of track removed from service will be double red flagged at both ends of the section. Double red flagging will be used for all de-energized sections of track.

Equivalent Entity – an entity that carries out duties similar to that of a Board of Directors, for a recipient of subrecipient of FTA funds under 49 U.S.C. chapter 53, including sufficient authority to review and approve or subrecipient's Public Transportation Agency Safety Plan.

Energized – when the power on the catenary is on or live.

Equivalent Protection – alternative designs, materials, or methods that the RTA can demonstrate to the SSOA will provide equal or greater safety for roadway workers than the means specified in this part.

Exclusive Track Occupancy – when only the Roadway Worker In Charge (RWIC) decides whether trains and track equipment are allowed to move within work limits. This authority is transferred from the controller.

Field Side – the outermost rail, not adjacent to any other track.

Flag – A temporary Wayside Signal can be metal or cloth and may be handheld to convey information from flagger to train operator.

Flagged Workzone – the use of flags/lights, and roadway flaggers to establish Exclusive Track Occupancy while working on the track.

Flag Person / Flagger – a roadway worker designated to direct or restrict the movement of rail transit vehicles or equipment past a point on a track to provide on-track-safety for roadway workers, while engaged solely in performing that function.

Forms of Protection – means various methods of protection to provide on-track safety for a roadway worker.

Foul Time Protection – is a method of establishing working limits in which a roadway worker is notified by the control center that no rail transit vehicles will be authorized to operate within a specific segment of track until the roadway worker reports clear of the track.

Fouling a Track – the placement of an individual of an item of equipment in such proximity to a track that the individual or equipment could be struck by a moving rail transit vehicle or on-track equipment. Fouling distance for a person is within 4 feet of the nearest rail, fouling distance for equipment is within 10 feet of nearest rail.

FRA – The Federal Railroad Administration.

Frog – A track structure that is used at an intersection of two running rails to permit wheels on either rail to cross the other.

FTA – The Federal Transit Administration.

Hand Signals – A signal given by the motion or position of a person's hand, arm, flag, or light.

Hot Spots – locations on the railroad where additional precaution is required because of various conditions:

- Curves with limited visibility
- Tunnels with limited or no clearance
- Bridge locations with limited or no clearance
- Track locations with limited or no clearance
- Track locations with heavy outside noise
- Track locations with limited visibility because of obstructions
- Weather hazards (fog, heavy rain, snow, etc)

(1) Locations with limited, close, or no clearance, including locations (such as alcoves, recessed spaces, or other designated places or areas of refuge or safety) with size or access limitations.

(2) Locations subject to increased rail vehicle or on-track equipment braking requirements or reduced rail transit vehicle operator visibility due to precipitation or other weather conditions.

(3) Curves with no or limited visibility.

(4) Locations with limited or no visibility due to obstructions or topography.

(5) All portals with restricted views.

(6) Locations with heavy outside noise or other environmental conditions that impact on-track safety.

(7) Any other locations with access considerations.

Hy-rail vehicle – a roadway maintenance machine that is equipped with retractable flanged wheels so that the vehicle may travel over the highway or on railroad tracks.

Inaccessible Track – a method of establishing working limits on non-controlled track by physically preventing entry and movement of trains and equipment.

Individual Rail Transit Vehicle Detection / Individual Train Detection (ITD) – a process by which a lone Worker acquires on-track safety by visually detecting approaching rail transit vehicles or equipment and leaving the track in ample time.

Interlocking – An arrangement of signals and switches interconnected to provide a requested route. Movements must succeed each other in prearranged sequence. It may be operated automatically or manually.

Job Briefing – a meeting addressing the requirements of this part that is conducted prior to commencing work by the Roadway Worker in Charge, typically at the job site, to notify roadway workers or other transit workers about the hazards related to the work to be performed and the protections to eliminate or protect against those hazards. Alternatively, briefings can be conducted virtually for those individuals who are working remotely on the job site.

It is provided by the Roadway Worker in Charge to all workers prior to entering the ROW and documented on the MOW Job Briefing Form.

Job Hazard Analysis – a systematic process for identifying and mitigating potential hazards associated with specific job tasks.

Lone Worker – an individual roadway worker who is not afforded on-track safety by another roadway worker, who is not a member of a roadway work group, and who is not engaged in a common task with another roadway worker.

Maximum Authorized Speed (MAS) – the highest permitted speed for the movement of rail transit vehicles established by the rail transit control system, service schedule , and operating rules. this speed is used when calculating ample time.

Minor Tasks – those tasks performed without the use of tools during execution of which a roadway worker or other transit worker can hear and visually assess their surroundings at least every five (5) seconds for approaching rail transit vehicles and that can be performed without violating ample time.

Near Miss – a narrowly avoided safety event.

On Sight Speed – a speed that allows the vehicle to be stopped within the range of vision of another train, a stop signal, a switch not properly aligned, a track defect, an obstruction, or workers fouling track.

On-Track Safety – a state of freedom from the danger of being struck by a moving rail transit vehicle or other equipment, and other on-track hazards, as provided by operating and safety rules that govern track occupancy by roadway workers, other transit workers, rail transit vehicles, and on-track equipment.

Place of Safety – a space an individual or individuals can safely occupy outside the track zone, sufficiently clear of any rail transit vehicle, including any on-track equipment, moving on any track.

Qualified – a status attained by a roadway worker or other transit worker who has successfully completed required training (including refresher training) for, has demonstrated proficiency in, and is authorized by the RTA (RTD) to perform the duties of a particular position or function.

Rail Fixed Guideway Public Transportation System – any fixed guideway system, or any such system in engineering or construction, that uses rail, is operated for public transportation, is within the jurisdiction of a State, and is not subject to the jurisdiction of the Federal Railroad Administration. these include but are not limited to rapid rail, heavy rail, light rail, monorail, trolley, inclined plane, funicular and automated guideway.

Rail Transit Agency (RTA) – any entity that provides services on a rail fixed guideway public transportation system.

Rail Transit Vehicle – any rolling stock used on a rail fixed guideway public transportation system.

Rail Transit Vehicle Approach Warning / Train Approach Warning – a method of establishing on-track safety by warning roadway workers of the approach of rail transit vehicles in ample time for them to move to or remain in a place of safety in accordance with the requirements of 49 CFR 671.

Rail Transit Worker – An employee of the transit agency (RTD) working around the tracks that doesn't fall under the category of a Roadway Worker, including Train Operators, Light Rail Vehicle Mechanics, Field Supervisors, RTD Police and Security, ETC.

Red Board – a fixed wayside signal governing train movement against normal current of traffic.

Redundant Protection – at least one additional protection beyond individual rail transit vehicle detection to ensure on-track safety for roadway workers. Redundant protections may be procedural, physical, or both.

Restricted Speed – Operate On-Sight speed, not to exceed 30 mph. Rail Vehicle – Train, rail bound work equipment, hi-rail, or any other vehicle traveling on rail.

Right of Way – controlled area along the alignment within 25 feet of the nearest rail.

Roadway – land on which rail transit tracks and support infrastructure have been constructed to support the movement of rail transit vehicles.

Roadway Maintenance Machine – a device which is used on or near rail transit track for maintenance, repair, construction or inspection of track, bridges, roadway, signal, communications, or electric traction systems, Roadway maintenance machines may have road or rail wheels or may be stationary.

Roadway Worker – a transit worker whose duties involve inspection, construction, maintenance, repairs, or providing on-track safety such as flag persons and watchpersons on or near the roadway or right-of-way or with the potential of fouling track.

Roadway Work Group / Work Group – two or more roadway workers organized to work together on a common task.

Roadway Worker in Charge (RWIC) – a roadway worker who is qualified under 49 CFR 671 to establish on-track safety.

Roadway Worker Protection (RWP) – the policies, processes , and procedures implemented by an RTA to prevent safety events for transit workers who must access the roadway in the performance of work.

RWP Manual – the entire set of the RTA's on-track safety rules and instructions maintained together, including operating rules and other procedures concerning on track safety protection and on-track safety measures, designed to prevent roadway workers from being struck by rail transit vehicles or other on track equipment.

Safety Event – an unexpected outcome resulting in injury or the death; damage to or loss of the facilities, equipment, rolling stock, or infrastructure of a public transportation system; or damage to the environment.

Shunt – a safety approved wire with a clamping device on each end. Properly installed, shunts show track occupancy to Control.

Sight Distance – the length of roadway visible ahead for a roadway worker.

Signals

Fixed Signal – a signal mounted along a track to direct rail traffic.

Hand Signal – signal given by the motion or position of a person's hand, arm, flag, or light.

Temporary wayside signal – metal or cloth flags which may be temporary placed along the wayside to govern train operation as required.

Interlocking signal – the fixed signal governing an interlocking, the normal aspect of which is Red.

ABS signal (Automatic Block Signal) – a series of consecutive blocks governed by block signals, activated by a train or by certain conditions affecting the use of the block.

State Safety Oversight Agency (SSOA) – an agency established by a State that meets the requirements and performs the functions specified by 49 U.S.C. 5329(e) and (k) and 49 CFR part 674.

Track Access Guide – a document that describes the physical characteristics of the RTA's track system, including track areas with close or no clearance, curves with blind spots or restricted sight lines, areas with loud noise, and potential environmental conditions that require additional consideration in establishing on-track safety.

Track

Adjacent Track – a track parallel and next to the track where you are located with track centers less than 25 feet apart.

Auxiliary Track – all tracks not designated as main track, Yard or Shop tracks. A pocket track, sidetrack or tail track for passing, storing or turning back trains.

Mainline Track – any track on the operating railroad, except yards, auxiliary, and tail tracks.

