

Union Pacific Railroad

GUIDELINES FOR
TRACK & GROUND MONITORING



CALL BEFORE YOU DIG
1-800-336-9193

Contents

1. Introduction.....	2
A. Purpose.....	2
2. Track and Ground Monitoring	2
A. General track and ground monitoring requirements	2
B. Track Monitoring.....	3
C. Ground Monitoring.....	3
D. Contingency Plans.....	3
3. Excavation Requirements	4
A. Shoring Design.....	4
B. Excavation Safety.....	4
4. Glossary	5

1. Introduction

A. Purpose

1. The purpose of these Guidelines is to inform 3rd party Applicants, Contractors and others outside of the Railroad of the requirements and standards for the monitoring of track movement, both vertical and horizontal, and ground movement due to surrounding construction.
2. This document governs at all locations where the Railroad operates, regardless of track ownership or track status, either active or out of service.

2. Track and Ground Monitoring

A. General track and ground monitoring requirements

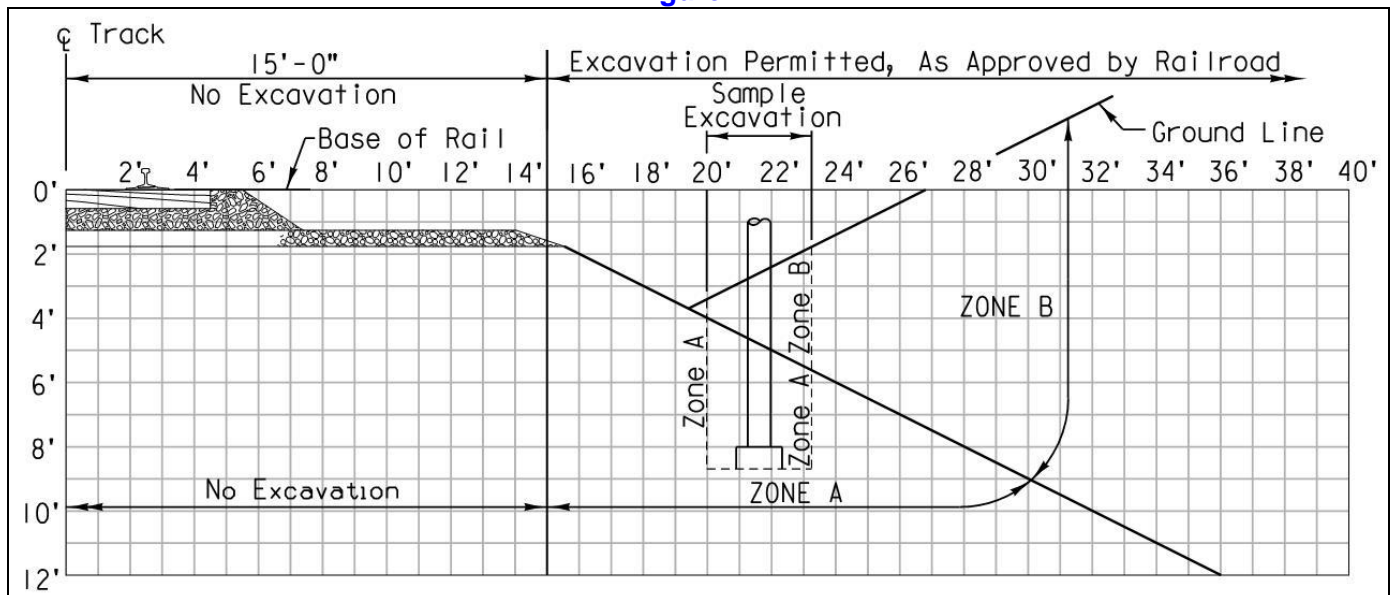
1. Track and ground monitoring are required for any of the following three conditions:
 - i. For crossings with pipe diameter and depth (below base of rail) as shown below in [Table 2-1](#).
 - ii. For shoring within Zone A of any track, as shown below in [Figure 2-1](#).
 - iii. Additional monitoring may be required by the Railroad on a case by case basis.
2. Monitoring schedule
 - i. Monitoring shall commence once any construction activity is within Zone A. See [Figure 2-1](#).
 - ii. Monitoring shall continue, after installation is complete, for 7 days or as required by the Railroad.
 - a. For large and/or shallow pipeline installations monitoring may be required for up to 30 days.
3. General requirements
 - i. Temporary lighting may also be required by the Railroad to identify tripping hazards to train crewmen and other Railroad personnel.
 - ii. Any excavation, holes or trenches on the Railroad property shall be covered, guarded and/or protected. Handrails, fence, or other barrier methods must meet OSHA and FRA requirements.

Table 2-1

Depth, feet (below base of rail)	Table 2-1										
	<=6	<=12	<=18	<=24	<=30	<=36	<=42	<=48	<=54	<=60	>60
<=5	X	X	X	X	X	X	X	X	X	X	X
<=10	X	X	X	X	X	X	X	X	X	X	X
<=15	X	X	X	X	X	X	X	X	X	X	X
<=20			X	X	X	X	X	X	X	X	X
<=25					X	X	X	X	X	X	X
<=30								X	X	X	X
>30										X	X

