

RAILER SMS 6.0 User Manual

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Welcome

Welcome to RAILER®

Welcome to RAILER® Version 6.0. RAILER is a member of the Sustainment Management System (SMS), a family of software products that includes PAVER, ROOFER, and BUILDER. RAILER is a railroad track asset management system designed as a decision support tool for evaluating track conditions and planning track sustainment, restoration, and modernization

(SRM) activities on military, short line, and industrial track networks. RAILER combines railroad engineering technology; infrastructure management principles; model, standards, and analysis procedures; and computer speed and power into a decision support tool.

The RAILER® Sustainment Management System

There are thousands of miles of military, short line, and industrial railroad track that serves a vital role in transportation for the Department of Defense and the private economy. Due to lower speeds and frequency of use, this track has maintenance and management requirements which typically differ from the large Class I commercial railroads. However, in order to ensure this safe and reliable mode of transportation, and protect the nation's investment, these track networks still need to be periodically inspected and continually maintained cost efficiently. RAILER® SMS is a knowledge-based track management program that gives planners decision support in the sustainment, restoration, and modernization (SRM) of their track network. It combines condition assessment, work plan generation, and spatial analysis through a companion Geographical Information System (GIS) program to help provide support for informed decisions to managers.

The first step in the RAILER® implementation process is the creation of track inventory. This is a physical survey of what makes up the track network, and includes pertinent information about the rail, ties, switches, culverts, curves, grades, grade crossings, etc. A key part of this inventory process involves establishing a track naming convention and stationing scheme. The stationing helps to establish a reference point and location for each track. It also makes it easier to locate defects during the inspection and subsequent repair. Once the inventory is collected, a detailed inspection of the track is done to identify, locate, and record track defects. RAILER® links each recorded defect to 1) operations restrictions and maintenance levels based on governing standards, 2) a Track Structure Condition Index (TSCI) metric relating physical quality and condition, and 3) local work actions to correct the defect.

This information is used to make informative decisions in the development of efficient short and long-range work plans. Using the TSCI and the track standards with a customized set of business rules and prioritization schemes, managers can use the software to narrow down a long list of deficiencies to a filtered list of the most important work based on the condition and operations for the track. The RAILER® process provides important decision support to engineers and facility planners with the following key information:

- What rail assets exist.
- What defects and deficiencies exist and costs to fix.
- What restrictions are imposed – and the effect on operations and readiness.
- What the physical track health/condition is (IRS ratings).
- Short and long term maintenance strategies showing costs and effects of funding levels.
- Assists both installation and HQ level decision support through objective and consistent metrics (garrisons can be compared equally)

RAILER® RED

RAILER® Remote Entry Database (RED) is provided with the RAILER® SMS software to allow for electronic collection of inventory and inspection information while in the field. This software can be installed on a tablet PC for quick, accurate, and easy data collection for direct upload into RAILER® software when back at the office. The RAILER® RED software also displays defect findings from a previous inspection for verification if the defect was fixed or still remains. In addition, it displays the operating restriction for a recorded defect in real time based on the governing track standard.

Benefits of Implementing and Using RAILER®

- Knowledge of track inventory

- Structured inspection approach tailored to management need
- Use of RAILER® RED for track inventory and inspection data collection
- Instant access of stored information through reporting features
- Tabular and graphical condition comparison to various track standards and a condition index scale
- Establish deterioration rates for ties, rail, ballast, and the track as a whole
- User-specified maintenance and repair policies and costs
- Rapid estimates of work requirements
- Structured approach to prioritize work based on user-set criteria
- Ability to develop work plans, including specific projects
- Ability to display track information on a map display through GIS

What's New in Version 6.0

RAILER® version 6.0 has undergone a complete upgrade from the previous version 5.3. If you are familiar with previous versions, you will notice many changes in program layout and navigation from V5.3. RAILER V6.0 is developed in the latest Microsoft .Net 2.0 technology, significantly improving the speed and performance of the software. In addition, many new features have been incorporated into version 6.0. Some of the most notable are:

Network Hierarchy Navigation Tree A network hierarchy tree is available to view the groupings of areas, tracks, and track segments in a user-friendly fashion. Track and segment information, inventory information, and inspection information can also be quickly viewed and edited from this tree at the click of a button, greatly enhancing the program navigation.

Track Copy Feature The program now supports copying an entire track, including segment and inventory information to quickly create tracks of similar structure.

Enhanced Work Planning Module The RAILER work planning module has been streamlined to improve both usability and flexibility. Work Planning setup and configuration follows a standardized process of creating cost books, policies, standards, prioritization schemes, and inflation factor sets that can be used as input parameters in the creation of current year and multi-year work plans.

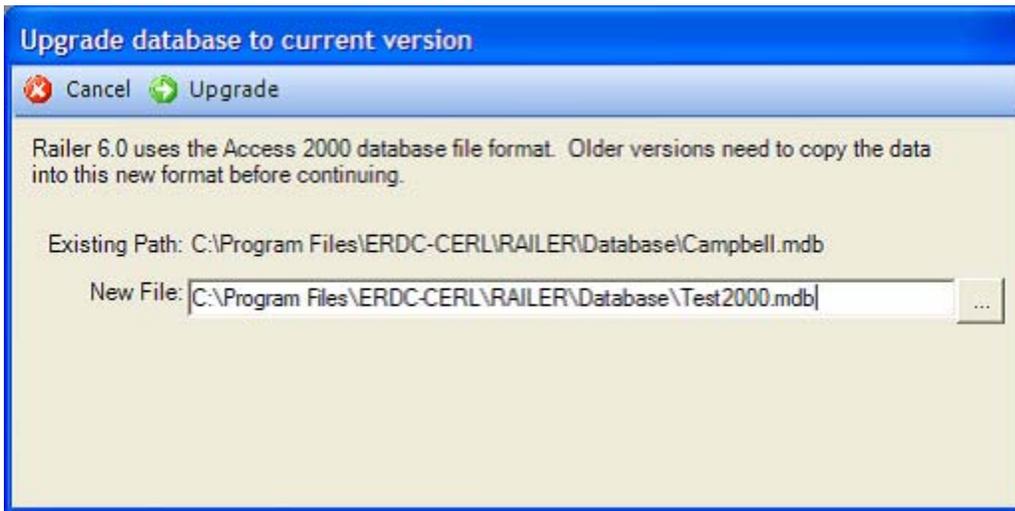
Grade Crossing Condition Index Computation The RAILER Grade Crossing Inspection module has been revised and new data elements added to support the computation of the Grade Crossing Condition Index (GCCCI). The GCCCI follows the same CI scales as for Ballast, Ties, and Rail to represent physical condition on a 0-100 point measure.



Basics

Converting a V5.3 database

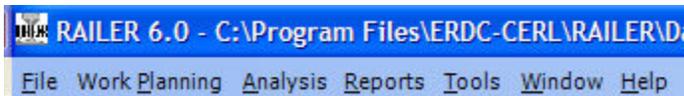
Due to the drastic changes between RAILER Version 5.3 and Version 6.0, a database conversion is necessary to continue using your existing V5.3 database in Version 6.0. This will automatically be performed the first time you attempt to open your V5.3 database in RAILER 6.0. When converting the database, the following screen will appear:



Simply chose the path and file name to save the converted database to, and click UPGRADE. A new version 6.0 database will be created from your existing V5.3 database.

RAILER Menu

The RAILER menu exists at the top of the program, and provides the user access to several basic functions. The menu is broken down into 8 main categories:



File Commands for creating a new database, opening an existing database, or existing the program.

Work Planning Access to work plan configuration screens such as costs, policies and funding, as well as access to Maintenance & Repair (M&R) plan generation screen.

Analysis Access to Condition Index (CI) Update command

Reports Access to Condition Index, Installation Status Report (ISR), and Standard Level reports

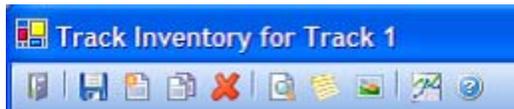
Tools Access to screens for setting up GIS, Importing/Exporting RAILER Remote Entry Database (RED) Data, security settings and users, and database options.

Windows Commands for arranging program windows in a cascade or tile format.

Help Access to electronic RAILER help table of contents, and additional info about RAILER.

RAILER Toolbar

The RAILER Toolbar is positioned at the top of each RAILER screen, and provides the user with several icons for quick access to basic actions on each screen.



These actions include:

	Close	Closes the active window
	Save	Saves all changes to a record
	New	Creates a new record
	Copy	Copies an existing record and all associated attribute data to a new record
	Delete	Deletes the active record showing on the screen
	Add'l Info	Opens a screen to provide optional additional information for an active record
	Comments	Opens a window for user to attach text comments about an active record
	Images	Opens a window for user to attach related images about an active record
	Reports	Displays options for running reports to display information

**Help**

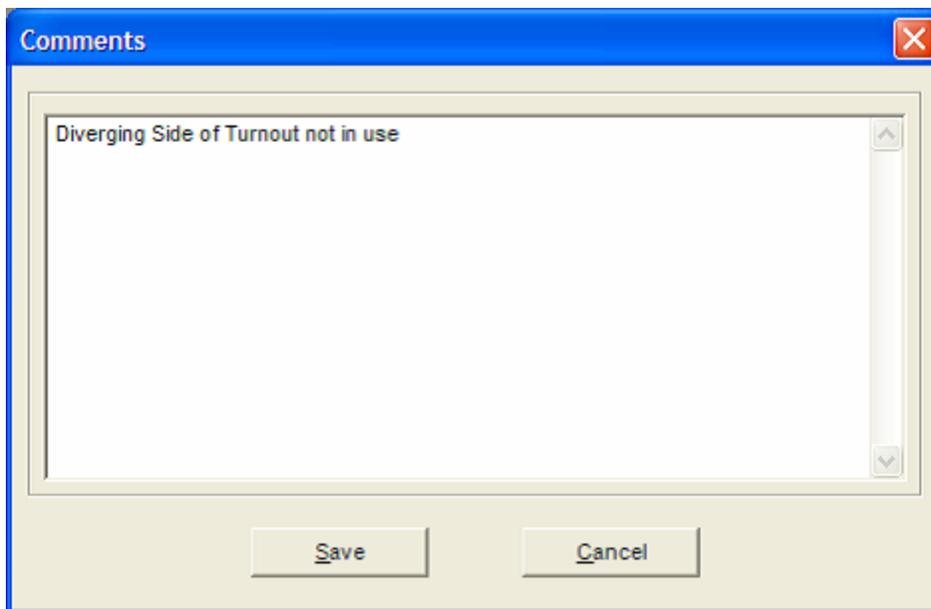
about one or more records

Provides context sensitive help to user about information and functionality of active window

Note: If a given button is gray out or not available, its action is not valid at that time

Comments

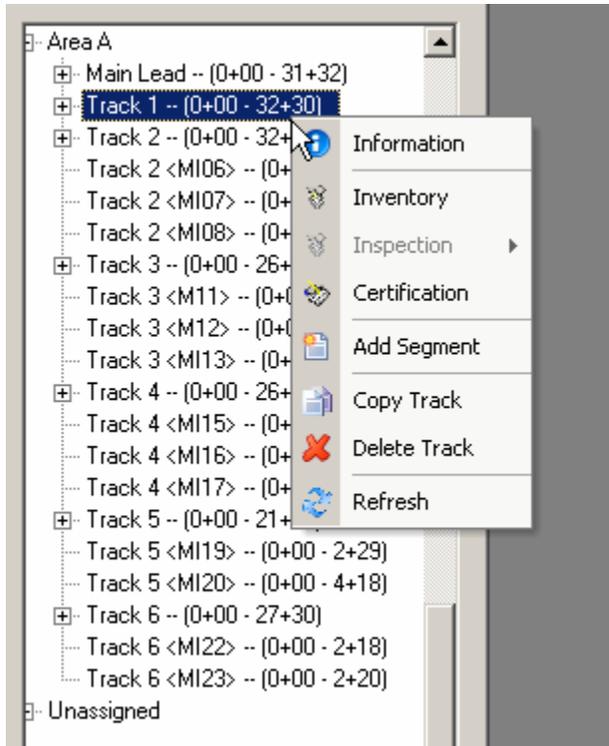
RAILER allows users to specify comments to provide more information about a particular record. Comments are available from the RAILER toolbar, and are applied to the active record on the screen. The comments screen is shown below.



Simply type in comments in the window as text, and click SAVE to save the comments. Use comments whenever you want to expand on a given data entry or elaborate a description.

Navigation Tree

The RAILER navigation tree provides a user-friendly interface for viewing, navigating, and working with the rail assets in the database. It consists of an expandable/collapse-able tree that breaks down the track network by areas, tracks, and segments. In this way, it is very easy to view all tracks that belong to a certain area, and all segments that belong to a certain track. In addition, a number of commands can be accessed by right-clicking on an area, track, or segment in the tree, as shown below.



For example, by right-clicking on a given track in the tree, the user can bring up track information, inventory, inspection, certification, or add segments, delete the track, etc. The right-click menu is context sensitive depending on whether a segment, track, area, or network is chosen. The tree provides the primary means of navigating through the different levels of the RAILER database and accessing the inventory or inspection information.