Maintenance of Way Track – a segment of track where employees, trains, railroad maintenance machines and equipment are permitted to move under local supervision. Maintenance of Way tracks are not under the direction of Control, but they still require appropriate roadway worker protection.

Pocket Track – a center track situated between the mainline tracks to hold and turn trains.

Sidetrack – an auxiliary track located on the side of the mainline tracks used to store trains or enable trains on the same line to pass.

Tail Track – an auxiliary track located at the end of the mainline tracks used to store trains or enable trains on the same line to pass.

Track Zone – an area identified by the RTA where a person or equipment could be struck by the widest equipment that could occupy the track.

Transit Worker – any employee, contractor , or volunteer working on behalf of the RTA or SSOA.

Transit Worker Safety Reporting Program – the process required under 673.23(b) that allows transit workers to report safety concerns, including transit worker assaults, near-misses, and unsafe acts and conditions to senior management, and describes transit worker behaviors that may result in disciplinary action.

Train Approach Warning – the use of flagger to warn workers of approaching trains or track equipment. Warnings should provide ample time for workers to reach a place of safety.

Watchperson – a roadway worker qualified to provide warning to roadway workers of approaching rail transit vehicles or track equipment and provide at least 15 seconds advance warning plus time o clear based on the maximum authorized track speed for the work location to transit workers before the arrival of rail transit vehicles.

Working Limits – a segment of track with explicit boundaries upon which rail transit vehicles and on-track equipment may move only as authorized by the roadway worker having control over that defined segment of track.

Work Zone – immediate area where work is being performed within the track zone.

Yard – a system of tracks to connect and store trains.

CARDINAL RULES

Summary: Cardinal rules if violated could lead to immediate injury or death.

1. All Workers shall expect and be vigilant for train or equipment movement in any direction, on any track, and at any time.
2. Do not use cell phone while within fouling distance of the track.
3. You must conduct and document a job briefing with all members of the work group prior to entering the alignment.
4. Clear track immediately when warned. Clearing to an adjacent track is allowed if deemed to be the safest place.
5. Do not foul a track unless required by your job duties.
6. Treat all trains as if they are operating at Maximum Authorized Speed and will not stop for you.
7. Report unsafe acts, unsafe conditions, and near-misses on the roadway per RTD's reporting program.

JOB BRIEFING

Summary: The job briefing is an essential part of Roadway Worker Protection. A transit worker may only foul the track once they have received appropriate permissions and redundant protections have been established as specified in the RWP manual. It ensures roadway workers clearly communicate to each other details of the work plan, protection employed, hazards associated with the planned work, and method of train approach warning prior to fouling a track.

The job briefing must include the following, as appropriate:

(1) A discussion of the nature of the work to be performed and the characteristics of the work, including work plans for multiple roadway worker groups within a single work area;

(2) Working limits;

(3) The hazards involved in performing the work. For RTAs with electrified systems, this discussion must include the status of power and hazards explicitly related to the electrified system;

(4) Information on how on-track safety is to be provided for each track identified to be fouled; identification and location of key personnel, such as a watchperson and the roadway worker in charge; and information on what should be done in the event of an emergency;

(5) Instructions for each on-track safety procedure to be followed, including appropriate flags and proper flag placement;

(6) Communication roles and responsibilities for all transit workers involved in the work;

(7) Safety information about any adjacent track, defined as track next to or adjoining the track zone where on-track safety has been established, and identification of roadway maintenance machines or on-track equipment that will foul such tracks;

(8) Information on the accessibility of the roadway worker in charge, including emergency contact information, and alternative procedures in the event the roadway worker in charge is no longer accessible to members of the roadway work group;

(9) Required personal protective equipment;

(10) Designated place(s) of safety of a sufficient size to accommodate all roadway workers within the work area; and

(11) The means for determining ample time.

Prior to entering the alignment a job briefing must be conducted with all members of the work party by the Roadway Worker In Charge. Lone workers must conduct a job briefing with their supervisor prior to entering alignment.

Job briefing shall include instructions for emergency evacuation and no roadway worker shall re-enter the ROW until RWIC confirms safety is re-established and a follow-up job briefing is conducted.

In the event the RWIC is inaccessible, Control will be contacted to determine next steps.

When a rule violation is observed, Control and MOW Supervisor will be contacted and the violation will be included in the MOW Job Debriefing Form. Investigations and further actions will be scaled appropriately to the specific circumstances of the rule violation.

Debriefing must be conducted after the work is completed. Debriefing will include near misses, lessons learned, follow up actions including reporting, and feedback on any good faith challenges raised.

An "MOW Job Briefing Form" and "MOW Job Debriefing Forms" must be filled out and signed by all members of the work group acknowledging in writing the protections providing on-track safety measures for their specific task before accessing the roadway or track zone.

"MOW Job Briefing Forms" and "MOW Job Debriefing Forms" must be turned into supervision at the end of shift.

JOB HAZARD ANALYSIS (JHA)

Summary: The purpose of a Job Hazard Analysis (JHA) is to describe how to perform tasks, identify associated hazards, and determine controls to mitigate those hazards. Utilizing this JHA will allow us to analyze work activities while also identifying tools, materials and equipment needed to safely complete a task. During this process, existing and potential hazards, risks, and methods to eliminate or protect against the hazards are identified.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Summary: The purpose of PPE is to provide protection for employees against health and safety risks at work. The following list of PPE is required while working on the alignment.

Required PPE

1. High visibility vest class 2 vest or uniform that meets class 2 or higher.
2. Protran.
3. White strobe during limited visibility and night.
4. Work shoes as required by agency policy.
5. Authority to be on tracks.
6. Additional items of PPE, such as eye protection, hand protection, head protection, hearing protection, and fall protection, may be required for job specific functions.

RESPONSIBILITIES AND CERTIFICATIONS

RTD establishes, implements, and maintains the RWP Program; verifies compliance; and ensures all transit workers and contractors meet Part 671 requirements.

Escorted Visitors

Visitors or emergency personnel that do not fall into the categories of roadway worker or transit worker and requires access to the right-of-way will be escorted at all times by a flagger, RWIC, or Maintenance of Way Supervisors and Management.

Responsibilities

- Attend Job briefing and Job Hazard Analysis
- Move to designated place of safety when alerted by the RWIC/Flagger
- Report any accident or near miss to RWIC
- Attend debriefing when an accident or a near miss occurs
- Follow standards for PPE as outlined
- Emergency responders must contact Control prior to entering the ROW, receive a safety briefing or escort where practicable, and wear required PPE

Transit Worker

Transit workers can be anyone working on behalf of RTD. This will include contractors and volunteers. Positions that may be considered transit worker only include, but is not limited to: train operators, access permit holders, Light Rail Vehicle Maintenance Mechanics, Facility Maintenance, Public Facilities, Light Rail Transportation Field Supervision, Transit Police, Safety and Environmental Compliance, regulators, or any other visitors that need access to the right-of-way. SSOA personnel access the roadway under this RWP and the SSOA Risk-Based Inspection Program. Refer to the PTASP and SSOA Procedure Manual for PPE, escort, and notification steps.

Responsibilities (if work zone falls within fouling distance)

- Attend Job briefing and Job Hazard Analysis
- Move to designated place of safety when alerted by the RWIC/Flagger
- Report any accident or near miss to RWIC
- Attend debriefing when an accident or a near miss occurs
- Follow standards for PPE as outlined

Certification

- Certification will be documented and recorded within the Laserfiche system and identified by visible RWP credentials prior to entering the roadway

Roadway Workers

Responsibilities

- Attend Job briefing and Job Hazard Analysis
- Move to designated place of safety when alerted by the RWIC/Flagger
- Report any accident or near miss to RWIC
- Attend debriefing when an accident or a near miss occurs
- Follow standards for PPE as outlined

Certification

- Certification for Roadway Workers will be conducted on an annual basis and include written and hands-on assessment
- Certified Roadway Workers shall be able to demonstrate knowledge of proper use horn/bell signals and proper hand signals to communicate with rail vehicles
- Certification will be documented and recorded within the Laserfiche system and identified by visible RWP credentials prior to entering the roadway

Flaggers

Responsibilities

- Attend Job briefing and Job Hazard Analysis
- Provides warning to workers of approaching rail vehicles
- Communicates with any advance flaggers to provide notification of approaching rail vehicles
- Work zone flagger and advance flagger must remain within visual and audible distance from each other
- Control the movement of rail vehicles through the work zone using hand signals as directed by the RWIC
- Ensure all workers have moved to the designated place of safety and the track is safe for train movement prior to allowing train to proceed
- Flaggers must not perform any duty that will interfere with the duties of flagging
- Report any accident or near miss to RWIC
- Attend debriefing when an accident or a near miss occurs
- Follow standards for PPE as outlined

Certification

- Certification for Flagger will be conducted on an annual basis and include written and hands-on assessment
- Certified Flagger shall be able to demonstrate knowledge of proper use horn/bell signals and proper hand signals to communicate with rail vehicles
- Certification will be documented and recorded within the Laserfiche system and identified by visible RWP credentials prior to entering the roadway

Roadway worker In Charge

Responsibilities

- Provide job briefing for work group prior to any roadway worker fouling a track, every time the roadway worker fouls the track
- The RWIC is responsible for the on-track safety for all members of the roadway work group
- Provide communications with Control
- Provide de-briefing following any near-miss or incident including and ensure data is reported to the correct authority
- Provide a follow-up job briefing if track safety condition changes or before any changes to on-track safety procedures during the work period or immediately following an observed violation of on-track safety procedures regarding on-track safety, or other workers join established work crew before work in the track zone may continue
- Ensure all personnel that will be working within the right of way are qualified in Roadway worker protection

