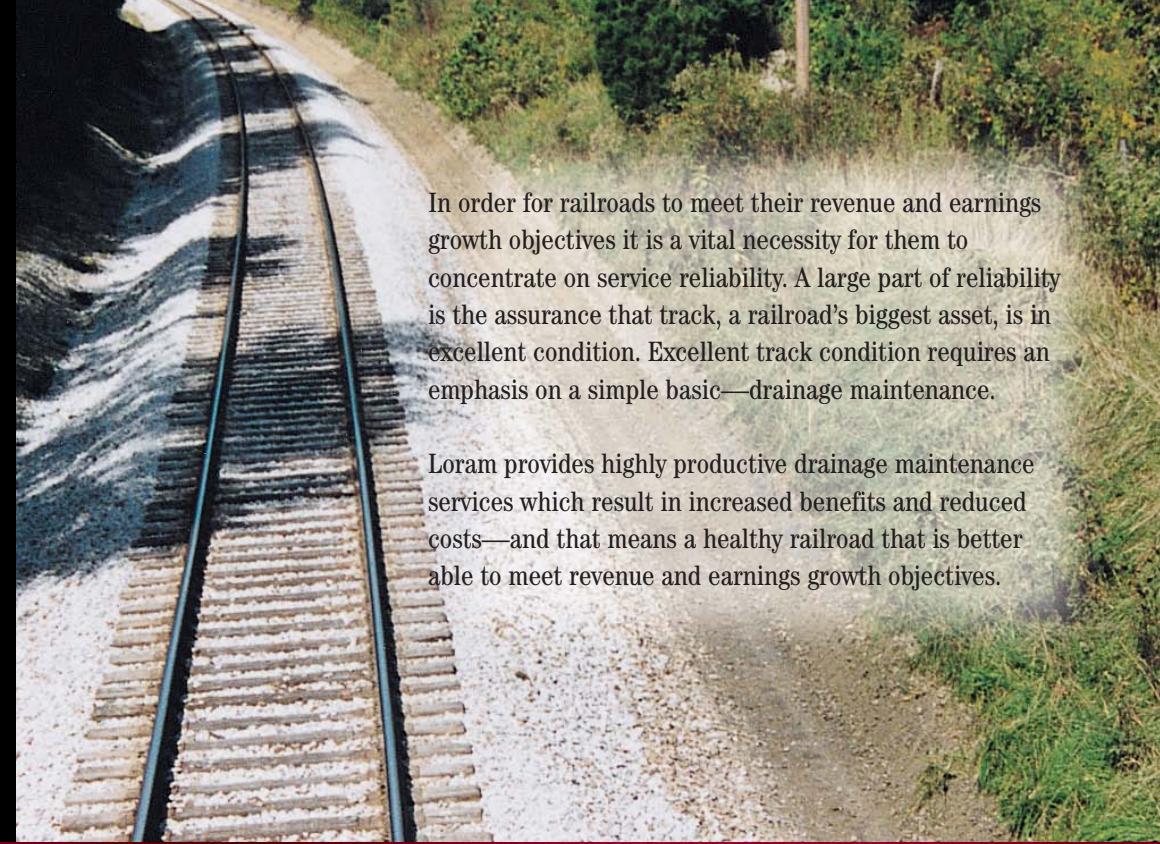


Drainage Maintenance



In order for railroads to meet their revenue and earnings growth objectives it is a vital necessity for them to concentrate on service reliability. A large part of reliability is the assurance that track, a railroad's biggest asset, is in excellent condition. Excellent track condition requires an emphasis on a simple basic—drainage maintenance.

Loram provides highly productive drainage maintenance services which result in increased benefits and reduced costs—and that means a healthy railroad that is better able to meet revenue and earnings growth objectives.

Water is the enemy. It can be costly.

It is sometimes difficult to measure and see the damage from poor drainage maintenance. A seemingly dry right-of-way may not convey a problem. Unseen water trapped below the surface often goes undetected. Fouled ballast itself is often difficult to see and detect as a problem.



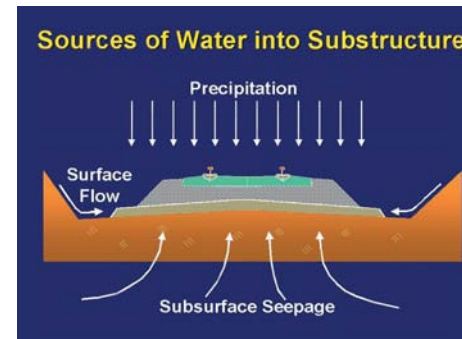
Standing Water In Ditch

The costly results of poor drainage.

- Track profile deteriorates which can increase the frequency of surfacing operations by a factor of ten.
- The need for track alignment accelerates.
- Track buckling can increase by as much as 10% to 30% as a result of a corresponding decrease in the lateral strength of the shoulders.
- Slow orders after tamping and track disturbance are greatly increased.
- The need for herbicide applications can increase due to vegetation growth in the ballast. Ballast must be cleaned or organic growth residue will provide the basis for further plant growth.
- Fouled shoulder ballast causes a reduction in the strength of the interlocking ballast. This loss creates the need for flatter slopes at the shoulder, or more costly ballast.

Problem #1 Clogged Ditches

If there is no place for the water to drain, problems will occur.