Glossary of Common RAILER Terms

Area: A group of tracks with similar characteristics to be managed together

BSCI: Ballast & Subgrade Condition Index

Clearance: Any permanent obstruction near the track right of way that potentially impedes the movement of a train.

Condition Index: An objective measure of the condition of a track, or segment, based on observed defects present

Curves: A change in horizontal track direction

Drainage: A culvert, ditch or other structure that diverts water away from the track structure

GCCI: Grade Crossing Condition Index

GIS: Geographic Information System, 3rd party tool to display RAILER information spatially

Global Work Action: Work Action to apply to an entire segment of track, regardless of defects present

Grade: A measure of the % incline of a portion of track

Grade Crossing: Material covering track to bring grade level with top of rail

ISR: Installation Status Report, for Army readiness reporting

Local Work Action: Work Action to correct a localized defect

Network: Encompassed all track at a site or installation

Prioritization: A method of objectively defining the relative importance of work items

Rail Crossing: A track component that allows 2 individual tracks to cross each other at the same grade

RAILER RED: Remote Entry Database field inspection/data collection module for RAILER

RJCI: Rail & Joint Condition Index

Segment: A portion of a track which serves as the basic unit for Maintenance & Repair issues

Station: The reference location at a discrete track point, measured from the beginning of the track

TCI: Tie Condition Index

Track : A designated portion of the network with a natural begin and end point

Track Structure: The components that make up the track's ability to carry wheel loads, including subgrade, ballast, ties, rail, etc

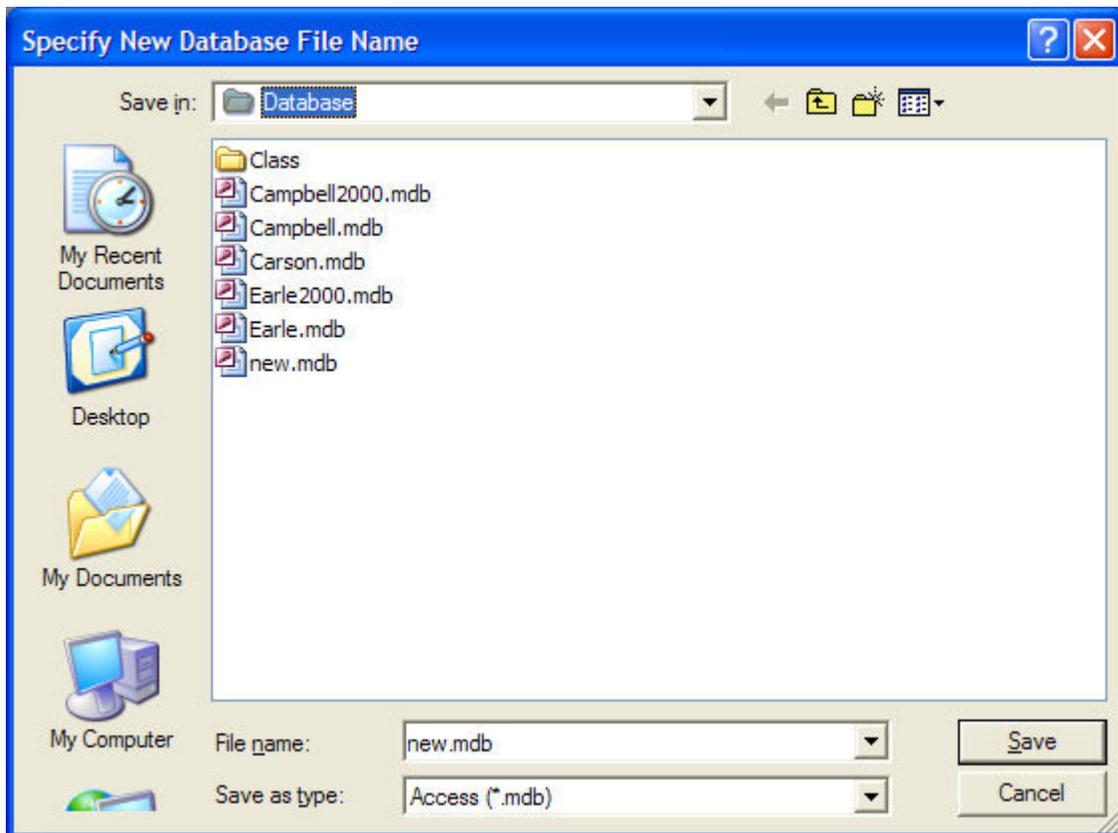
TSCI: Track Structure Condition Index

Turnout: Portion of track where two tracks diverge

Getting Started

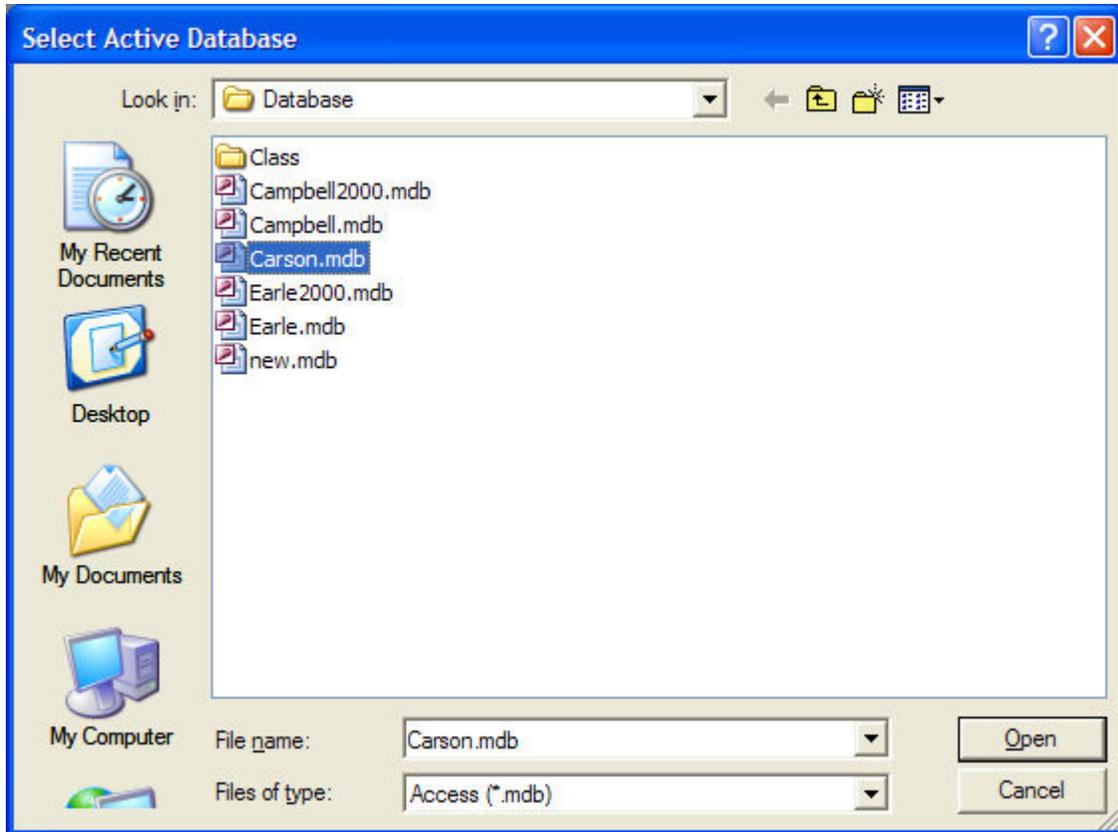
Creating a new Database

RAILER stores data in an Microsoft Access 2000 database. To create new RAILER database, select New Database from the File menu. Chose the file name and location to save the database, and click Save.



Opening an Existing Database

To open an existing RAILER database, select Open Database from the File menu. Chose the file name and location of where the existing database is at, and click Save.



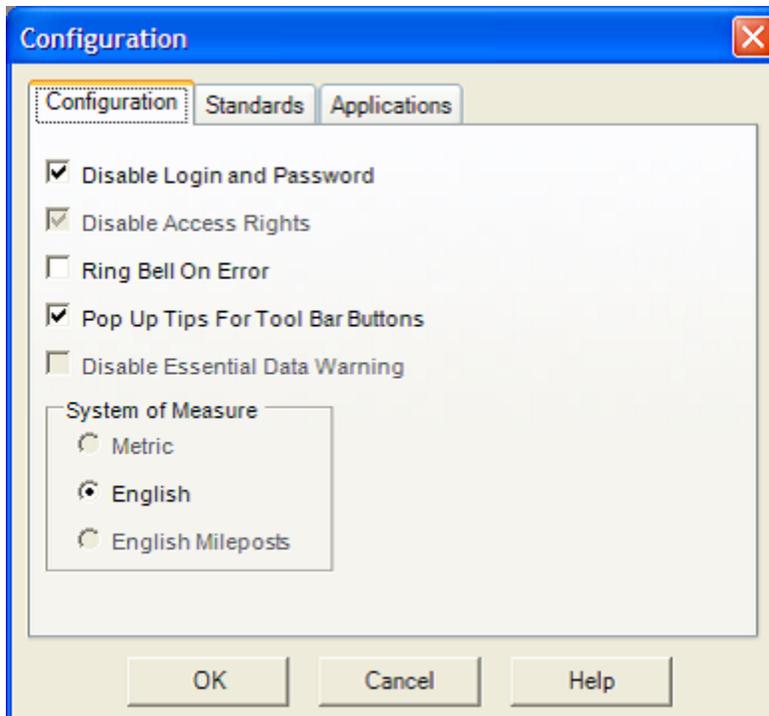
Database Configuration

The configuration screen under the Tools menu is shown below. It provides configuration options for the user. For version 6.0, the following are the available options:

Disable Login and Password Check to disable password protection for the database

Ring Bell on Error Check to ring bell when a RAILER error is produced

Pop Up Tips For Tool Bar Button Check to enable tool tip descriptions when cursor passes over a button



Note that Version 6.0 supports only English Units of Measure.

Active Standards

After creating a new database, it is necessary to specify which track standard applies for the database. Active database track standards can be set from the Standards tab in the configuration screen accessed via the Tools menu.

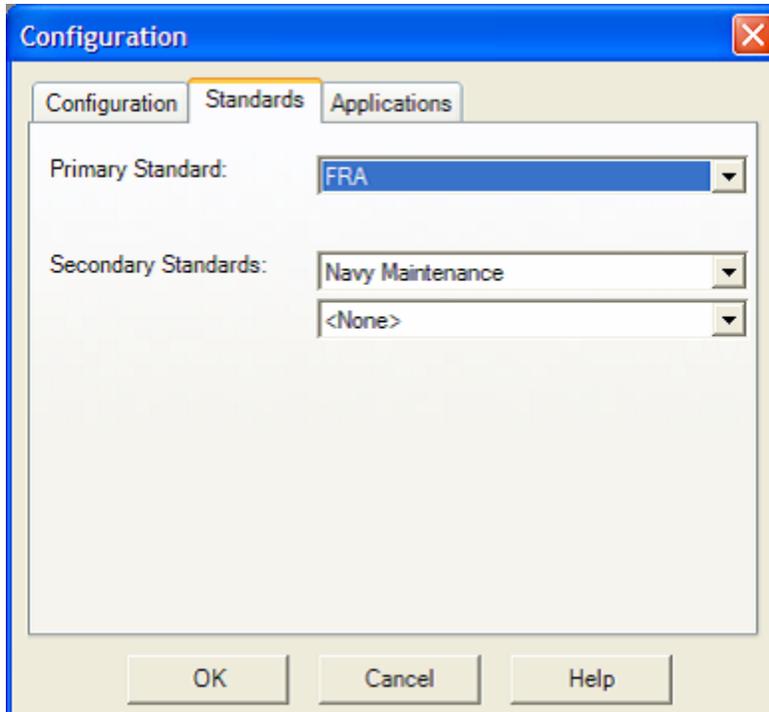
In version 6.0, the following track standards are available:

- FRA
- Navy Safety
- U.S. Army
- UFC (Tri-Service)

The primary standard is the main standard for the database, and it is what inspection results and the work plan generation is shown against. The primary standard establishes a condition level and associated action or restriction for each defect identified on the track. For example, for the UFC (Tri-Service) Standard, the following defect condition levels exist (from least serious to most serious):

- **Defect Free** No defects exist.
- **Full Compliance** Defect does not require corrective maintenance or track restriction.

- **Maintenance A** Maintenance action is required to correct defect on category A track, but no operating restriction is imposed.
- **Maintenance B** Maintenance action is required to correct defect on category A or B track, but no operating restriction is imposed.
- **Restricted Operations** Defect requires an immediate speed restriction be placed on track affected. Restriction exists until defect is corrected.
- **Close to Traffic** Defect is so severe that affected track is closed to train traffic until defect is corrected.



When a primary standard is chosen, that standard is used when displaying defect condition levels in the inspection and M&R screens. As an option, up to 2 additional secondary standards can be specified for use in reporting features.