- RWIC must serve only the function of maintaining on-track safety for all members of the roadway work group and perform no other unrelated job function while designated for duty
- RWIC must designate a flagger/flaggers or act as the flagger for the work group
- When a single RWIC oversees multiple work groups, each group designates a qualified employee for direct communication with the RWIC

Certification

- Certification for RWIC will be conducted on an annual basis and include written and hands-on assessment
- Certified RWIC shall be able to demonstrate knowledge in all forms of protection, ability to utilize the track access guide, proper radio communication with control, work zone setup, Job briefing, de-briefing
- Certification will be documented and recorded within the Laserfiche system and identified by visible RWP credentials prior to entering the roadway

Lone Workers

Responsibilities

- Review Job Briefing and Job Hazard Analysis with MOW Supervisor prior to calling control to gain access to the right of way
- Adhere to all rules governing the usage of ITD while on the right of way
- The lone worker may perform routine inspection or minor tasks and move from one location to another. The lone worker may not use power tools and may only access locations defined in the track access guide as appropriate for lone workers
- Individuals utilizing ITD as a form of protection must use redundant protections to include
  - Radio call in procedure
  - Usage of Roadway Worker Advance Warning System (Protran)

Certification

- Certification for Lone Worker will be conducted on an annual basis and include written and hands-on assessment
- Certified Lone Workers shall be able to demonstrate knowledge in all forms of protection, ability to utilize the track access guide, proper radio communication with control, Job briefing, de-briefing
- Lone worker must be qualified as a RWIC
- Certification will be documented and recorded within the Laserfiche system and identified by visible RWP credentials prior to entering the roadway

Maintenance of way Supervisors and Management

Responsibilities

- Respond to and conduct job briefings with lone workers
- Attend Job briefing and Job Hazard Analysis
- Move to designated place of safety when alerted by the RWIC/Flagger
- Report any accident or near miss to RWIC
- Attend debriefing when an accident or a near miss occurs
- Follow standards for PPE as outlined

Certification

- Certification for Supervisors and Managers will be conducted on an annual basis and include written and hands-on assessment
- Certified Supervisors and Managers shall be able to demonstrate knowledge of proper use horn/bell signals and proper hand signals to communicate with rail vehicles
- Supervisors and Managers will be required to be certified for all Roadway worker positions, Roadway Worker, Flagger, RWIC, and Lone Workers
- Certification will be documented and recorded within the Laserfiche system and identified by visible RWP credentials prior to entering the roadway

GOOD FAITH CHALLENGE

Summary: Purpose of a good faith challenge is straightforward: To provide roadway workers with a non-punitive mechanism for raising and resolving on-track safety concerns so the work can be performed safely.

A good faith challenge is an opportunity to jointly resolve any Roadway Worker Protection concerns; it is not a confrontation with your supervisor or RTD management. A job briefing is the first opportunity to make a good faith challenge; however, a challenge can be made at any time. Challenges require prompt and fair resolution.

RTD management fully supports a roadway worker's absolute right to initiate a good faith challenge without fear of retaliation or discipline. The good faith challenge process begins when an employee raises an RWP concern.

Key Points:

1. Employees should remain clear of track until the challenge is resolved.
2. All roadway workers should know where to access RTD's good faith challenge procedures and understand the resolution process.
3. Roadway workers should periodically review the good faith challenge procedures during crew meetings/job briefings.
4. Supervisors and co-workers should actively encourage the use of the good faith challenge.
5. RTD management should periodically review their Roadway Worker Protection program to identify and remove any administrative or procedural barriers to the utilization of the good faith challenge.

Good Faith Challenge Process

Note: All good faith challenges steps will be held outside fouling distance.

1. Roadway worker has concern about on-track safety and discusses with Roadway Worker in Charge.
2. If challenge can be resolved, resume work. If the challenge cannot be resolved, the supervisor will be contacted.
3. If the supervisor cannot resolve over the phone, the supervisor will report to the scene and evaluate the challenge.
4. If the onsite supervisor cannot resolve, then the MOW manager or his designee will be reached for resolution.
5. If good faith challenges have merit, deficiencies will be corrected and employees will resume work. If the good faith challenge has no merit, RWP will be explained by supervisor to Roadway workers and employees will resume work.

6. All good faith challenges will be documented.

Remember: If you are uncertain about your safety, trust your instincts; make a good faith challenge. You may be saving your life.

RADIO COMMUNICATIONS

Summary: Use of the radio is a vital part of roadway worker protection. Communications from control to a roadway worker that pertains to their on-track safety will be repeated back to control for clarity.

Example:

Control “employee is given permission to access the alignment to set signals red and then establish their flagged work zone”

Roadway Worker “understand I have permission to access the alignment and set signals red and then establish my flagged work zone”

6 FORMS OF PROTECTION

Summary: The purpose of roadway worker protection is to prevent accidents and casualties caused by rail vehicles striking roadway workers. The following methods of protection described in this manual will vary depending on the type of work performed and location. More than one form of protection may be used at the discretion of the RWIC.

a. Inaccessible Track
b. Foul Time
c. Flagger Protection
d. Exclusive Track Occupancy
e. Individual Train Detection (ITD)
f. Track Out of Service

		FORM OF PROTECTION					
		Inaccessible Track	**Foul Time**	**Flagger Protection**	**Individual Train Detection**	**Exclusive Track Occupancy**	**Track Out of Service**
	Type of Track	Yard/ Auxiliary	Interlocking	All	All	Mainline	Mainline
Steps to Apply Protection	**JHA/Job Briefing**	YES	YES	YES	With Supervisor	YES	YES
	Call Control/Yard for permission	Yard at Elati Control	Control	Control	Control	Control	Control
	Force Signals Red	NO	YES	NO	NO	Optional	Optional
	Set up Flags	If applying Derail in yard	NO	NO	NO	YES	Double Red Flags at each end
	Use of Shunt	NO	Optional	NO	NO	Optional	NO
	Rail Vehicles Allowed in Work Zone	NO	NO	YES	YES	YES	NO
	Can Track be Unsafe for Trains Traffic	YES	YES	NO	NO	YES	YES
	Sight distant dependant	NO	NO	YES	YES	NO	NO

6 Forms of Protection: a. Inaccessible Track

Summary: This form of protection is used only in yards and auxiliary tracks by making the track inaccessible by one of the following methods below. Prior to making a yard track inaccessible, the shop supervisor and Yard Master must be notified at Elati and Control must be notified at Mariposa and auxiliary tracks.

Either of the two methods listed below are acceptable to make a track inaccessible:

1. Line and lock switches on the limits of work zone to prevent access.
   a. Line the switch away from the track being worked on.
   b. Switches on both ends need to be lined away from work zone.
   c. Dual control switches will be taken off power.
   d. If the switch lacks the ability to be locked out, then point clamp or spike the switch point.

2. Installing derail(s) with flag placement.
   a. Permission must be obtained from MOW supervisor on duty.
   b. Derails must be secured at all times. When transporting derails in vehicles they must be chained and locked to the vehicle to prevent theft. When installed on the rail they must be securely locked to prevent tampering.
   c. Derails must have double red flags placed at the location of the derail.
   d. An additional red flag must be placed 50 feet in advance of the derail.

Step by Step – Inaccessible Track

1. Notify Shop Supervisor at Elati or Control at Mariposa of track to be made inaccessible.
2. Conduct job briefing with all members of the work group.
3. Line switches on both ends away from the work zone and lock/point lock switch; or, install derails with double red flag protection if unable to use switches for protection.
4. If switch is dual control, take switch off power.
5. Protection must remain in place until the track is made safe and workers are clear.

6 Forms of Protection: b. Foul Time

Summary: A method of establishing on track protection where the roadway worker in charge (RWIC) requests that the controller stop all trains and track equipment from entering the work zone until all personnel are clear of the track and the track is safe for train movement. Can only be used at interlocking and electric switch lock locations.

Note: Trains are never allowed to bypass a red signal into the work zone under foul time protection.

Foul Time is a restrictive form of protection, in that trains are not allowed into the work zone until the Roadway worker reports clear and gives back authority to Control. Control has authority as whether or not to grant foul time to a roadway worker. If the roadway worker fails to give back foul time, trains will not be allowed to move until the roadway worker is contacted and it is confirmed the track is safe and the roadway worker(s) is clear.

Upon receiving permission from control, the Roadway Worker must force signals governing entrance(s) into the work zone to red. This can be accomplished by placing the interlocking house into Local control mode, taking the switch(s) out of correspondence, opening gold nuts or placing a shunt.

If in an electric switch lock area the signal maintainer will be required to take the switch/switches out of correspondence setting outer opposing signals (OOS) red.

Key Points

1. No Trains will be allowed in your work zone during foul time.
2. Used for short periods of time only, not to exceed 10 minutes.
3. Used in interlocking's and electric lock switch areas only.
4. Will be used in conjunction with a flagman.

Step by Step – Foul Time

1. Conduct job briefing with all members of the work group.
2. Notify control of location of foul time and wait to receive authority before proceeding.
3. force signals governing entrance(s) into the work zone to red.
4. Protection must remain in place until the track is made safe and workers are clear.

6 Forms of Protection: c. Flagger Protection

Summary: A method of establishing protection in which the RWIC assigns a qualified flagger to provide warning to the roadway workers of an approaching train and signal train to stop if required. Use of this form of protection is not meant to be used when the track is unsafe.

Train approach warning must provide at least 15 seconds warning.