X = Monitoring is required

Figure 2-1



B. Track Monitoring

1. Track Deflection Limits
 - i. The top of rail shall not permanently deflect more than ¼ inch vertical or horizontal. This is not an “allowable” deflection. All estimated deflection should be eliminated to the greatest extent possible prior to construction.
2. Targets
 - i. Track monitoring shall not require track access other than to place the track monitoring targets.
 - ii. Monitoring targets should be placed such that monitoring is possible when a train is present. However, monitoring during the passing of a train is not required as the train will temporarily deflect the track.
 - iii. Adhesive backed reflective targets may be attached to the side of the rail temporarily. Targets should be removed once monitoring phase is complete.
 - iv. Note, there are normal and temporary vertical track deflections caused by the passage of a train which should be noted and established prior to construction.
3. Monitoring Plan
 - i. If the top of rail does deflect more than 1/4 inch, either vertical or horizontal, all operations shall stop until the matter is resolved.
 - ii. Provide established contingency plan, [See Section 2.D](#), in the event of ground loss and/or the rail deviates ¼ inch vertical or horizontal.
 - iii. Establish a bench mark in the vicinity of the construction. Establish locations for shooting elevations on the top of rail at each area of construction.
 - a. Example locations for shooting rail elevations would be at:
 - At the centerline of an under track crossing.
 - At both outside edges of the crossing. ie. For a wide excavation.
 - At multiple locations from the crossing/excavation edge but no less than 10, 20, 30, 40 and 50 feet from the crossing.
 - iv. Monitoring shall be continuous and recorded in a field log book dedicated for this purpose. Copies of these field log entries can be made available to all concerned parties upon request at any time during construction.

C. Ground Monitoring

1. Provide means for monitoring ground settlement. Submit monitoring plan for Railroad review.
2. Ground monitoring points should be in alignment above the proposed construction activities.

D. Contingency Plans

1. The Contractor shall supply Contingency Plan(s), which anticipate reaching the Threshold and Shutdown values, for all construction activities which may result in horizontal and/or vertical track deflection.
 - i. Track monitoring values:
 - a. Threshold value = 1/8 inch permanent vertical or horizontal deflection
 - b. Shutdown value = 1/4 inch permanent vertical or horizontal deflection
2. The Contingency Plans shall provide means and methods, with options if necessary.
3. The Contractor should anticipate the need to implement each Contingency Plan with required materials, equipment and personnel.
 - i. Once the Threshold value is met, the contractor shall determine the appropriate Contingency Plan(s) and immediately discuss this plan with, and receive approval confirmation from, the Railroad or authorized Railroad representative.
 - ii. Once the Shutdown value is met all project work shall stop and the chosen Contingency Plan shall commence.
 - a. The Railroad may choose to allow and/or require the immediate implementation of specific approved Contingency Plans, submitted by the Contractor, once the Shutdown value is met.

3. Excavation Requirements

A. Shoring Design

1. For temporary earth retention design requirements on the Right-of-Way, see the Railroad Guidelines for Temporary Shoring. http://www.up.com/real_estate/roadxing/industry/index.htm

B. Excavation Safety

1. Guardrails
 - i. Guardrails shall be provided to surround unattended excavations on Railroad Right-of-Way per OSHA Standard Number 1926.502 as follows:
 - a. The guardrail height shall be at least 42 inches above the walking surface.
 - b. The smallest dimension for openings in the guardrail shall be no greater than 19 inches.
 - c. Guardrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds applied within 2 inches of the top edge, in any outward or downward direction, at any point along the top edge of the guardrail.

4. Glossary

Applicant: Any party proposing to install a new, and/or abandon existing, pipelines or Wirelines on Railroad right-of-way or other Railroad operating location, regardless of track being active or out of service. This includes any contractor, employee or consultant hired by said party.

Call Before You Dig: A Union Pacific Railroad 24-hr by 7-day communication center to assist in protecting, documenting and notifying callers of other utilities installed within the Railroad right-of-way.

1-800-336-9193

Crossing: Refers to a Utility which is crossing the Railroad track(s).

Carrier Pipe: Pipe used to transport the product.

Casing Pipe: Pipe through which the carrier pipe is installed.

Cover: Distance from either the base of rail or finished grade to the top of Pipeline or Wireline.

Encroachment: Utilities on Railroad right-of-way which are generally oriented parallel with Railroad right-of-way and/or track.

Centerline of Track: An imaginary line, that runs down the center of the two rails of a track.

Construction Documents: Design plans and calculations, project and/or standard specifications, geotechnical report and drainage report.

Construction Window: A timeframe in which construction or maintenance can be performed by the Contractor with the required presence of a Flagman.

Contractor: The individual, partnership, corporation or joint venture and all principals and representatives (including Applicant's subcontractors) with whom the contract is made by the Applicant for the construction of the Grade Separation Project.

Facility: Refers to the Applicant's pipeline, wireline, poles, manholes, handholes, splice boxes, storage tanks and other such structures which exist as part of the Applicant's infrastructure.

Flagman (Flagging): A qualified employee of the Railroad providing protection to and from Railroad operations per Railroad requirements.

Guidelines: Information contained in this document.

Industry Track: A secondary track designed to allow access to industries along the main track.

Main Track: A principle track, designated by Timetable or special instructions, upon which train movements are generally authorized and controlled by the train dispatcher. Main Track must not be occupied without proper authority.

Railroad Load: Cooper E-80 loading.

Railroad: Refers to Union Pacific Railroad.

Railroad Manager of Track Maintenance (MTM): Railroad representative responsible for maintenance of the track and supporting subgrade.

Right-of-Entry Agreement: An agreement between the Railroad and an Applicant or a Contractor allowing access to Railroad property.

Right-of-Way: The private property limits owned by the Railroad.

Tracks: The rails, ties and ballast and roadbed that compose the traveling surface used by trains.

Utility: Refers to a pipeline or wireline.

Wireline: Refers to electric power and communication utility systems including, but not limited to, all associated conductors, cables, support structures, and equipment.