Setting up Users

Each RAILER database user can be given their own Login name, Login password, and user privileges. This gives each user customized data access rights.

These rights include:

Super User Has comprehensive rights to all portions of the program and database, including the ability to add or delete users, and change user settings. This is typically a database administrator.

Modify Data Has rights to add, delete, and modify data, including inventory and inspection information.

Certification Official For Navy Users, has access to certification screen for certifying track. If a user is a certifying official, they are either specified as an inspector or certifier. In the Navy, each track certification record must be signed by both the inspector and certifier.



The screenshot shows a dialog box titled "Update Users". It features a "Login Name" dropdown menu currently showing "J Smith", a "New Password" text input field, and an "Access Rights" section. The "Access Rights" section includes checkboxes for "Super User" (unchecked), "Modify Data" (checked), and "Certification" (checked). Under "Certification", there are radio buttons for "Inspector" (selected) and "Certifier" (unselected). At the bottom of the dialog are buttons for "Accept", "Help", and "Cancel".

To create a new user (only applicable for users specific as Super Users):

1. Click New User Button
2. Type name in Login Name box
3. Click Accept

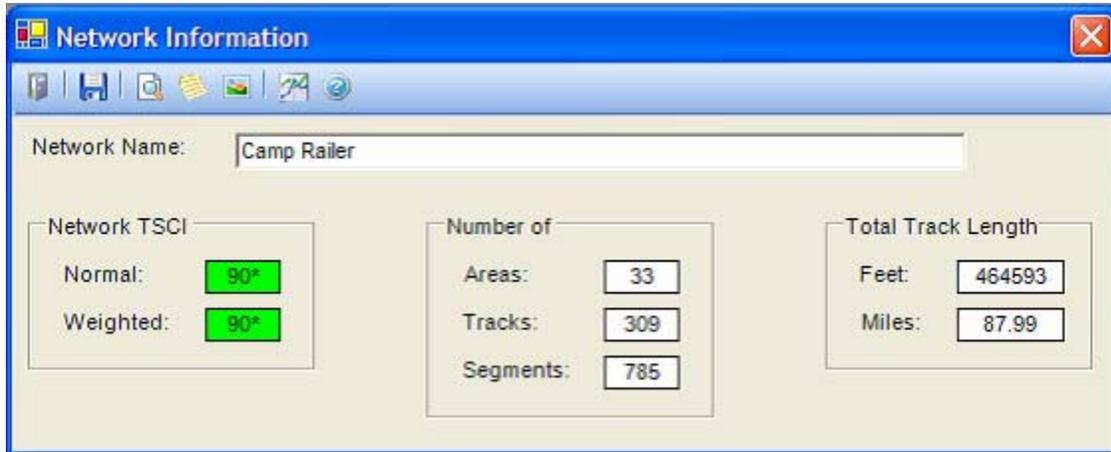
To delete an existing user:

1. Select user from Login Name Drop Down List
2. Click Delete User

Track Network Hierarchy

Network

The network information screen is accessible by right-clicking on the Network in the Navigation Tree, and choosing Information.



The network information screen displays high level data about the track network. This includes:

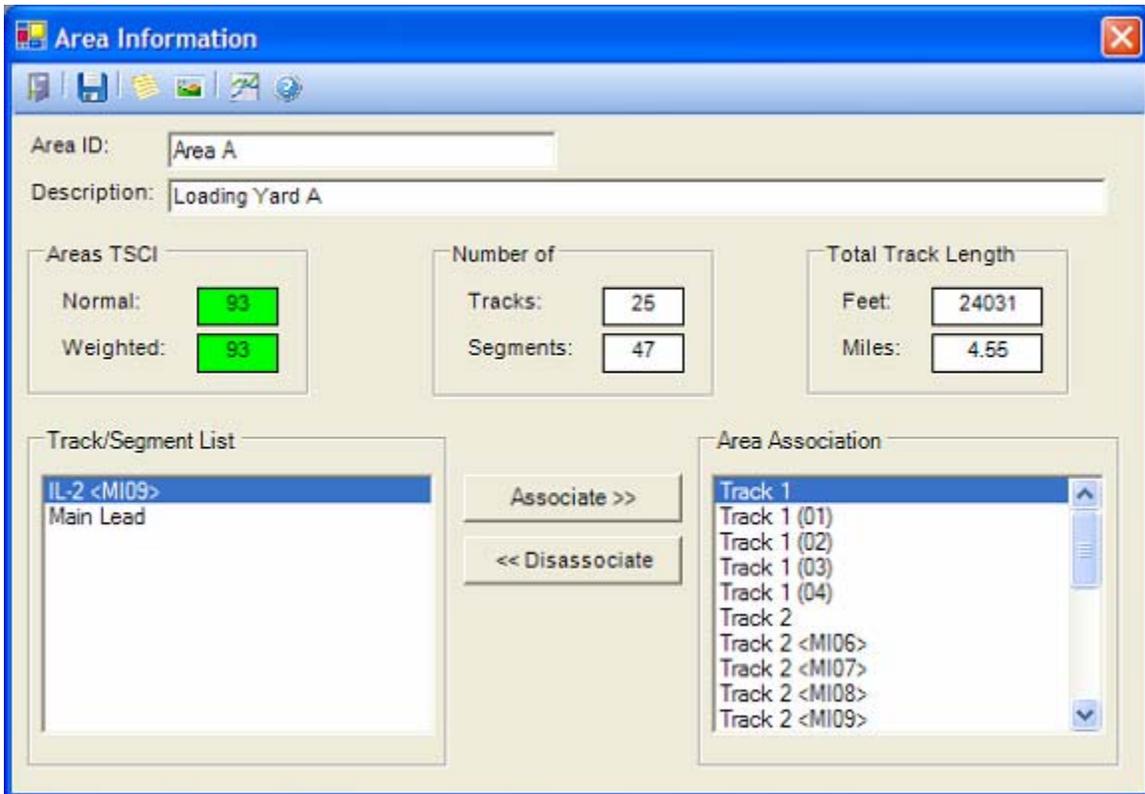
Network TSCI This is the comprehensive Track Structure Condition Index for the entire track network, and relates the general condition of the overall network. The normal TSCI is a straight average of the TSCI for all tracks in the network. The Weighted TSCI is an average of each track TSCI, weighted by the length of each track.

Number Stats Displays a count of the number of areas, tracks, and segments in the network.

Total Track Length Displays the total track feet and total track miles in the network.

Areas

The Area Information screen displays information about an area in the network. It is accessed by right-clicking on that area in the navigation tree, and choosing Information. To create a new area, right-click on the network in the tree, and chose Add Area. To delete an area, right-click on the area to be deleted, and chose Delete Area (note that track and segments within area do not get deleted, they get assigned as unassociated tracks)



An area is a logical grouping of tracks, and so after an area is created, tracks can be associated to the area.

To associate tracks with an area:

1. Chose the track on the Track/Segment List box on the left
2. Click Associate>> and the track will be included in the Area Association box on the right

To disassociate tracks from an area:

1. Chose the track from the Area Association box on the right
2. Click <<Disassociate and the track will be included in the Track/Segment List box on the left.

The area information screen displays the following data about the tracks in the area:

Area TSCI This is the comprehensive Track Structure Condition Index for the entire area, and relates the general condition of the overall area. The normal TSCI is a straight average of the TSCI for all tracks in the area. The Weighted TSCI is an average of each track TSCI, weighted by the length of each track.

Number Stats Displays a count of the number of tracks, and segments in the area.

Total Track Length Displays the total track feet and total track miles in the area.

Tracks

The Track Information screen displays information about a designated track. It is accessed by right-clicking on that track in the navigation tree, and choosing Information. To create a new track, right-click on the network or an area in the tree, and chose Add Track. To delete a track, right-click on the track to be deleted, and chose Delete Track (note that all segments, track inventory info, inspection data associated with the track will also be deleted.)

The screenshot shows the 'Track Information' dialog box with the following data:

Field	Value
Track ID	Track 2
Begin Station	0 + 0
End Station	32 + 38
Length.ft	3238
Area ID	Area A
Track TSCI - Normal	92
Track TSCI - Weighted	92
Number of Segments	5

The track name and track boundaries may be established based on engineering or Public works records, drawings, or track operations conventions. It is recommended to establish a consistent and recognizable naming convention for tracks in the network. Each track has a begin station and end station boundary, and track length is computed automatically by the program from that. Each track also has an area ID which can be used to identify or specify which area (if any) the track belongs to.

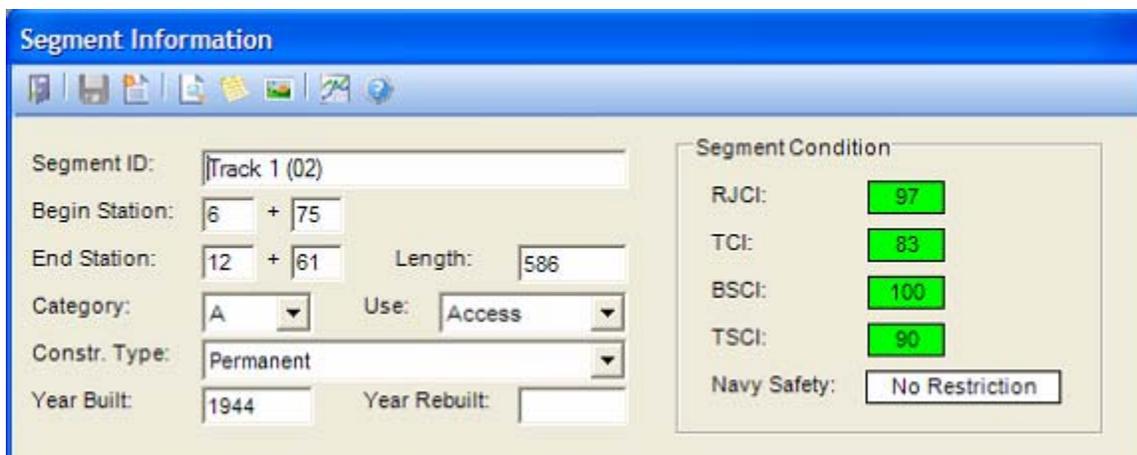
The following track information is also displayed:

Track TSCI This is the comprehensive Track Structure Condition Index for the track, and relates the general condition of the overall track. The normal TSCI is a straight average of the TSCI for all segments. The Weighted TSCI is an average of each segment TSCI, weighted by the length of each segment.

Number Stats Displays a count of the number of segments in the track.

Segments

The Segment Information screen displays information about a track segment. It is accessed by right-clicking on that segment in the navigation tree, and choosing Information. To create a new segment for a track, right-click on the track in the tree, and chose Add Segment. To continue adding additional segments to a track, simply click the New button  on the Segment Information screen toolbar to create a new segment record. To delete a segment, right-click on the segment to be deleted in the navigation tree, and chose Delete Segment. (note that all inspection data associated with the segment will also be deleted.)



The screenshot shows the 'Segment Information' window with the following data:

Segment Information		Segment Condition	
Segment ID:	Track 1 (02)	RJCI:	97
Begin Station:	6 + 75	TCI:	83
End Station:	12 + 61	BSCI:	100
Category:	A	TSCI:	90
Use:	Access	Navy Safety:	No Restriction
Constr. Type:	Permanent		
Year Built:	1944		
Year Rebuilt:			
Length:	586		

Segments divide the track up into manageable units for inspection and work planning purposes. Typically, segment boundaries on a track go from one switch point to another switch point, but segment boundaries can also be placed at grade crossings, mileposts, etc. For practical purposes, it is suggested that maximum segment lengths be no longer than a one mile. Segment boundaries should be continuous (ie there should be no gaps between segments).

The segment information screen displays the condition measures for the segment based off of the most recent inspection results. This includes:

RJCI Rail and Joint condition index for segment

TCI Tie condition index for segment

BSCI Ballast and subgrade condition index for segment

TSCI Track Structure condition index, which is the weighted average of RJCI, TCI, and BSCI for segment.

Standard Level This is the standard level for the segment based off of the primary track standard.

Inventory

Track Structure

Track structure inventory information for a given track is accessible by right-clicking on the track in the navigation tree, and choosing Inventory. The structure tab contains data describing the fundamental structure of the track, including rail and tie details, for a given location of track.

Track Inventory for Track 1

Begin Station: 0+00 End Station: 32+30

Rail Crossings Clearances Drainage Bridges Appliances

Structure Turnouts Curves Grades Grade Crossings

Begin Station: 6 + 67 End Station: 7 + 48 Length: 81 ft

Rail

Weight: 85 lbs/yd

Section: 85AS

Length (avg): 33 CWR

Ties

Size: 7"x9"x8.5"

Material: Hardwood

Spacing: 22 in

A track's structure can change several times throughout the length of the track.

Each time the track structure changes, a structure record is created. That record indicates the boundary station locations for that portion of track structure, as well as common attribute information about the structure as seen above. To view the different structure records for a track, use the begin station drop box.

To add a new structure record, click the New  button and a blank record will be created. To copy an existing record, click the Copy  button and the active record, along with its associated attribute information, will be copied over to a new record. To delete the active structure record, click the Delete  button. To specify optional additional information about a track structure record, click the Additional Info  button and the following screen will appear.