Sufficient sight distance must exist in order to detect an approaching train and clear 15 seconds prior to train arrival. Always assume trains are at Maximum Authorized Speed (MAS). Where sufficient sight distance does not exist, an advance flagger may be used to relay train approach warning to the watchmen near the workgroup. All rules and procedures governing flaggers apply to advance flagger.

1. Assigned flagger shall devote full attention to detecting and communicating approach of trains and shall not be assigned any other duties.
2. Train approach warning shall be distinctive and clearly signify approach of trains or equipment.
3. Every roadway worker protected by flagger must maintain a position which enables workers to receive train approach warning.
4. Warning must be provided by means which does not require warned employees to be looking in a particular direction and must be detectable regardless of noise or work distractions.
5. Flagger must be trained, qualified, and designated in writing by RTD.
6. Advance Flagger must remain in visual and audible distance from the flagger at the work zone.
7. Flaggers shall be provided with and must have on their person the following mandatory equipment for performing the duties of a flagger.
    a. Operating Radio
    b. Yellow Flag or Flashlight
    c. Air Horn with spare air or whistle

Step by Step – Flagger Protection

1. Conduct job briefing with all members of the work group.
2. Notify control of location of Flagger and wait to receive authority before proceeding.
3. Protection must remain in place until workers are clear.

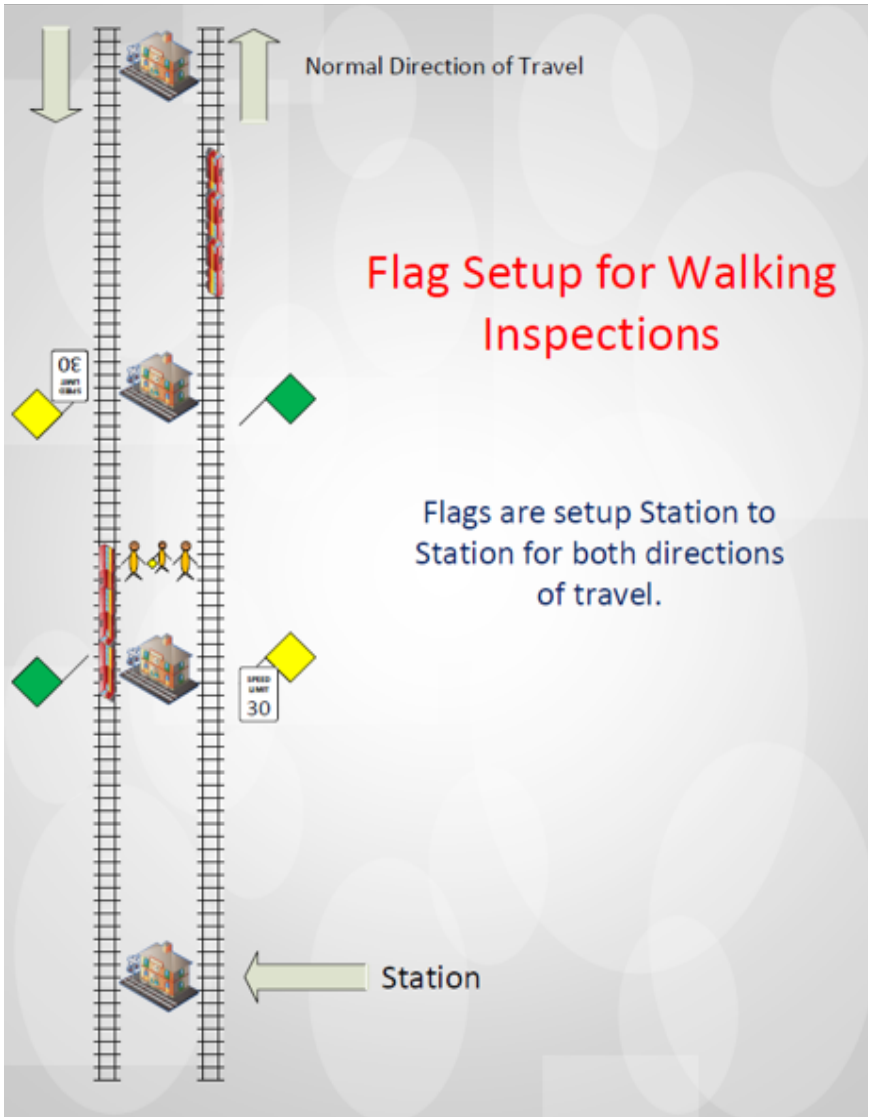
6 Forms of Protection: d. Exclusive Track Occupancy (ETO)

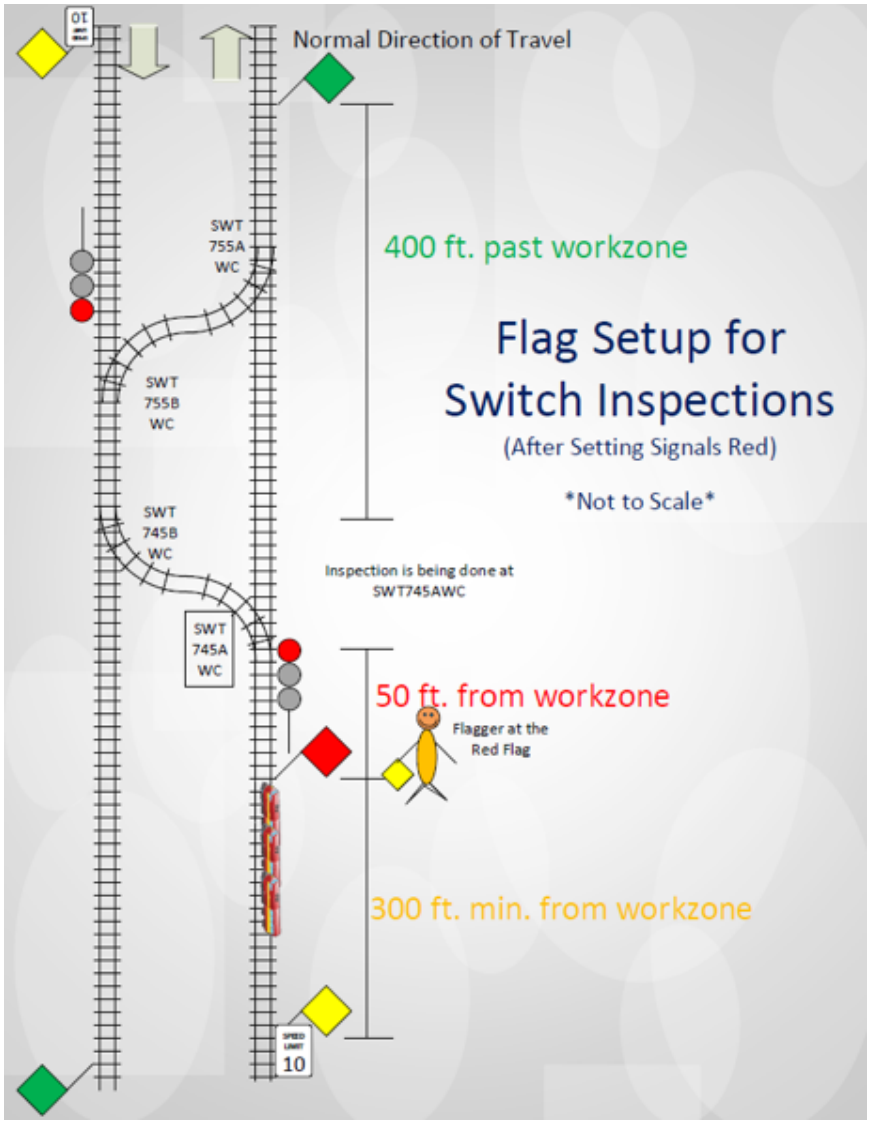
Summary: Work zone established on mainline tracks where movement of trains and equipment shall be made only at the discretion of the Roadway Worker In Charge via hand signals from the flagger. ETO can be used when the track is unsafe, but consideration needs to be given for headway on the corridor that ETO is being used on. Exclusive track occupancy must comply with the following requirements.

1. Mainline track within the working limits shall be placed under the control of one qualified Roadway Worker in Charge.
2. Authority for exclusive track occupancy can only be given over the radio and only from control.
3. One or more flagger(s) will be present to direct movement depending on sight distances and size of work zone.
4. Work limits for exclusive track occupancy shall be clearly defined by the following:
    4.1. Flags of the colors yellow, red, and green, and power flares placed as prescribed.
    4.2. For walking inspections flags yellow and green will be set up from station to station and train will not pass workers without receiving hand signal from RWIC at scene per S.O.P 102.2
    4.3. At interlocking locations, set signals to red in addition to flags.
    4.4. Shunts may also be used.
5. Trains may only bypass red signals after permission is given by control.
6. Trains may only enter the work zone after receiving a permissive hand signal from the flagger.