These conditions if not corrected, will become bigger, more expensive maintenance issues.

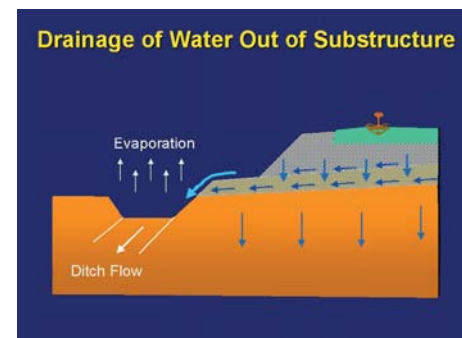


Blocked Ditch



Erosion-Fouled Ditch

Solution #1 The Engineered Ditch



The function of the engineered ditch.

- Intercepts and diverts water from outside the track area.
- Lowers the water table to allow drainage from subgrades.
- Extends the effective duration of ballast cleaning cycles by allowing free-flow from the ballast section.
- Intercepts and drains water from the track structure.

The functional benefits of ditch maintenance.

- Extends track life with free-flowing drainage.
- Extends component life.
- Extends undercutter and shoulder ballast cleaner cycles.
- Reduces spot maintenance.
- Improves track stability.



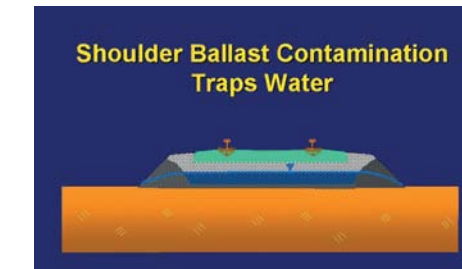
The Loram Badger Ditcher

Problem #2 Fouled Shoulder Ballast

Trapped water causes expensive problems.

Engineers know that water trapped in the ballast section increases ballast degradation and decreases the necessary interlocking mechanics between particles. This, in turn, causes a loss of longitudinal and lateral ballast strength. This loss of strength leads to deterioration of track geometry. Result—the

frequency of surfacing cycles and other corrective maintenance must be increased. Additionally the loss of strength can create batter that damages rail and loosens fasteners. Wet ties deteriorate more rapidly and the track becomes more vulnerable to frost heaves in cold weather.



Contaminated Ballast Shoulder

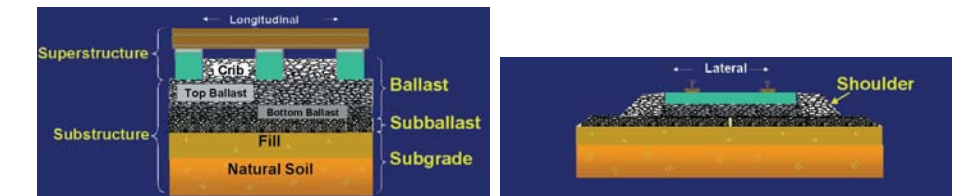


Water Trapped In The Track

Solution #2 Clean Shoulder Ballast

The function of ballast.

- Supports the loaded track.
- Distributes the load.
- Maintains the track geometry and facilitates correction.
- Acts as a medium for effective drainage of the track structure.



The Loram High Performance Shoulder Ballast Cleaner

The functional benefits of shoulder ballast cleaning.

- Increases the tonnage between undercutter cycles.
- Extends the tonnage between surfacing cycles.
- Extends the ballast and tie life.
- Reduces the occurrence of frost heaves.

The Complete Drainage System

Grade crossings, overpasses and adjacent tracks can become impediments to water flow and therefore need to be considered when attacking drainage problems. Getting the water out of the track structure and flowing in ditches will not matter if culverts are plugged. A complete drainage system

includes the installation and cleaning of culverts, the addition of catch basins and drain tiles, brush cutting and vegetation control, and the disposal of obstacles, such as old ties, rails and debris.

Loram wishes to acknowledge the use of drawings and diagrams from *A Track Substructure Seminar* presented by Dr. Ernest T. Selig, Professor Emeritus, University of Massachusetts and President, Ernest T. Selig, Inc.



You Can Depend On Loram.

Why? Reliability...productivity...experience...cost-effectiveness...to name a few of the reasons. Since its inception in 1954 Loram has been involved with the maintenance and rehabilitation of the roadbed. We have been providing shoulder ballast cleaning services since 1968 when we produced the shoulder ballast cleaner. Our experienced personnel will work with you to develop a practical custom-made drainage program for your property.

Experienced, trained crews.

A formal training program is required of all operators before assignment to an operating machine where they add to their skills with a wide variety of on-the-job railroad experiences. The well-qualified crews produce the results you're looking for.



Operational excellence at all levels.

Everyone at Loram, regardless of his or her job, has a role to play in the achievement of operational excellence. This includes personnel with many years of railroad experience to the industry's best trained equipment operators, and from Loram's manufacturing team to its efficient accounting staff. Loram's people are focused on the end product—and that is to provide Loram customers with a service unparalleled in the industry.

Remember, that an investment in a simple business basic—drainage maintenance—is an investment that will help you to realize your revenue and earnings goals. Contact Loram to discuss drainage maintenance and how you can benefit.

LORAM®

Reliable Cost Effective Service Solutions

LORAM®

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Good Business Starts With The Basics

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