Structure Detail

Track
 Deflection: [] in
 Modulus: [] lb/in/in

Rail
 Weight Change
 Left: [6] + [65]
 Right: [6] + [68]
 Brinell Hardness: []

Ties
 Count/Length: [18] / [33] TF
 Wood Species: []
 Moisture State: []

F&OTM
 Joint Bar Leng: [24] in
 Joint Bar Holes: [4]
 Hold Down Device: [Cut Spikes, Single Shoulder Tie Plate]
 Gauge Rods Rail Anchors
 Tie Plate Length: [10] in
 Tie Plate Width: [7.5] in

Ballast
 Type: [Crushed Grar]
 Depth: [] in
 Top Size: []
 Drainage: [] %

Subgrade
 CBR: []
 Unified Class: []
 AASHTO Class: []
 FAA Class: []
 Stress Limit: [] PSI
 Modulus: []

[Save] [Cancel]

Turnouts

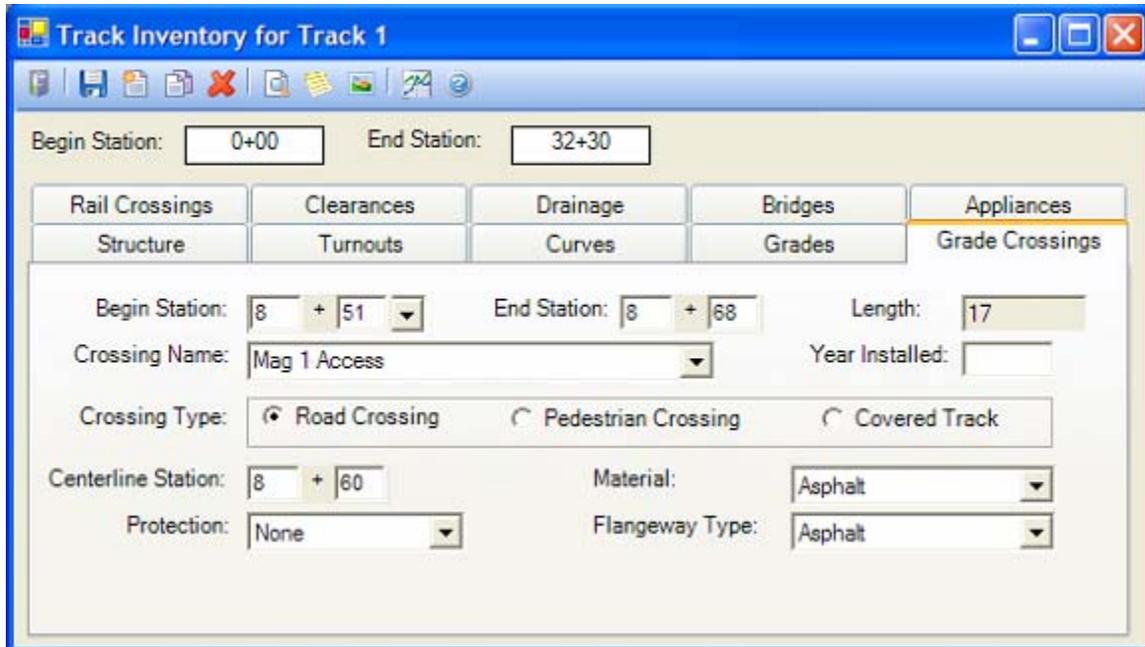
Turnout inventory information for a given track is accessible by right-clicking on the track in the navigation tree, and choosing Inventory. The turnout tab contains data for each turnout associated with a track. Note that even though a turnout exists at the intersection of two tracks, it should be recorded in the inventory of the main track only.

A given track (especially ladder type tracks) can have several turnouts. To view the different turnout records for a track, use the turnout ID drop box. To add a new turnout record, click the New  button and a blank record will be created.

To copy an existing record, click the Copy  button and the active record, along with its associated attribute information, will be copied over to a new record. To delete the active turnout record, click the Delete  button. To specify optional additional information about a turnout record, click the Additional Info  button and the following screen will appear.

Grade Crossings

Grade Crossing inventory information for a given track is accessible by right-clicking on the track in the navigation tree, and choosing Inventory. The Grade Crossing tab contains a data record for each grade crossing in the track.



Track Inventory for Track 1

Begin Station: 0+00 End Station: 32+30

Rail Crossings	Clearances	Drainage	Bridges	Appliances
Structure	Turnouts	Curves	Grades	Grade Crossings

Begin Station: 8 + 51 End Station: 8 + 68 Length: 17

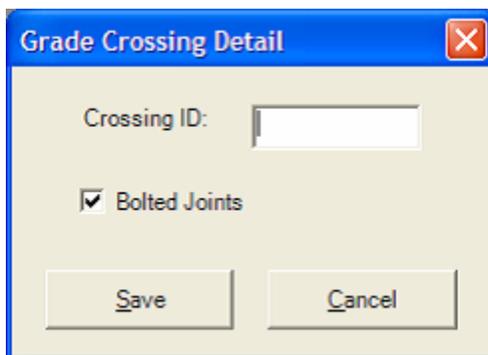
Crossing Name: Mag 1 Access Year Installed:

Crossing Type: Road Crossing Pedestrian Crossing Covered Track

Centerline Station: 8 + 60 Material: Asphalt

Protection: None Flangeway Type: Asphalt

A particular track may contain several grade crossings. To view the different grade crossing records for a track, use either the Begin Station drop box or the Crossing Name drop box. To add a new crossing record, click the New  button and a blank record will be created. To copy an existing record, click the Copy  button and the active record, along with its associated attribute information, will be copied over to a new record. To delete the active grade crossing record, click the Delete  button. To specify optional additional information about a grade crossing record, click the Additional Info  button and the following screen will appear.



Grade Crossing Detail

Crossing ID:

Bolted Joints

Save Cancel

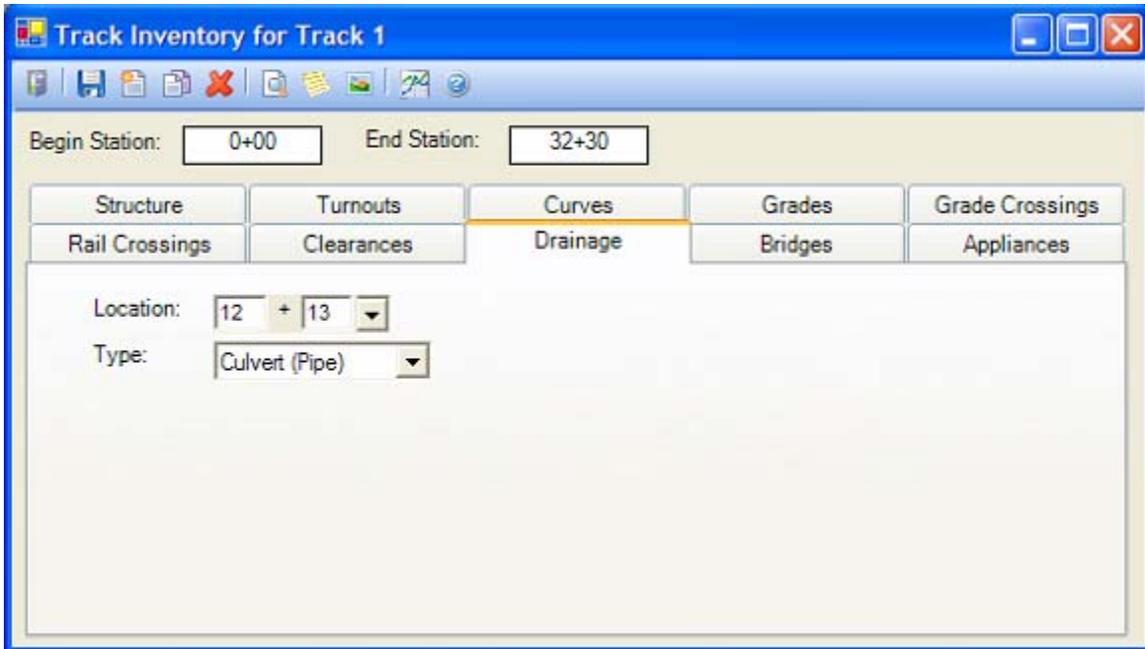
Rail Crossings

Rail crossing inventory information for a given track is accessible by right-clicking on the track in the navigation tree, and choosing Inventory. The rail crossing tab contains a data record for each rail crossing in the track.

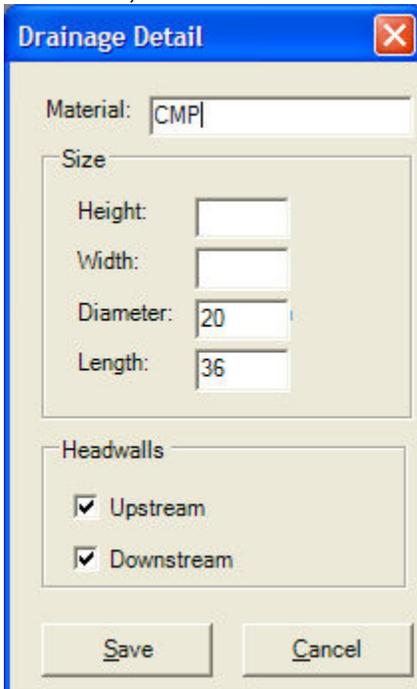
A particular track may contain several rail crossings. To view the different rail crossing records for a track, use the Centerline Station drop box. To add a new crossing record, click the New  button and a blank record will be created. To copy an existing record, click the Copy  button and the active record, along with its associated attribute information, will be copied over to a new record. To delete the active rail crossing record, click the Delete  button.

Drainage

Drainage inventory information for a given track is accessible by right-clicking on the track in the navigation tree, and choosing Inventory. The drainage tab contains a data record for each drainage structure in the track.



A particular track may contain several drainage structures, including culverts, pipes, ditches, etc. To view the different drainage items for a track, use the Location drop box. To add a new drainage record, click the New  button and a blank record will be created. To copy an existing record, click the Copy  button and the active record, along with its associated attribute information, will be copied over to a new record. To delete the active drainage record, click the Delete  button. To specify optional additional information about a drainage structure, click the Additional Info  button to bring up the following window.



Bridges

Bridge inventory information for a given track is accessible by right-clicking on the track in the navigation tree, and choosing Inventory. The bridge tab contains a data record for each bridge that the track spans.

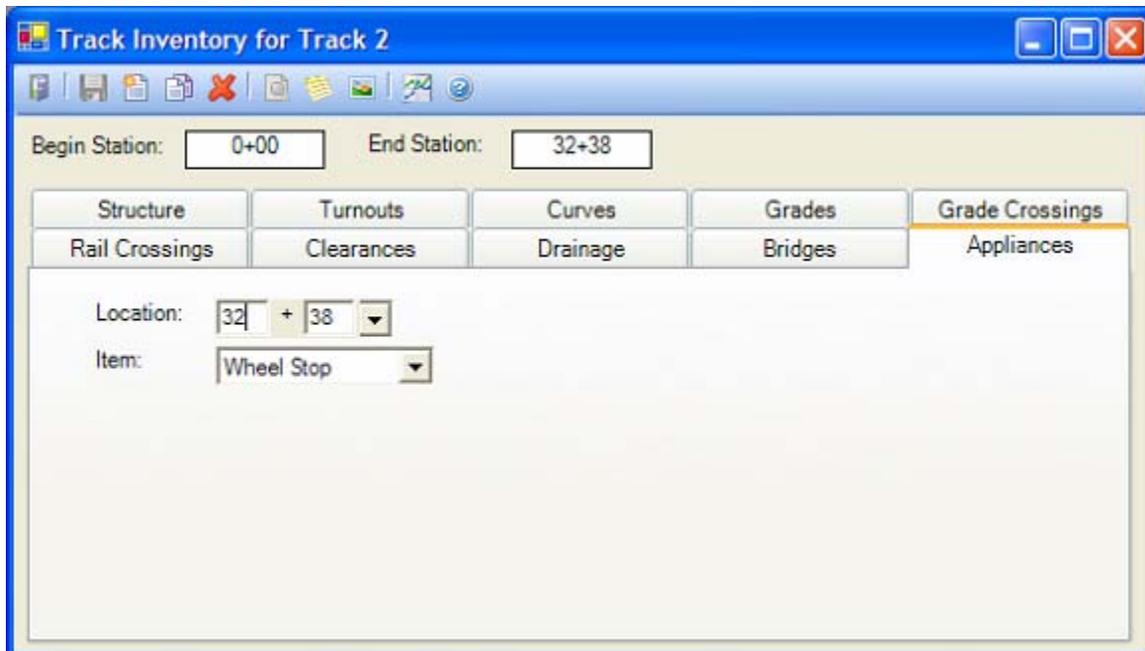
'."/>

To view the different bridge records for a track, use the Begin Station drop box.