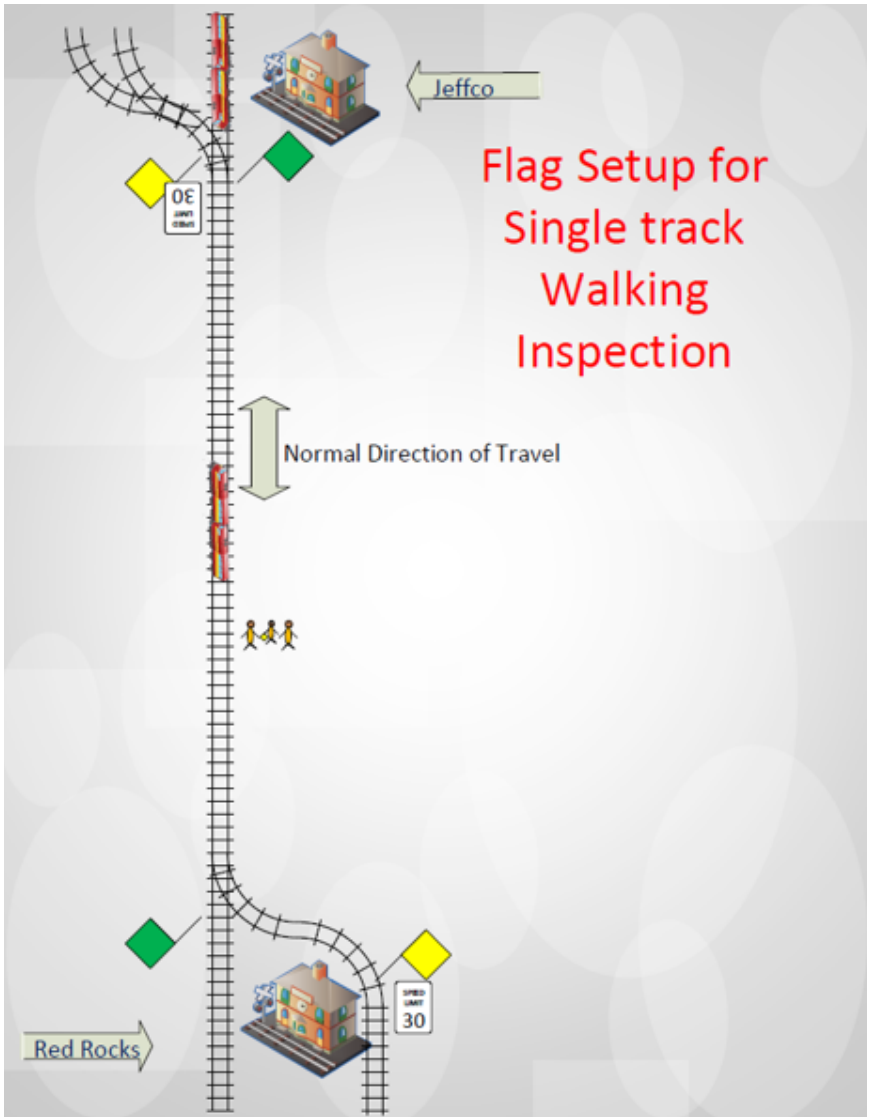
Step by Step – ETO

1. Conduct job briefing with all members of the work group.
2. Notify control of location of the ETO and wait to receive authority before proceeding.
3. If other than a walking inspection, notify control and set signals red.
4. Setup flags.
5. Notify control that flags are set and ask to begin work.
6. Upon completion of work notify control that flags are being pulled.
7. Once flags are pulled return signals to normal.
8. Clear the track and call control to notify them of clearance and verify signals are normal.

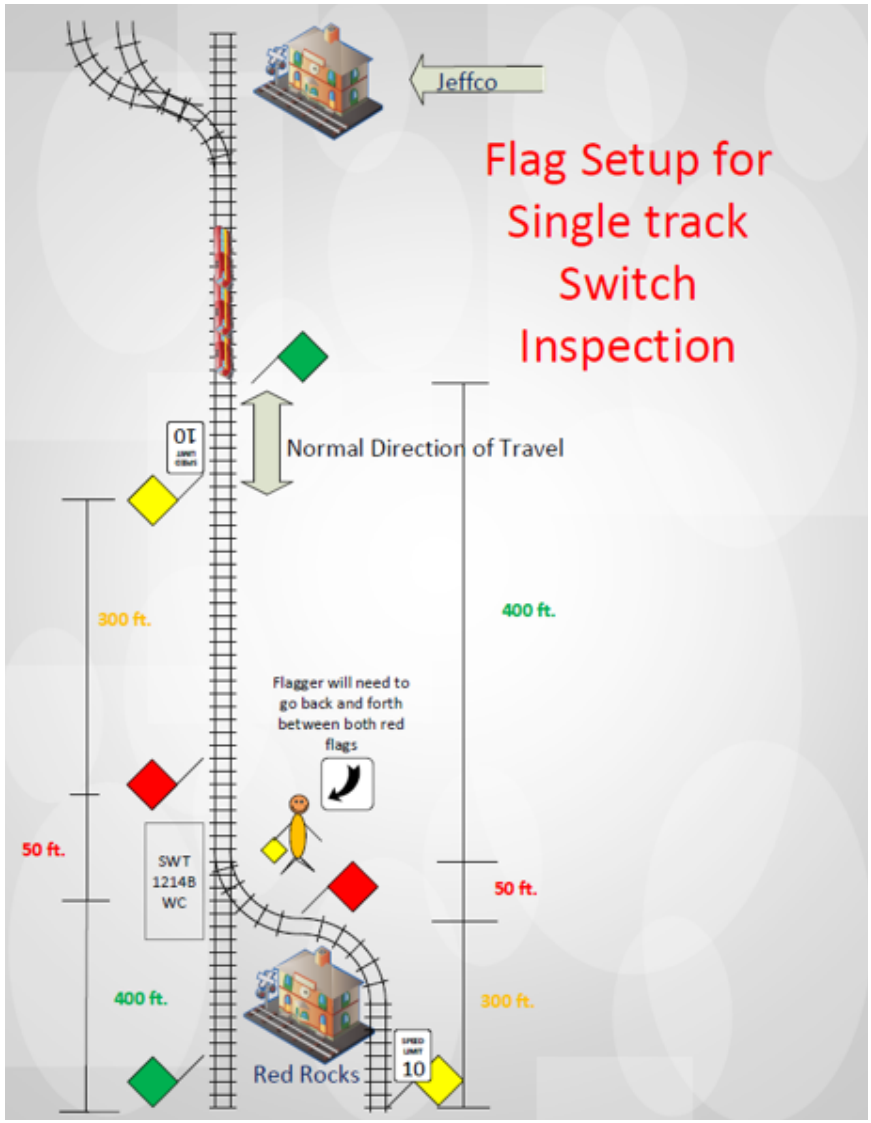

Normal Direction of Travel
Flag Setup for Walking Inspections
Flags are setup Station to Station for both directions of travel.
30
30
Station


Normal Direction of Travel
SWT 755A WC
SWT 755B WC
SWT 745B WC
SWT 745A WC
400 ft. past workzone
Flag Setup for Switch Inspections
(After Setting Signals Red)
Not to Scale
Inspection is being done at SWT745AWC
50 ft. from workzone
Flagger at the Red Flag
300 ft. min. from workzone
10

6 Forms of Protection: **Flag Setup for Single track Walking Inspection**



6 Forms of Protection: **Flag Setup for Single track Switch Inspection**



6 Forms of Protection: e. Individual Train Detection (ITD)

Summary: A form of protection by which a lone worker fouls a track while performing a visual inspection. It can only be used with sufficient sight distance and lone worker must be able to detect approaching trains and clear to a safe location 15 seconds prior to trains arrival.

1. A lone worker must be trained, qualified, and designated in writing by RTD to employ ITD as a form of protection.
2. Lone worker must job brief with Supervisor or Control before fouling track and complete the job briefing form.
3. ITD can only be used where the Lone worker can visually detect the approach of a train moving at the maximum speed authorized on that track, and move to a previously determined place of safety, not less than 15 seconds before the train would arrive at the location of the lone worker.
4. A lone worker using ITD may not be engaged in any common task or in a close proximity with another roadway worker.
5. A lone worker retains an absolute right to use forms of protection other than individual train detection if he or she deems it necessary, and to occupy a place of safety until such other form of protection can be established.
6. Individuals utilizing ITD as a form of protection must utilize redundant forms of protection to include administrative procedures (radio call procedure) Roadway Worker Advance warning system (Protran).

Step by Step – ITD

1. Conduct job briefing with supervisor.
2. Notify control of location of the ITD and wait to receive authority before proceeding.
3. Enter the track and adhere to all rules regarding ITD.
4. Once completed, clear the track and notify control.

Limitations of ITD

- Location must have a clear line of sight to detect an approaching train traveling at MAS and roadway worker must be able to clear to a place of safety 15 seconds prior to arrival of train.
- Lone Workers must not engage in any work, may only perform visual inspections.

6 Forms of Protection: f. Track Out of Service

Summary: A form of protection in which mainline track is removed from revenue service by use of double red flags in conjunction with de-energized wire or by establishing a manual block and lining switches as to prevent trains from entering the out of service track.

1. This form of protection should only be used when condition of the track is impassable or unsafe for revenue service.
   a. Non-operative Train.
   b. Accident.
   c. Maintenance equipment or operations.
2. When track is taken out of service by de-energizing the overhead wire, both ends of that segment must be double red flagged. One flag placed in the gauge and the other placed on the signal side of the rail. Use power flares as required.
3. Power down sheet will be used in non-emergency situations.

Step by Step – Track Out of Service

1. Conduct job briefing with all members of the work group.
2. Notify control of location of the track out of service and wait to receive authority before proceeding.
3. Setup manual block / de-energize OCS and set double red flags.
4. Work may start.
5. Clear track once work is complete, restore power / manual block, and remove flags.
6. Notify control the track is back in service.

ROADWAY WORKER ADVANCED WARNING SYSTEM (PROTRAN)

Summary: A warning system meant to enhance roadway worker protection. The system gives a visual and audible warning approximately 15 seconds in advance of the arrival of a train. The system also alerts the operator of the LRV to the presence of the workers. This system in no way replaces any form of roadway worker protection.