To add a new bridge record, click the New  button and a blank record will be created. To copy an existing record, click the Copy  button and the active record, along with its associated attribute information, will be copied over to a new record. To delete the active bridge record, click the Delete  button.

Appliances

Appliance inventory information for a given track is accessible by right-clicking on the track in the navigation tree, and choosing Inventory. The appliance tab contains a data record for each appliance associated with the track, including items such as car bumpers, wheel stops, derails, etc.



A particular track may contain appliance items. To view the different appliance records for a track, use the Location drop box. To add a new appliance record, click the New  button and a blank record will be created. To copy an existing record, click the Copy  button and the active record, along with its associated attribute information, will be copied over to a new record. To delete the active rail appliance record, click the Delete  button.

Grades

Grade information for a given track is accessible by right-clicking on the track in the navigation tree, and choosing Inventory. The grade tab contains track grade information.

Track Inventory for Track 2

Begin Station: 0+00 End Station: 32+38

Rail Crossings	Clearances	Drainage	Bridges	Appliances
Structure	Turnouts	Curves	Grades	Grade Crossings

Begin Station: 16 + 10 End Station: 19 + 29 Length: 319

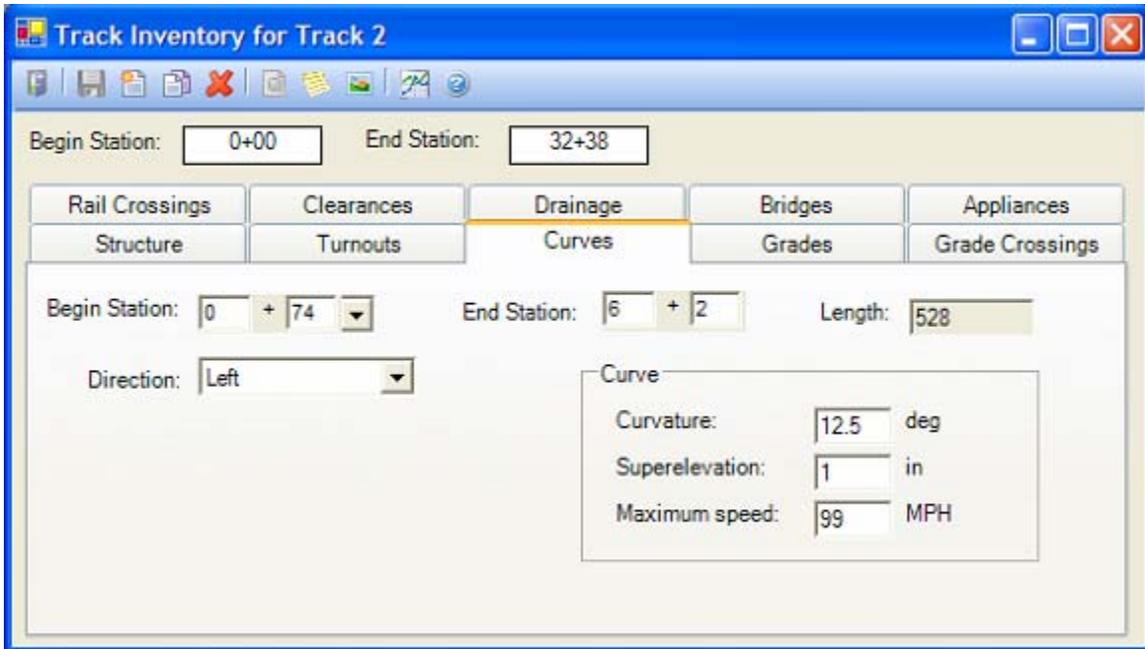
Percent Grade: 1.25

To view the different grade records for a track, use the Begin Station drop box.

To add a new grade record, click the New  button and a blank record will be created. To copy an existing record, click the Copy  button and the active record, along with its associated attribute information, will be copied over to a new record. To delete the active grade record, click the Delete  button.

Curves

Curve information for a given track is accessible by right-clicking on the track in the navigation tree, and choosing Inventory. The curve tab contains track curves information.



To view the different curve records for a track, use the Begin Station drop box.

To add a new curvey  button and the active record, along with its associated attribute information, will be copied over to a new record. To delete the active curve record, click the Delete  button.

Clearance

Track clearance information for a given track is accessible by right-clicking on the track in the navigation tree, and choosing Inventory. The clearance tab contains data describing track clearance issues affecting the track.

Track Inventory for Track 2

Begin Station: 0+00 End Station: 32+38

Structure	Turnouts	Curves	Grades	Grade Crossings
Rail Crossings	Clearances	Drainage	Bridges	Appliances

Begin Station: 31 + 84 End Station: 32 + 17 Length:ft 33

Clearance Restriction Related Facility

Facility Type: Magazine Facility Number: I-10

A particular track may contain several clearance issues, including both horizontal and vertical clearance. To view the different clearance records for a track, use the Begin Station drop box. To add a new clearance record, click the New  button and a blank record will be created. To copy an existing record, click the Copy  button and the active record, along with its associated attribute information, will be copied over to a new record. To delete the active clearance record, click the Delete  button. To specify optional additional information about a track structure record, click the Additional Info  button and the following screen will appear.

Clearance Res. Detail

Measurement

Method: From Rail Head

Horizontal: 60

Vertical:

Docks and Ramp Car Positions:

Save Cancel

Detailed Inspection

Ties Inspection

Tie inspection information, as with all inspection information, is stored and accessed at a segment level. To access the tie inspection screen, right click on the segment of interest, then choose Inspection -> Detailed. The tie tab contains a tally of tie defects for that segment on a given inspection date. Tie inspection information can be viewed for any inspection on record in the database by using the Date drop down box, and choosing the date of the inspection. Note that the Defect Free check box is used to denote the segment as inspected and completely free of tie defects.

The screenshot shows the 'Detailed Inspection' window with the following details:

- Date: 6/28/2005
- Begin Station: 0+00
- End Station: 51+58
- Inspector: DRU
- Defect Free:
- Total: 105
- Defective: 105
- Missing/Wide Spaced: 0
- Skewed: 1
- WO List & Cond Edit button

Defect	Quantity	UM
Single Defective Tie	83	EA
Single Defective Joint Tie	9	EA
All Joint Ties Defective (1 Tie)	1	EA
Isolated Defective Tie Cluster (2 Ties)	3	EA
Isolated Defective Tie Cluster (3 Ties)	0	EA
Isolated Defective Tie Cluster (4 Ties)	0	EA
Isolated Defective Tie Cluster (5 Ties)	0	EA
Defective Tie Cluster (2 Ties) that Includes Joint Tie(s)	0	EA
Defective Tie Cluster (3 Ties) that Includes Joint Tie(s)	0	EA
Defective Tie Cluster (4 Ties) that Includes Joint Tie(s)	1	EA
Defective Tie Cluster (5 Ties) that Includes Joint Tie(s)	0	EA
Adjacent Defective Tie Cluster (2 Ties)	0	EA
Adjacent Defective Tie Cluster (3 Ties)	0	EA
Adjacent Defective Tie Cluster (4 Ties)	0	EA
Adjacent Defective Tie Cluster (5 Ties)	0	EA

If a given tie defect is severe enough that its station location or condition level should be noted for a potential work order, the **WO List & Cond Edit** button displays the field for entering this information.

The 'Work Order List' window displays a table with the following data:

Defect	Station	Quantity	UM	Condition Lev	E/S W.O.#	MOA	Work Actio	Est. Cost	Date Fixed
All Joint	10+25	1	EA	10 MPH		DOT (Option 3)	8480	68.7	
Defectiv	14+20	1	EA	10 MPH		DOT (Option 3)	8485	137.4	
Defectiv	40+50	1	EA	5 MPH	Need #		0	0	

Rail Inspection

Rail inspection information, as with all inspection information, is stored and accessed at a segment level. To access the rail inspection screen, right click on the segment of interest, then choose Inspection -> Detailed. The rail tab contains a grid, with each row of the grid representing defects for that segment on a given inspection date. Rail inspection information can be viewed for any inspection on record in the database by using the Date drop down box, and choosing the date of the inspection.

The 'Detailed Inspection' window shows the following details:

- Date: 6/28/2005
- Begin Station: 0+00
- End Station: 51+58
- Inspector: DRU

The 'Rail' tab is selected, showing a grid of defects:

Defect	Station	Rail	Length	Dens	Quan	U	Condition	E/S W.O.	MOA	Work A	Est. Cos	Date Fixe
Chip/Dent In Head <= 0.25" (<=1/4)	15+80	L	3		1	E	Full Com					
Bolt Hole Crack > 1.5"	5+80	L			1	E	10 MPH					

To insert additional defects for an inspection record (on a given date), click the **Insert** button to insert additional rows to the grid. To delete a defect from the inspection record, highlight the row, and click the **Delete** button. Note

that the Defect Free check box is used to denote the segment as inspected and completely free of rail defects. In addition, the Non-destructive test check box is used if the rail inspection was conducted using NDT methods.

Other Track Materials

OTM inspection information, as with all inspection information, is stored and accessed at a segment level. To access the OTM inspection screen, right click on the segment of interest, then choose Inspection -> Detailed. The OTM tab contains a grid, with each row of the grid representing defects for that segment on a given inspection date. OTM inspection information can be viewed for any inspection on record in the database by using the Date drop down box, and choosing the date of the inspection.

The screenshot shows the 'Detailed Inspection' window with the following details:

- Date:** 6/28/2005
- Begin Station:** 0+00
- End Station:** 51+58
- Inspector:** DRU
- Navigation Tabs:** Geometry, Grade Crossings, Turnouts, Ties, Rail, F&OTM (selected), Appliances, Rail Crossings, Ballast/Subgrade, Drainage, Impaired Insp.
- Checkboxes:** Defect Free, Non-destructive test
- Buttons:** Delete, Insert
- Table:**

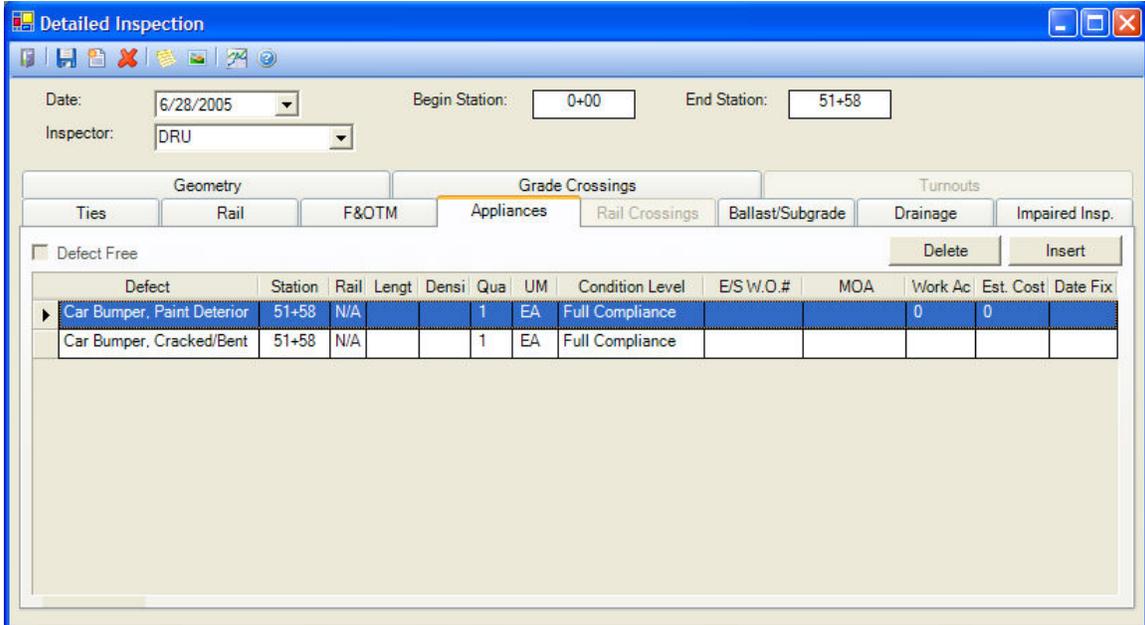
Defect	Station	Rail	Length	Densit	Quanti	UM	Condition Level	E/S W.O.	MOA	Work	Est. Cost	Date Fi
▶ Spike, Missing (Additional Spi	1+28	B	622	75	482	EA	Full Complianc					
Rail Anchor, Missing	2+60	L			2	EA	Full Complianc					
Spike, Improper Position	3+00	L			1	EA	Full Complianc					
Bolts, Loose (1 Bolt)	4+12	R			1	EA	Full Complianc					
Rail Anchor, Improper Position	4+15	R			2	EA	Full Complianc					
Rail Anchor, Improper Position	4+25	R			1	EA	Full Complianc					
Rail Anchor, Missing	4+25	L			1	EA	Full Complianc					
Washer, Broken	4+30	R			1	EA	Full Complianc					
Washer, Missing	4+60	L			1	EA	Full Complianc					
Washer, Broken	5+00	L			1	EA	Full Complianc					

To insert additional defects for an inspection record (on a given date), click the **Insert** button to insert additional rows to the grid. To delete a defect from the inspection record, highlight the row, and click the **Delete** button. Note that the Defect Free check box is used to denote the segment as inspected and completely free of OTM defects. In addition, the Non-destructive test check box is used if the OTM inspection was conducted using NDT methods.