1. This warning system cannot be used as a sole form of protection.
2. All MOW employees who enter the alignment must have a Protran unit.
   a. Before leaving the shop, each unit will be tested in the radio room.
   b. If there is a failure in the shop a new unit will be assigned before leaving.
   c. RWIC will check that all Protran units are on during the job briefing.
   d. Protran units will be turned off when clear of the alignment.
3. If a unit fails in the field
   a. Work can continue if the RWIC has a functioning unit.
   b. Failure of a unit will be reported to the on duty supervisor upon leaving the alignment and turned in at the end of shift.
   c. If there are no functioning Protran units in a work group the group will leave the alignment and notify the on-duty MOW supervisor.
   d. Units will be returned to their charger at the end of the shift.
4. The Protran system is designed to give 15-20 seconds of warning for the approach of a LRV.
   a. RWIC will alert the group when to clear the track and workers will acknowledge the alarm.
   b. Once LRV has passed and RWIC has given all clear, work may resume.
   c. If the alarm goes off again after acknowledging the alarm that may indicate another LRV is on approach.
   d. If the color magenta flashes while alerting of after acknowledgment, then more than one LRV is present.
   e. If a LRV approaches and there is no alarm on any Protran unit, contact control and alert them to the failure to alarm.
5. Contractors will not be issued Protrans.

SHUNTS

Summary: a safety approved wire with a clamping device on each end. Properly installed, shunts show track occupancy to Control. Shunts may be used when roadway workers establish a work zone. Vehicles will be equipped with two shunts each.

1. When accessing the track and working at a fixed location shunts may be used.
2. Notify control that a shunt will be put down in conjunction with one of 7 forms of RWP.
3. Place an orange cone next to the shunt to help locate it.
4. When exiting the tracks remove the shunt last and notify control of its removal.
5. Verify this by checking the shunt removal box on the job briefing form.

WORK EQUIPMENT OPERATION

One of the following forms of protection are required while working:

1. **Track Out Of Service**
    a. Establishing a manual block and physically preventing trains from entering the work zone.
    b. Forcing Signal red by placing a shunt, setting up double red flags, de-energizing overhead wire. No trains will be allowed into the work zone.

While Traveling to the work zone or performing moving inspections (i.e. aerial wire inspection):

1. Control will grant authority to get on the tracks/enter the mainline and will not allow following trains to enter the block in which the on-track equipment is occupying.
2. Equipment must have reliable and tested permanent shunt installed on vehicle or control must set preceding signal red.
3. Work equipment needs to maintain a minimum 400 feet space between vehicles when traveling.
4. Call signals into control as required by control
5. Place all powered switches in hand before traversal

HY-RAIL SPEEDS

The maximum speed governing the movement of Hy-rail vehicles is as follows:

- Maximum of 25 MPH on mainline tangent track
- Maximum of 15 MPH on all mainline curves except curves containing restraining rails
- Maximum of 5 MPH on all mainline curves containing restraining rails
- Maximum 3 MPH over ballasted to embedded transitions
- Maximum of 5 MPH on all auxiliary or yard tracks
- Maximum of 10 MPH through street crossings Hy-rail vehicles will stop before traveling through any street crossings
- Maximum speed through switches and frogs will be 5 MPH. When approaching Power Switches the Hy-rail vehicle will be brought to a stop and the switch will be put in hand before moving onto the switch points.
- Maximum speed for Hy-rail vehicles pulling Hy-rail trailers or equipment will be 15 MPH. Supervisor permission must be obtained prior to backing with a trailer and a spotter must be present.

In adverse weather conditions or in situations affecting normal operation Hy-rail operators must reduce speed to a rate, which will permit the Hy-rail vehicle to be safely stopped short of any obstacle within one-half the sight distance of the operator.

ADJACENT TRACK PROTECTION

Summary: Roadway worker protection needs to be established on adjacent tracks when:

1. Track centers are 25 feet or less apart and equipment has potential to foul adjacent track.
2. Track centers are 25 feet or less apart and Roadway workers are on the ground.

The form of protection is up to the discretion of the RWIC.

TRAINING REQUIREMENTS

Summary: All roadway workers will receive new hire RWP training and certification tests for each position they will be qualifying for. Each year after that, roadway workers will receive refresher training on RWP along with re-certification tests for each position they are qualified for. Passing the training is a requirement of the job and having your proof of training card on your person at all times is required to access the alignment.

Training requirements for RWP

1. All MOW personnel will attend a 2-day initial training course which will include:
   a. Initial RWP training is instructor-led and interactive, allowing participants to ask questions and demonstrate understanding before qualification.
   b. Classroom instruction on the RWP document.
   c. Field practice covering the 6 different forms of protection (Inaccessible Track, Foul Time, Flagger Protection, Exclusive Track Occupancy, Individual Train Detection (ITD), and Track Out of Service) highlighting the roles and responsibilities of each roadway worker.
   d. Certification test for each position they will be qualified for.
2. Operations Control Center and Rail Vehicle Operators receive RWP awareness or RWIC-equivalent training covering communication, protection rules, and incident coordination.
3. Annual refresher training and re-certification test.
4. Refresher field practice will be held every other year.
5. No additional training requirements/ certifications will be required for contractors or subcontractors working within the right of way, the RWIC assigned to work with the contractor will make the decision what form of protection is appropriate for the situation and ensure all workers are present for the job briefing prior to start of work.
6. RWP trainers must hold active certification, complete RTD's Train-the-Trainer course, attend annual refresher training, and participate in peer evaluations.

Training Content

The RWP training will address the following:

(1) How to interpret and use the RTD's RWP manual;

(2) How to challenge and refuse assignments in good faith;

(3) How to report unsafe acts, unsafe conditions, and near-misses after they occur, and the mandatory duty to make such reports;

(4) Recognition of the track zone and understanding of the space around tracks within which on-track safety is required, including use of the track access guide;

(5) The functions and responsibilities of all transit workers involved in on-track safety, by position;

(6) Proper compliance with on-track safety instructions given by transit workers performing or responsible for on-track safety functions;

(7) Signals and directions given by flag person/flagger, and the proper procedures upon receiving a rail transit vehicle approach warning from a flag person/flagger;

(8) The hazards associated with working on or near rail transit tracks to include traction power, if applicable;

(9) Rules and procedures for redundant protections identified under 49 CFR 671.37 and how they are applied to RWP; and

(10) Requirements for safely crossing rail transit tracks in yards and on the mainline.

RWP REVIEW, UPDATES, AND APPROVAL

The manual will be reviewed and updated at least once every two years for review and approval by the State Safety Oversight Agency or Colorado Public Utilities Commission. Feedback from RWP meetings, near-miss reports, and field observations informs training updates during the biennial review.

Updates will be communicated to all affected parties. RWP Manuals and Track Access Guides and revisions will be distributed to all roadway workers via digital copy or physical copy. Acknowledgment is tracked.

AUDIT AND COMPLIANCE MONITORING

Field observations are routinely conducted to verify compliance with the RWP Program. RTD submits quarterly RWP Program Status Reports to SSOA summarizing audits, field checks, and corrective actions; aligned with CAP update cycle.

Audits of the RWP program, including all required RWP program elements, will be conducted annually in conjunction with the Internal Safety Reviews. State Safety Oversight Agency or Colorado Public Utilities Commission may also conduct separate annual audits of the RWP program elements.

RTD provides an annual RWP briefing to the Accountable Executive and Board as part of the Safety Management System performance update.

All RWP records (certifications, job briefings, training) shall be retained for a minimum of three (3) years in Laserfiche and made available to FTA/ SSOA on request.

APPENDIX

Safety Risk Assessment

Purpose of the Table and Alignment with 49 CFR Part 671

This table supports compliance with 49 CFR Part 671 by outlining the required safety risk assessment process and identifying categories of roadway work that require redundant protections. It aligns with the Agency Safety Plan (ASP) and incorporates the methods in §673.25(c) and (d) for identifying hazards and determining appropriate mitigations.

Each category of work listed in the table represents a unique risk profile. The risks must be assessed using the agency's Safety Risk Management (SRM) process, and appropriate redundant protections—procedural and/ or physical—must be applied. Lone workers must be included in this assessment and provided, at a minimum, with foul time or an SSOA-approved equivalent.

Redundant protections are defined as layered safety measures that reduce the likelihood of harm if a primary control fails. Examples include flagger protection, exclusive track occupancy, shunt devices, warning systems, and power-off verifications. These protections are determined based on factors such as type of work, location, and operational conditions.

The table is a tool to help ensure that roadway worker protection is risk-informed, job-specific, and compliant with both the RTA's ASP and the SSOA's program standard. The safety risk assessments used to inform these protections must be updated at least every two years and may be informed by engineering inputs, safety assurance activities under §673.27, investigation findings, and lessons learned from near misses or unsafe conditions.

This approach ensures alignment with federal requirements while improving field-level understanding and application of safety controls.

Likelihood (Pre-Control):

Likelihood refers to the estimated probability of the hazard occurring before any protective measures are implemented. This estimation is based on historical data, field observations, documented incidents or near-misses, and expert judgment. It reflects how often similar events have happened or are expected to occur under current conditions without additional safeguards.

Severity (Pre-Control):

Severity represents the expected level of harm or consequence to workers or operations if the hazard occurs without any protections in place. This includes injury, fatality, property damage, or system disruption. Severity is judged by considering the worst credible outcome based on historical incidents, exposure duration, task complexity, and proximity to live rail.

Residual Likelihood (Post-Control):

Residual likelihood is the reassessed probability that a hazard will occur after all planned or implemented controls are in place. This considers the effectiveness, reliability, and human factors related to the protections. It should reflect real-world conditions, including whether the protections are consistently applied, enforced, and understood.