Appliance Inspection

Appliance inspection information, as with all inspection information, is stored and accessed at a segment level. To access the Appliance inspection screen, right click on the segment of interest, then choose Inspection -> Detailed. The Appliance tab contains a grid, with each row of the grid representing defects for

that segment on a given inspection date. Appliance inspection information can be viewed for any inspection on record in the database by using the Date drop down box, and choosing the date of the inspection.



To insert additional defects for an inspection record (on a given date), click the **Insert** button to insert additional rows to the grid. To delete a defect from the inspection record, highlight the row, and click the **Delete** button. When inputting appliance defects, note that the Station field is a drop list which displays the location of all appliances in the inventory for that segment.

Rail Crossing Inspection

Rail Crossing inspection screen, right click on the segment of interest, then choose Inspection -> Detailed. The Rail Crossing tab contains a grid, with each row of the grid representing defects for that segment on a given inspection date.

Rail Crossing inspection information can be viewed for any inspection on record in the database by using the Date drop down box, and choosing the date of the inspection.

Date: 6/21/2006 Begin Station: 0+00 End Station: 10+00
Inspector: DRU

Geometry Grade Crossings Turnouts

Ties Rail F&OTM Appliances Rail Crossings Ballast/Subgrade Drainage Impaired Insp.

Defect Free

Crossing Defects Flangeway Measurements

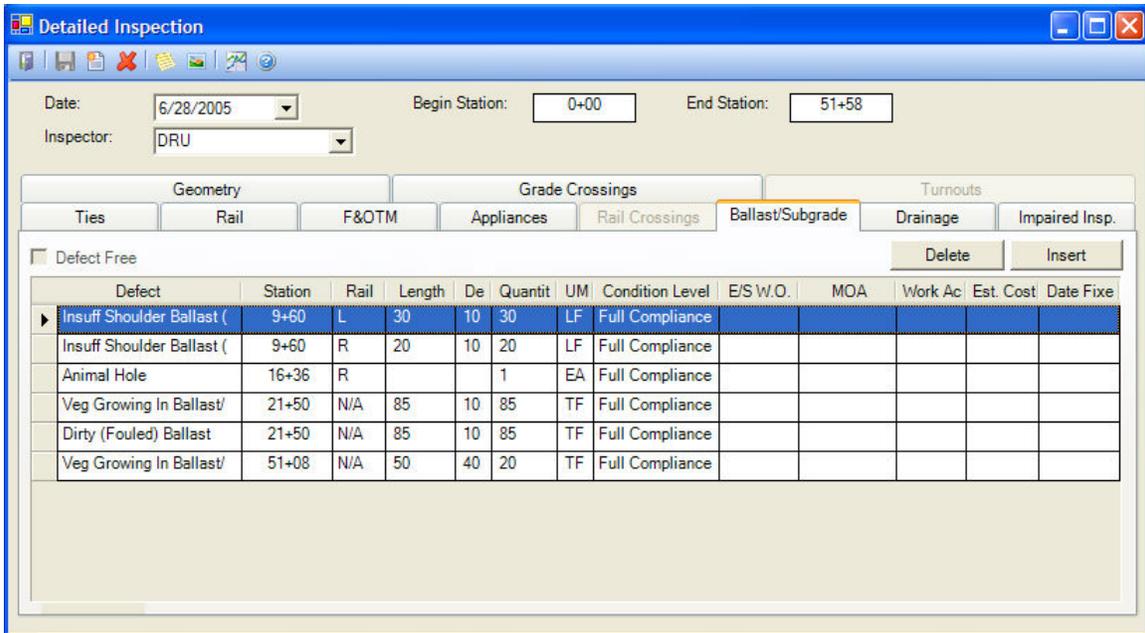
Defect	Station	Rail	Length	Den	Quanti	UM	Condition Level	E/S W.O.	MOA	Work A	Est. Cos	Date Fixe
Bolts, Loose	5+00	N/A			1	EA	Full Compliance					
Casting Arm, Corroded	5+00	N/A			1	EA	Full Compliance					

To insert additional defects for an inspection record (on a given date), click the **Insert** button to insert additional rows to the grid. To delete a defect from the inspection record, highlight the row, and click the **Delete** button. When inputting rail crossing defects, note that the Station field is a drop list which displays the location of any rail crossing in the inventory for that segment. In addition, the Flangeway Measurements tab contains information about rail crossing flangeway width and depth measurements.

Ballast/Subgrade Inspection

Ballast/Subgrade inspection information, as with all inspection information, is stored and accessed at a segment level. To access the Ballast/Subgrade inspection screen, right click on the segment of interest, then choose Inspection - > Detailed. The Ballast/Subgrade tab contains a grid, with each row of the grid representing defects for that segment on a given inspection date.

Ballast/Subgrade inspection information can be viewed for any inspection on record in the database by using the Date drop down box, and choosing the date of the inspection.



To insert additional defects for an inspection record (on a given date), click the **Insert** button to insert additional rows to the grid. To delete a defect from the inspection record, highlight the row, and click the **Delete** button. Note that the Defect Free check box is used to denote the segment as inspected and completely free of Ballast/Subgrade defects.

Drainage Inspection

Drainage inspection information, as with all inspection information, is stored and accessed at a segment level. To access the Drainage inspection screen, right click on the segment of interest, then choose Inspection -> Detailed. The Drainage tab contains a grid, with each row of the grid representing defects for that segment on a given inspection date. Drainage inspection information can be viewed for any inspection on record in the database by using the Date drop down box, and choosing the date of the inspection.

Date: 6/28/2005 Begin Station: 0+00 End Station: 51+58
Inspector: DRU

Geometry Grade Crossings Turnouts
Ties Rail F&OTM Appliances Rail Crossings Ballast/Subgrade Drainage Impaired Insp.

Defect Free Delete Insert

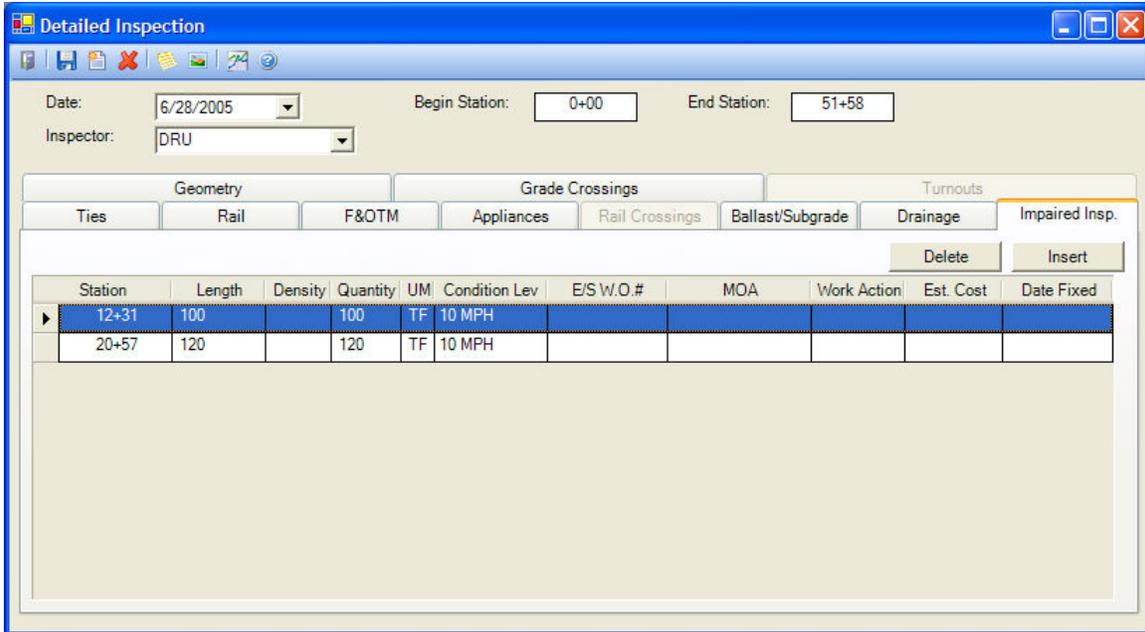
Defect	Station	Rail	Length	Dens	Quan	U	Condition	E/S W.O.	MOA	Work A	Est. Co	Date Fix
▶ Drainage Structure (Other), Partially	5+27	N/A			1	E	Full Com					
Drainage, No Defects	9+13	N/A			1	E	Defect Fr					
Drainage, No Defects	16+36	N/A			1	E	Defect Fr					

To insert additional defects for an inspection record (on a given date), click the **Insert** button to insert additional rows to the grid. To delete a defect from the inspection record, highlight the row, and click the **Delete** button. When inputting Drainage defects, note that the Station field is a drop list which displays the location of all appliances in the inventory for that segment.

Impaired Inspection

Impaired Inspection information, as with all inspection information, is stored and accessed at a segment level. Impaired inspection denotes that the inspection process was impaired due to external circumstances, such as cars on the track.

To access the Impaired Inspection screen, right click on the segment of interest, then choose Inspection -> Detailed. The Impaired Inspection tab contains a grid, with each row of the grid representing the locations of impairment for that segment on a given inspection date. Impaired Inspection information can be viewed for any inspection on record in the database by using the Date drop down box, and choosing the date of the inspection.



To insert additional impaired locations for an inspection record (on a given date), click the **Insert** button to insert additional rows to the grid. To delete a location from the inspection record, highlight the row, and click the **Delete** button.

Geometry Inspection

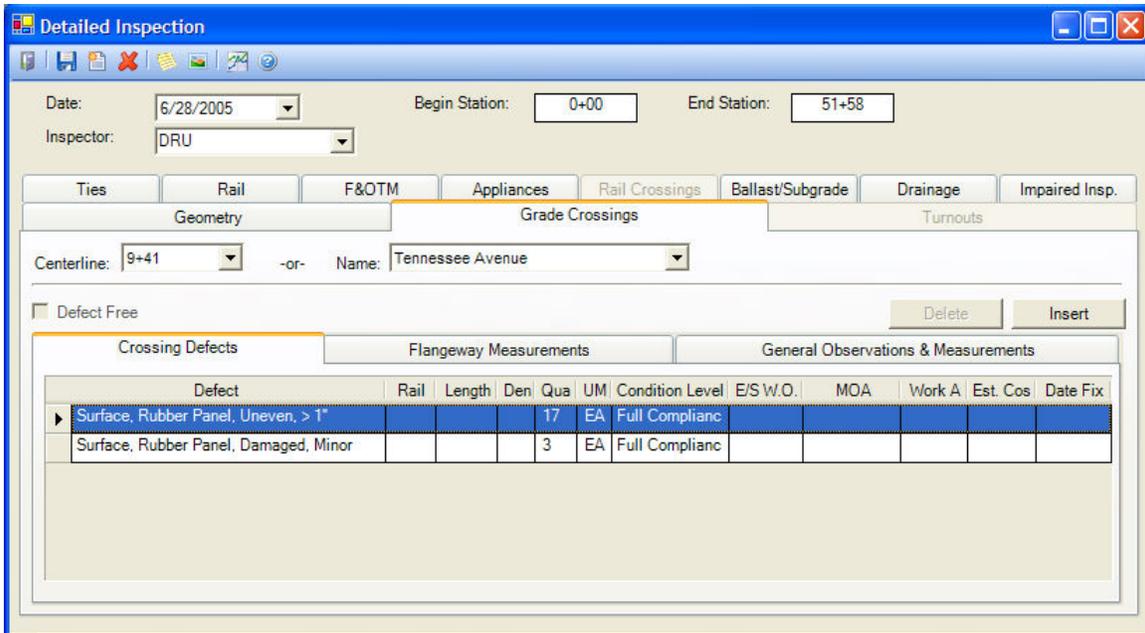
Geometry inspection information, as with all inspection information, is stored and accessed at a segment level. To access the Geometry inspection screen, right click on the segment of interest, then choose Inspection -> Detailed. The Geometry tab contains 5 sub-tabs for alignment, crosslevel, displacement, gauge, and profile geometry deviations. Each sub-tab contains a grid, with each row of the grid representing geometry deviation measurements for that segment on a given inspection date. Geometry inspection information can be viewed for any inspection on record in the database by using the Date drop down box, and choosing the date of the inspection.

Station	Rail	Bridge	Meas.	Relative	Length	UM	Condition Level	E/S W.O.#	MOA	Work A	Est. Cos	Date Fixe
8+20	L	<input type="checkbox"/>	0.5	0.5	20	TF	Full Compliance					
10+00	L	<input type="checkbox"/>	0.5	0.5	50	TF	Full Compliance					
45+50	L	<input type="checkbox"/>	0.5	0.5	15	TF	Full Compliance					
44+80	R	<input type="checkbox"/>	1.5	1.5	220	TF	Full Compliance					

To insert additional deviation measurements for an inspection record (on a given date), click the **Insert** button to insert additional rows to the grid. To delete a deviation measurement from the inspection record, highlight the row, and click the **Delete** button. Note that the Defect Free check box is used to denote the segment as inspected and completely free of all geometry deviations. In addition, the Operational Inspection check box is used if the geometry inspection was conducted in conjunction with train operations.