Residual Severity (Post-Control):

Residual severity is the potential consequence if the hazard occurs after controls are in place. While the likelihood may drop, the consequence usually remains the same unless protections are designed to limit impact (e.g., barriers that prevent full contact or automatic shutoffs).

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Hazard ID	Code of Federal Regulations (CFR) Citation	Categories of work requiring redundant protections: Redundant protections must be identified for roadway workers performing different categories of work on the roadway and within track zones, which may include but are not limited to categories such as:	Work Category	Hazard Identification
RWP-001	49 CFR 671.39(c)(1)	Roadway workers moving from one track zone location to another	Moving between track zones	Movement not seen or coordinated
RWP-002	49 CFR 671.39(c)(2)	Roadway workers performing minor tasks	Performing minor tasks	Zone entered without protection
RWP-003	49 CFR 671.39(c)(3)	Roadway workers conducting visual inspections	Visual inspections	Unexpected train movement
RWP-004	49 CFR 671.39(c)(4)	Roadway workers using hand tools, machines, or equipment in conducting testing of track system components or non-visual inspections	Testing track with tools	Blocked hearing/ sight
RWP-005	49 CFR 671.39(c)(5)	Roadway workers using hand tools, machines, or equipment in performing maintenance, construction, or repairs; and/or	Construction/ maintenance	Multiple interface risks
RWP-006	49 CFR 671.39(c)(6)	Lone workers accessing the roadway or track zone or performing visual inspections or minor tasks.	Lone worker tasks (only can be visual inspections)	No support if primary fails

Likelihood (Pre-Control)	Severity (Pre-Control)	Initial Risk Score (Pre-Control)	Likelihood (Post-Control) Residual likelihood is the reassessed probability that a hazard will occur after all planned or implemented controls are in place. This considers the effectiveness, reliability, and human factors related to the protections.	Severity (Post-Control) Residual severity is the potential consequence if the hazard occurs after controls are in place. While the likelihood may drop, the consequence usually remains the same unless protections are designed to limit impact.
Frequent movements.	Historical near miss data and industry data indicate potential for fatality	2B	Multiple forms of protection and redundant protections reduce likelihood of exposure or dependency on single point of failure	Limited interface between train-roadway worker and sight distance from flagger protection where ETO and TOS not utilized reduces severity of contact
Minor tasks are brief and situationally aware, but still vulnerable.	Injury or fatality likely if work is performed without awareness of train presence.	2B	Multiple forms of protection and redundant protections reduce likelihood of exposure or dependency on single point of failure	Limited interface between train-roadway worker and sight distance from flagger protection where ETO not utilized reduces severity of contact
Visual inspections are brief and situationally aware, but still vulnerable.	Injury or fatality likely if work is performed without awareness of train presence.	2B	Multiple forms of protection and redundant protections reduce likelihood of exposure or dependency on single point of failure	Limited interface between train-roadway worker and sight distance from flagger protection where ETO not utilized reduces severity of contact
Tool use distracts from auditory/ visual train cues, observed in field.	Distraction and equipment proximity create high injury potential.	2B	Multiple forms of protection and redundant protections reduce likelihood of exposure or dependency on single point of failure	Limited interface between train-roadway worker and sight distance from flagger protection where ETO and TOS not utilized reduces severity of contact
Multiple crews and equipment increase risk exposure.	Industry fatalities historically associated with equipment/train interface.	2B	Multiple forms of protection and redundant protections reduce likelihood of exposure or dependency on single point of failure	Limited interface between train-roadway worker and sight distance from flagger protection where ETO and TOS not utilized reduces severity of contact
Lone worker exposure is infrequent, but high severity if failure occurs.	Total reliance on single detection method increases risk.	2B	Limited duration of task and redundant protections reduce likelihood of exposure	Total reliance on single detection method increases risk.

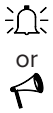
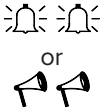
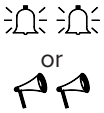
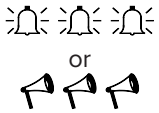
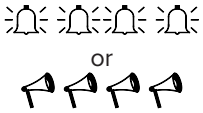
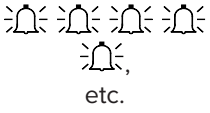
Hazard ID	Residual Risk Score (Post-Control)	Forms of Primary Protections	Required Redundant Protection	Protection Type	Task Duration
RWP-001	2E	Flagger Protection or Exclusive Track Occupancy or Track Out of Service	Protran system + Call In Procedure	Physical + Procedural	Short to Medium
RWP-002	2E	Flagger Protection or Exclusive Track Occupancy or Foul Time	Flags + Protran system + Call In Procedure	Physical + Procedural	Short
RWP-003	2E	Flagger Protection or Exclusive Track Occupancy or Foul Time	Flags + Protran system + Call In Procedure	Physical + Procedural	Short
RWP-004	2E	Flagger Protection or Exclusive Track Occupancy or Foul Time	Flags + Protran system + Call In Procedure	Physical + Procedural	Medium
RWP-005	2E	Exclusive Track Occupancy or Inaccessible Track or Track Out of Service	Flags + Protran system + Call In Procedure	Physical + Procedural	Long
RWP-006	2D	Individual Train Detection (ITD)	Protran system + Call In Procedure	Procedural	Short

Zone Type	Responsible Role	Justification	How Protection Addresses Risk
Mainline, Auxilliary	Roadway Worker in Charge (RWIC) + Control	Redundancy required due to known incidents where movement between zones was not communicated. Stacked protections mitigate visibility and radio failure.	Prevents train movement through work zone unless authorized, ensuring worker visibility and control.
Mainline, Auxilliary	Roadway Worker in Charge (RWIC) + Control	Task frequency low, but lacks routine planning. Flagger and signage alert nearby operators; radio adds procedural hold.	Provides visual and auditory warning to both train operators and workers to avoid collisions.
Mainline, Auxilliary	Roadway Worker in Charge (RWIC) + Control	Lone workers have misjudged train speed/distance. ITD alone not sufficient "visual/flag warnings needed.	Provides visual and auditory warning to both train operators and workers to avoid collisions.
Mainline, Auxilliary	Roadway Worker in Charge (RWIC) + Control	Noise, vibration, and concentration on tools reduce train detection. Controls ensure layered safety.	Prevents train movement through work zone unless authorized, ensuring worker visibility and control.
Mainline, Auxilliary	RWIC + Control + Maintenance-of-Way (MOW) Supervisor	Documented severe injuries during active construction. Multi-modal control is As Low As Reasonably Practicable (ALARP) due to sustained exposure.	Provides visual and auditory warning to both train operators and workers to avoid collisions.
Mainline, Auxilliary	Lone Worker + Control + Maintenance-of-Way (MOW) Supervisor	Fatal near misses validate need for physical + procedural backup. SSOA-approved alternatives needed where Foul Time impractical.	Temporarily halts train traffic during critical tasks, minimizing risk of unexpected movements.

RISK ASSESSMENT MATRIX					
Severity / Probability	Catastrophic (1)	Severe (2)	Serious (3)	Limited (4)	Negligible (5)
Frequent (A)	High	High	Serious	Medium	Medium
Probable (B)	High	High	Serious	Medium	Moderate
Remote (C)	Serious	Serious	Medium	Moderate	Low
Improbable (D)	Medium	Medium	Moderate	Low	Low
Highly Improbable (E)	Medium	Moderate	Low	Low	Low

Hand and Bells

5.9	**Hand Signals**	
5.9.1	Swung at right angle to the track.	STOP AND STAY 
5.9.2	Arm extended straight out from the body.	REDUCE SPEED 
5.9.3	Raised and lowered vertically.	PROCEED 
5.9.4	Swung slowly in a circle at right angle to the track.	BACK UP 

5.11.1	 or	Acknowledges receipt of a STOP hand signal.
5.11.2	 or	Acknowledges a PROCEED or REDUCE SPEED hand signal.
5.11.3	 or	Bell shall be used prior to moving the train forward.
5.11.4	 or	Horn shall be used prior to backing up. Acknowledges a BACK UP hand signal.
5.11.5	 or	Call for signal.
5.11.6	 , etc.	A warning to people on or near the tracks and at station platforms. Also used while passing standing cars.
5.11.7		A warning to people or vehicles on or near the tracks. This is to be used if Rule 5.11.6 is not sufficient.
5.11.8	 (two longs, a short, and a long)	The standard warning when approaching at-grade crossings with the final horn blast occurring as the Operator's cab travels through the crossing.