Grade Crossing Inspection

Grade Crossing inspection information, as with all inspection information, is stored and accessed at a segment level. To access the Grade Crossing inspection screen, right click on the segment of interest, then choose Inspection - > Detailed. The Geometry tab allows you to bring up a grade crossing's inspection records by choosing either the crossing centerline station or road name from the corresponding drop down boxes. The Crossing Defects sub-tab contains a grid, with each row of the grid representing grade crossing defects for the selected grade crossing on a given inspection date.



To insert additional grade crossing defects for a grade crossing inspection record (on a given date), click the **Insert** button to insert additional rows to the grid. To delete a grade crossing from the inspection record, highlight the row, and click the **Delete** button. Note that the Defect Free check box is used to denote the grade crossing as inspected and completely free of all defects. In addition, the Flangeway Measurements tab contains information about grade crossing flangeway width and depth measurements. Finally, the General Observations and Measurements tab (shown below) contains additional observations about the condition of the grade crossing in terms of ride quality, sight distance, track profile, and approach elevation.

The screenshot shows the 'Detailed Inspection' window with the following details:

- Date:** 6/28/2005
- Begin Station:** 0+00
- End Station:** 51+58
- Inspector:** DRU
- Navigation Tabs:** Ties, Rail, F&OTM, Appliances, Rail Crossings, Ballast/Subgrade, Drainage, Impaired Insp.
- Sub-tabs:** Geometry, Grade Crossings, Turnouts
- Centerline:** 9+41
- Name:** Tennessee Avenue
- Buttons:** Defect Free, Delete, Insert
- Inspection Categories:**
 - Crossing Defects:** Ride Quality (radio buttons: Excellent, Good, Fair, Poor)
 - Sight Distances:** Adequate (selected), Inadequate
 - Track Profile in Crossing:** Excellent (No Settlement), Good (Settlement < 1"), Fair (Settlement 1 - 3") (selected), Poor (Settlement > 3")
 - Approach Elevation:** Defect Free (selected), One Approach Excessive, Both Approaches Excessive
- Details Buttons:** Located under Ride Quality and Sight Distances.

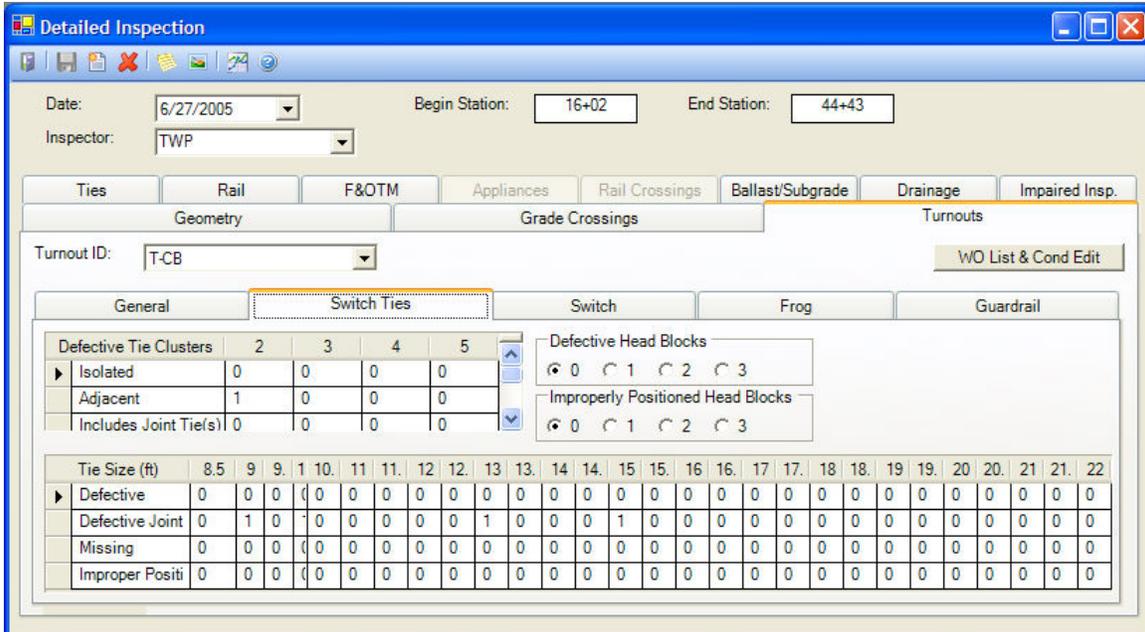
Turnout Inspection

Turnout inspection information, as with all inspection information, is stored and accessed at a segment level. To access the Turnout inspection screen, right click on the segment of interest, then choose Inspection -> Detailed. To view or edit the turnout inspection record for another turnout, choose the turnout ID from the drop down list. The General Observation tab (below) displays general information about the condition of the turnout.

The screenshot shows the 'Detailed Inspection' window with the following details:

- Date:** 6/27/2005
- Begin Station:** 16+02
- End Station:** 44+43
- Inspector:** TWP
- Navigation Tabs:** Ties, Rail, F&OTM, Appliances, Rail Crossings, Ballast/Subgrade, Drainage, Impaired Insp.
- Sub-tabs:** Geometry, Grade Crossings, Turnouts
- Turnout ID:** T-CB
- Buttons:** WO List & Cond Edit
- Inspection Categories:**
 - General:**
 - Switch Difficult to Operate
 - Rail Weight or Section Change
 - Debris in Crib Area
 - Line and Surface:**
 - Excellent (DF) (selected)
 - Good
 - Fair
 - Marginal
 - Poor
- Other Tabs:** Switch Ties, Switch, Frog, Guardrail

The Switch Ties tab (below) displays information about the defective switch ties in the turnout selected. An individual switch tie can be marked as defective, defective joint, missing, or improperly positioned (skewed). In addition, the size of each defective tie can be noted in the tie grid.



The switch tab (below), frog tab, and guardrail tab each contain a list of their respective components, and the possible defects associated with each, arranged in a grid format. A defect can be noted by checking the box or indicating the number of defective components of a given defect type are present in the turnout. In addition, the switch, frog, and guardrail all have measurements that can be recorded on the corresponding tab.

Detailed Inspection

Detailed Inspection

Date: 6/27/2005 Begin Station: 16+02 End Station: 44+43
 Inspector: TWP

Ties Rail F&OTM Appliances Rail Crossings Ballast/Subgrade Drainage Impaired Insp.

Geometry Grade Crossings Turnouts

Turnout ID: T-CB WO List & Cond Edit

General Switch Ties **Switch** Frog Guardrail

Point L: Gauge at Pt. in: 56.5 Gauge at Joints 1st: 56.5 Less than 4 L:
 Gap: R: Gauge at Heel in: 56.75 in Curved Closure Rail: 2nd: Functional Rail Braces: R:

Description	DF	Imp. Size	Imp. Type	Loose	Imp. Pos.	Dam.	Worn	Miss	Other
Switch Stand	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>					
Target/Lamp	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>				
Ground Throw Leve	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>					
Point Locks/Lever L	<input checked="" type="checkbox"/>	0	0	0	0	0		0	
Jam Nut	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>					
Connecting Rod	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>					
Switch Rods	<input checked="" type="checkbox"/>	0	0	0	0	0		0	
Switch Clips	<input type="checkbox"/>	0	0	0	1	0		0	0
Connecting Rod Bol	<input type="checkbox"/>	1	0	0	1	0		0	
Switch Rod Bolts	<input type="checkbox"/>	0	0	1	0	0		0	
Clip Bolts	<input checked="" type="checkbox"/>	0	0	0	0	0		0	
Cotter Keys	<input type="checkbox"/>	0	0					0	

Safety Inspection

Safety Inspections

Unlike a detail inspection which addressed all defects, a safety inspection usually only addresses the most critical defects types which should be corrected in an expedient fashion. Safety inspection information, as with all inspection information, is stored and accessed at a segment level. To access the safety inspection screen, right click on the segment of interest, then choose Inspection - > Safety. The Safety Inspection screen contains a grid, with each row of the grid representing safety defects for that segment.

Insp Date	Inspector	Comp	Defect	Station	Rail	Len	Den	Qua	UM	Condition Level	E/S	MO	Date Fixed
06/15/2006	Mike G	None	0					0					
05/21/2006	Mike G	Ballast	Dirty (Fouled) Ballast	6+00	N/A	400	50	200	TF	Full Compliance			
05/21/2006	Mike G	Fastenings	Joint Bars, Cracked (Cen	5+00	L			1	EA	5 MPH			
05/21/2006	Mike G	Ties	Isolated Defective Tie Cl	2+00	N/A			1	EA	No Operation	1A	DOT	06/05/2006

To insert additional safety defects, click the **Insert** button to insert additional rows to the grid. To delete a safety defect from the segment record, highlight the row, and click the **Delete** button. The safety grid shows all defects previously recorded, regardless of the date they were found. Use the **Show Existing Defects** and **Show Fixed Defects** check boxes to display only current safety defects that exist on the track, only safety defects that have been fixed, or all safety defects identified.

Safety Inspection may occur on a monthly, or more frequent, schedule. If safety defects have been identified via a previous inspection, and those defects are still found to be present under the next safety inspection, it is not necessary to enter those defects again - the system already has those recorded as existing defects. If a safety inspection is performed that turns up no new safety defects, a new record show be entered for that inspection date where the component is set to none - denoting no defects.

During a detailed inspection, it is not unlikely to come across a critical defect that requires a immediate work action because it is a safety concern. If a given

defect is denoted as requiring a work order during the detailed inspection, that defect will be displayed on the safety screen as well.

Uninspected Deteriorated

Uninspected Deteriorated

The Uninspected Deteriorated screen is accessible from the tree right click menu, then choosing Inspection -> Uninspected Deteriorated. This inspection option is available for tracks/segments whose condition is so poor that it is not worthwhile to inspect. In this situation, ultimately the track or segment requires total reconstruction.



To create a new Uninspected Deterioration record for a segment:

1. Highlight the track or segment from the tree, right click and choose Inspection -> Uninspected Deterioration
2. Click the New  button
3. Chose the date and inspector
4. Click the Save  button

Certification

Track Certification

For Navy installation track, certification records must be kept to indicate if each track and track segment is Certified, Restricted Certification, or Closed to Traffic.

This certification is based off of the finding of the detailed and/or safety track inspections and is signed by the inspector and certifying official, usually the garrison commander. RAILER can automatically produce a certification record using recent track inspection results. This record can be electronically signed and saved for retrieval at a later point in time.

Track Certification for: D <MD05>

Inspection Date: 5/17/2007 Date of Last Operational Inspection: Date of Last Non-Destructive Test:

Component Restriction Levels:

Rail: No Restriction Appliances: No Restriction Turnouts: N/A
F&OTM: No Restriction Drainage: No Restriction Geometry: No Restriction
Ties: No Restriction Rail Crossings: N/A Clearances: No Restriction
Ballast/Subgrade: Restricted Grade Crossings: No Restriction Impaired Inspection: Close to Traffic

Remarks:

Catastrophic Defect: Inspection Impaired at 9+22 in D <MD05>
Critical Defect: Veg Brushes Rolling Stock at 6+37 in D <MD05>

Certification:

Related Segmen	Recommendation	Certification
▶ D <MD05>	Non-Certification	Non-Certification

Inspector: Date: Certifying Official: Date:

To open the certification screen for a track, right click on the track (or segment) and choose Certification. The certification window will come up, and a new certification record can be generated by clicking the New button . This lists the certification level by component, as well as a description on critical or catastrophic defects. The inspector and certifier can each change the default

recommendations if necessary, and then click the Sign button  individually to sign the record. Note that an inspector or certifying official must be logged in as a user with the appropriate user privileges to use the electronic signature feature.

Work Planning

Configuration

Costs

The Costs screen is available from the Work Planning -> Configuration -> Costs menu. Users can create customized cost books of track repair work actions based on expected or contracted unit prices. These costs are then used in the work plan development process.

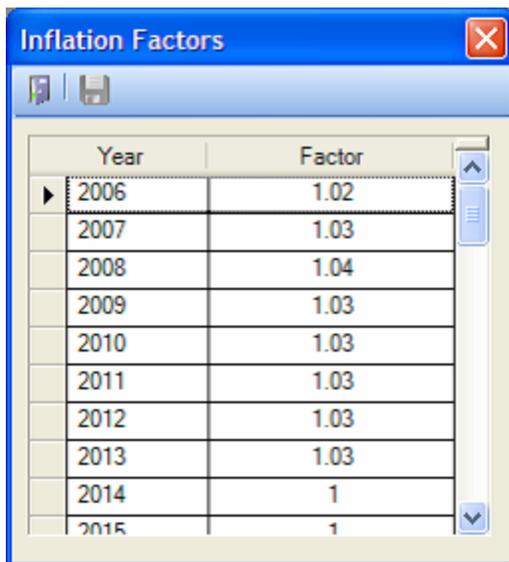
Work actions in RAILER are divided into Local and Global actions. Local work actions correct specific defects present on the track, and are applied at the local location where that defect is present. Global work actions are applied to an entire segment or track, regardless of the defects present on that track. For example, you may have a global work action to upgrade to a heavier rail section on a portion of track, regardless of the defects in that rail. Work actions and costs for either local or global actions are accessed using the Cost Scope radio button. In addition to unit cost information, the contract work action line item can be optionally stored.