Speed Sight Chart

Maximum Authorized Speed (MAS) MPH	Minimum Required Sight Distance Feet
5	110
10	220
15	330
20	440
25	550
30	660
35	770
40	880
45	990
50	1100
55	1210

Contact Numbers

For Emergencies, contact

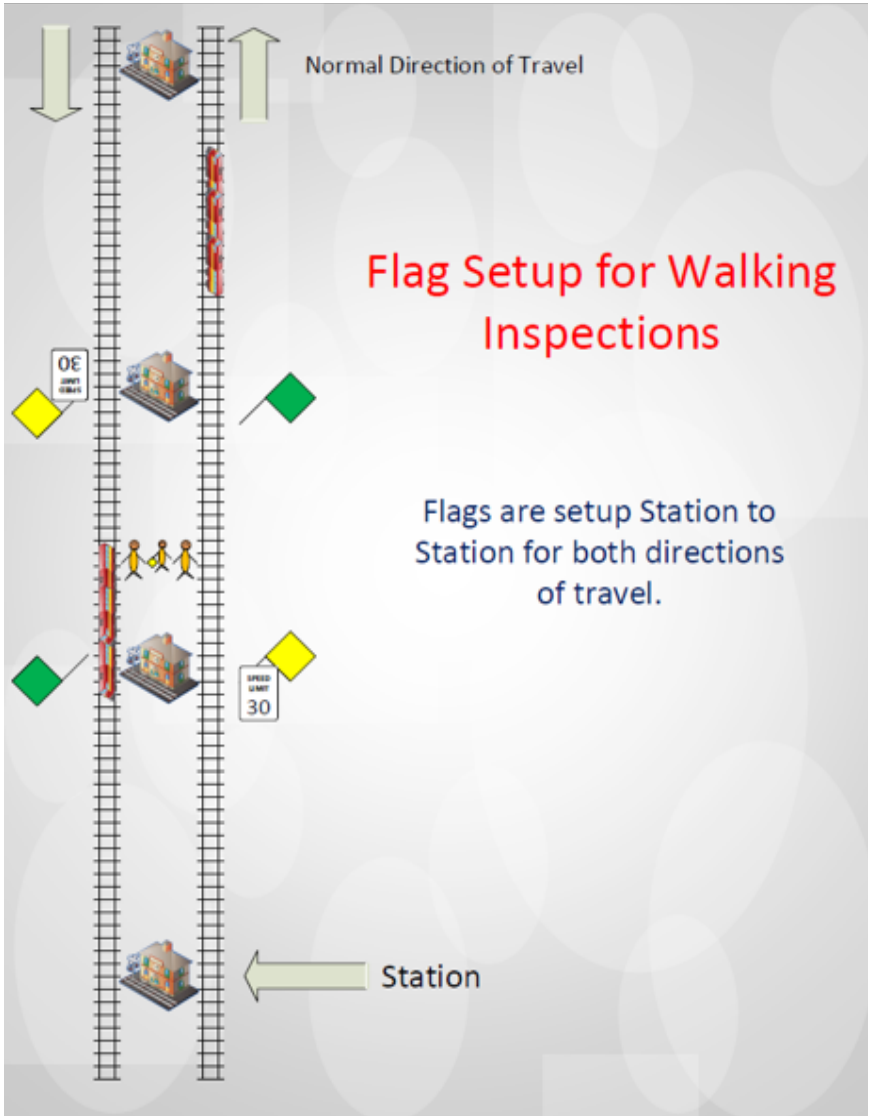
a. Control Center – 303.299.3480

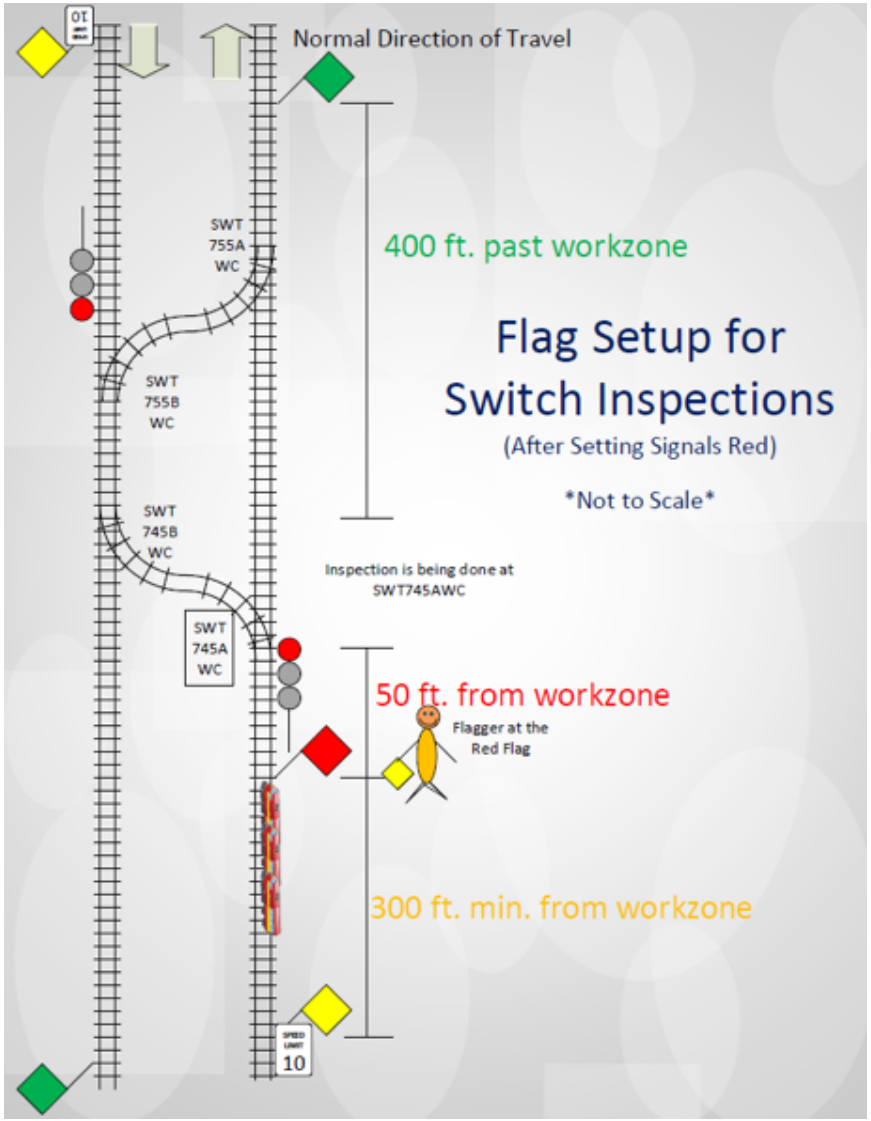
For additional information, contact:

b. Transit Safety Specialist – 303.299.3823

c. General Superintendent – Infrastructure and MOW – 303.299.3457

d. Manager MOW – 303.299.3324


Normal Direction of Travel
Flag Setup for Walking Inspections
Flags are setup Station to Station for both directions of travel.
30
30
Station


Normal Direction of Travel
SWT 755A WC
SWT 755B WC
SWT 745B WC
SWT 745A WC
400 ft. past workzone
Flag Setup for Switch Inspections
(After Setting Signals Red)
Not to Scale
Inspection is being done at SWT745AWC
50 ft. from workzone
Flagger at the Red Flag
300 ft. min. from workzone
10

Job Briefing Form / Job Hazard Analysis / Job Debriefing Form

This is an example of the Job Briefing Form, Job Hazard Analysis, and Job Debriefing Form. This form may be updated to reflect changes improvement opportunities identified for improved communications.

MOW JOB BRIEFING FORM

NO INDIVIDUAL SHALL FOUL ANY TRACK UNTIL RECEIVING AND ACKNOWLEGING JOB BRIEFING

Date	RWIC	Permit Number

Corridor	Track Segment/Track Access Guide pg. #	MAS of Track	Work Order Number

Work to be Performed

Form of Roadway Worker Protection:

Foul Time ____ Flagger Protection ____ Track out of Service ____ Exclusive Track Occupancy ____ Inaccessible Track ___ Individual Train Detection ____

Adjacent track Y____ N ____ Form of protection on adjacent track _____

Location to Clear Track

Instructions for emergencies: Alternate RWIC_____ First Aid provider _____

Where to clear _____ Should all trains be stopped Y___ N ___

All Personnel wearing required PPE ___ Protrans Turned On ____ Time Accessing the Track _____

Shunt Applied Y____ N___ Shunt Removed Y_____ N____

Are all Tools and Personnel clear of the tracks Y____ N____ Time Clear of the Track _____

Protrans Turned Off ____

Each Employee will acknowledge understanding of and agreement with the Job Briefing and JHA

Name	Signature	Time received Briefing/JHA	Time Clear	Employee clear initial

Contractor signature acknowledging Flagger_____ Time Started _____ Time Ended _____

Follow up briefing Y____ N___

JOB HAZARD ANALYSIS (JHA) FORM	
Title of Job or Task:	**Person(s) Creating this JHA:**
Date:	**Location:**

PPE & Other Equipment Required			
Eye Protection	Hard Hat	Hearing Protection	Respiratory Protection
Foot Protection	Gloves	Face Shield	Other PPE
Reflective Vest	Fall Protection		
Hand tools	Power Tools	Lifting Straps	

Use these designations in the "Hazards Present" column:			
SB – Struck By	CI - Caught In	FB – Fall to Below	CBY – Contacted By
SA – Struck Against	CB – Caught Between	FS – Fall at the Same Level	CO – Caught On
CW – Contact With	O – Overexertion or Repetitive Motion	E – Exposure to Chemicals, Noise, Vibration, Radiation, Electric Shock Potential	

BASIC JOB STEPS	HAZARDS PRESENT IN EACH JOB STEP		CORRECT AND SAFE PROCEDURES
Housekeeping	**FB, FS**	Slip, trip or fall hazards,	Administrative Controls & Personal Protective
Stop work authority		All RTD staff have the right and responsibility to stop work if they spot a hazard or potential for a hazard	

Job Debriefing:

Describe any near misses that occurred during this job_____

What measures were taken to mitigate the re-occurrence? _____

_____

Describe any work zone violations: Train ___ individual ___Train number _____ time _____

What was the nature of the work zone violation? Train operator not following flagging instructions ___

Train operator not following speed restrictions ___ Train operator not calling for signal ___

Train operator not sounding continuous bells ___ Train operator not calling control to bypass red __

Individual not following RWP procedures __ Explain_____

Weather related interruption __ Explain _____

Injury to individual ____ Nature of injury _____

rtd-denver.com
303.299.6000

Regional Transportation District
1660 Blake Street
Denver, CO 80202