	Description	UM	Cost	Line Item
<input checked="" type="checkbox"/>	Clean Ballast (Undercut)	TF	\$0.25	A001
<input checked="" type="checkbox"/>	Add Crib Ballast (1" Depth)	TF	\$0.50	A002
<input checked="" type="checkbox"/>	Add Crib Ballast (2" Depth)	TF	\$1.00	A002
<input checked="" type="checkbox"/>	Add Crib Ballast (3" Depth)	TF	\$1.50	A002
<input checked="" type="checkbox"/>	Add Crib Ballast (4" Depth)	TF	\$2.00	A002
<input checked="" type="checkbox"/>	Add Crib Ballast (5" Depth)	TF	\$2.50	A002
<input checked="" type="checkbox"/>	Add Crib Ballast (6" Depth)	TF	\$3.00	A002
<input checked="" type="checkbox"/>	Add Crib Ballast (7" Depth)	TF	\$3.50	A002
<input checked="" type="checkbox"/>	Add Crib Ballast (8" Depth)	TF	\$4.00	A002
<input checked="" type="checkbox"/>	Add Shoulder Ballast (Varying Depth)	LF	\$1.00	A003
<input checked="" type="checkbox"/>	Surface and Align Track (1" Lift or Depr	TF	\$4.10	A004
<input checked="" type="checkbox"/>	Surface and Align Track (2" Lift or Depr	TF	\$5.20	A004
<input checked="" type="checkbox"/>	Surface and Align Track (3" Lift or Depr	TF	\$6.30	A004

RAILER allows for the creation of Method of Accomplishment (MOA) cost books. To view cost data for a given cost book, use the MOA drop list. To create a new cost book, click the New  button. To copy an existing cost book along with all cost information, click the Copy  button. To delete a cost book, select the cost book from the MOA drop list, and click the Delete  button. To export cost data to Microsoft Excel, click the Export to Excel button.

Inflation

When creating Multi-year work plans in RAILER, it is important to forecast the costs for work actions in out years. Therefore, the user can adjust the factor to inflate the unit costs for each year. Inflation factors are accessed from the Work Planning -> Configuration -> Inflation menu.



The screenshot shows a window titled "Inflation Factors" with a close button (X) in the top right corner. Below the title bar are icons for a folder and a save icon. The main area contains a table with two columns: "Year" and "Factor". The table lists years from 2006 to 2015 with corresponding inflation factors. A vertical scrollbar is on the right side of the table.

Year	Factor
2006	1.02
2007	1.03
2008	1.04
2009	1.03
2010	1.03
2011	1.03
2012	1.03
2013	1.03
2014	1
2015	1

Policies

Policies in RAILER link a given defect with a corrective work action. For example, if a defective 5-in-a-row tie cluster is present on the track, numerous options exist for addressing the problem. One option could be to replace all ties, while another option could be to replace only the center tie. Each action has a different cost and level of repair effort, and each may be viable for a particular portion of track. The RAILER work planning module uses this information to automatically determine what work action to use to corrective an existing defect when generating a work plan.

	Description	Std. Condition	M&R Trigger	Work Action	UM
<input checked="" type="checkbox"/>	Appliances				
<input checked="" type="checkbox"/>	Ballast/Subgrade				
<input checked="" type="checkbox"/>	Drainage				
<input checked="" type="checkbox"/>	F&OTM				
<input checked="" type="checkbox"/>	Grade Crossings				
<input checked="" type="checkbox"/>	Rail				
<input checked="" type="checkbox"/>	Rail Crossings				
<input checked="" type="checkbox"/>	Ties				
<input checked="" type="checkbox"/>	Turnouts				
	Single Defective Tie	No Restriction	Follow Standard	Install/Replace On	EA
	Single Defective Joint	No Restriction	Restrict Ops	Install/Replace On	EA
	All Joint Ties Defectiv	Close to Traffic	Follow Standard	Install/Replace On	EA
	Isolated Defective Tie	No Restriction	Follow Standard	Install/Replace Tw	EA
	Isolated Defective Tie	No Restriction	Follow Standard	Install/Replace Thr	EA
	Isolated Defective Tie	Restrict Ops	Follow Standard	Install/Replace Fo	EA
	Isolated Defective Tie	Close to Traffic	Follow Standard	Install/Replace Fiv	EA
	Defective Tie Cluster (	No Restriction	Follow Standard	Install/Replace Tw	EA
	Defective Tie Cluster (	No Restriction	Follow Standard	Install/Replace Thr	EA
	Defective Tie Cluster (	Restrict Ops	Follow Standard	Install/Replace Fo	EA

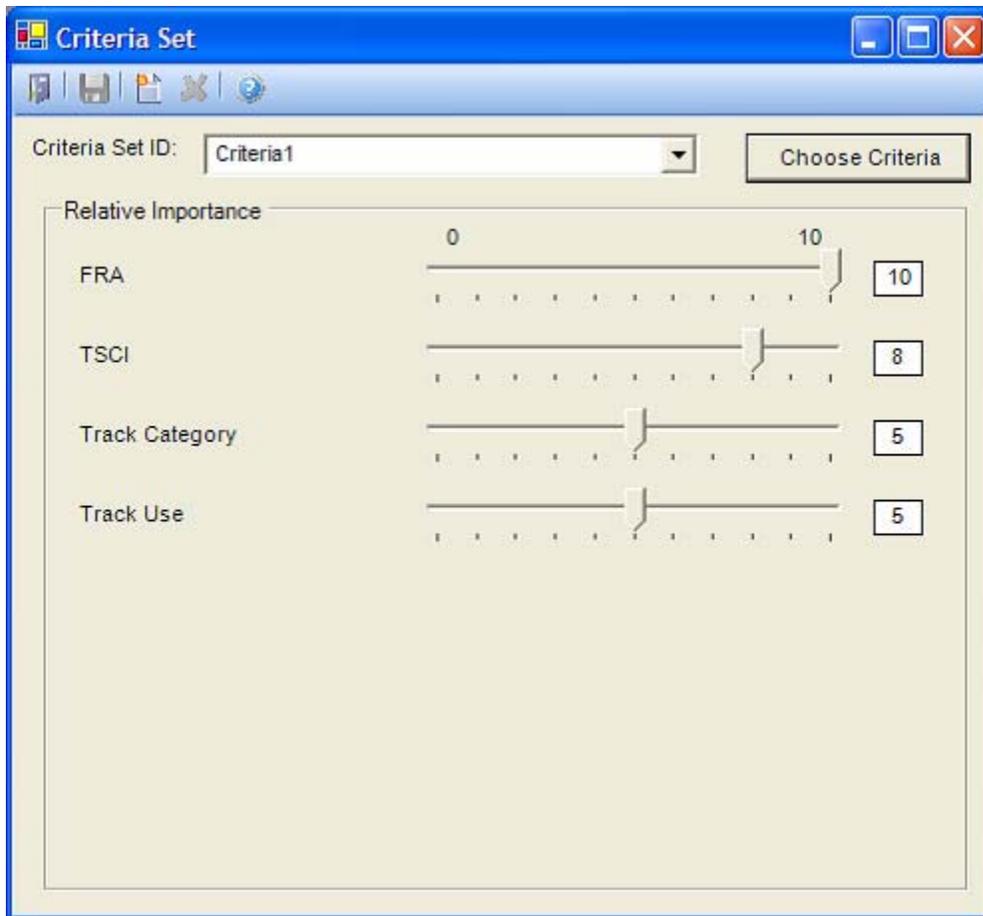
In RAILER, multiple maintenance and repair policies can be created. For example, there may be a minimum repair policy, a complete repair policy, or a best practice policy. New policies are created by clicking the New  button on the toolbar. A selected policy can be copied over to a new policy by clicking the Copy  button. A selected policy is deleted by clicking the Delete  button.

When a policy is created or edited, each defect in RAILER is shown in the description column. The work action to be applied for that defect can be set by clicking on the corresponding cell in the Work Action column, and choosing the appropriate work action from the drop list. In addition, the Std. Condition column lists the standard condition level for each defect based off of the standard displayed in the Standard drop box. If the user wanted to treat a given defect as a more serious defect against the standard, they could use the M&R Trigger column to lower the standard condition level. For example, even though a defective joint tie provides no restriction against the standard, the user could set the joint tie defect to be treated as a restricted operations defect for the purposes of that policy.

Prioritization

When work plans are developed, many times the cost of all suggested work actions exceeds the total budget. In this case, work item ranking is necessary to determine which items are the most critical to be accomplished under those budget constraints. A prioritization scheme establishes an organized framework for determining project and work item priorities and rankings based off of set user criteria.

The prioritization screen is accessed from the Work Planning -> Configuration -> Prioritization menu.



The first step to creating a prioritization scheme is to create a new criteria set:

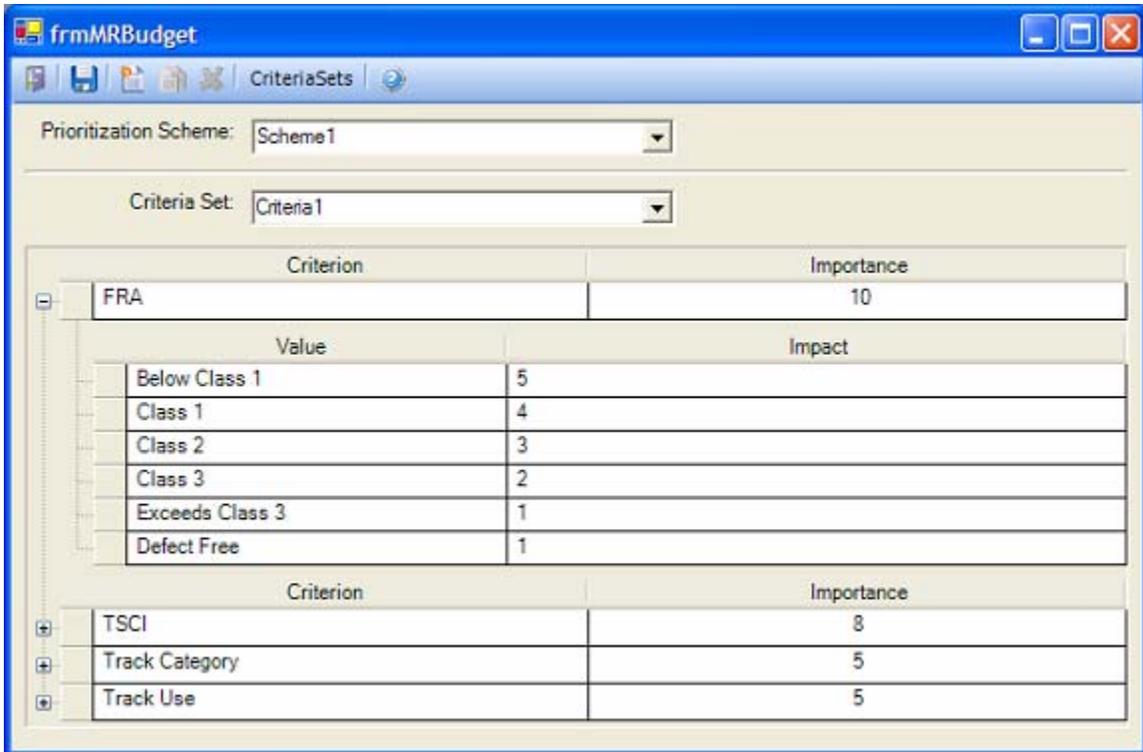
1. Click the New  button on the toolbar, and type the criteria set ID in the box.
2. Specify the criteria to be used by clicking the Choose Criteria button, and checking the box on the criteria to be included
3. Then use the slider bars to determine the relative weight of each criteria on a scale of 1-10.
4. When finished creating the criteria set, click Save.

Choose Criteria

Description	Include
▶ U.S. Army	<input type="checkbox"/>
FRA	<input checked="" type="checkbox"/>
Navy Maintenanc	<input type="checkbox"/>
Navy Safety	<input type="checkbox"/>
RJCI	<input type="checkbox"/>
TCI	<input type="checkbox"/>
BSCI	<input type="checkbox"/>
TSCI	<input checked="" type="checkbox"/>
Rate of Deterior	<input type="checkbox"/>
Rate of Deterior	<input type="checkbox"/>
Rate of Deterior	<input type="checkbox"/>

Save Cancel

Once the criteria to be used is specified, then impact factors can be assigned as measures of importance for each value or range for the criteria. From the example scheme below, the FRA standard was specified as a criterion, and all segments at the FRA standard level of Below class one will get the highest priority (an impact of 5). Likewise, segments at a FRA standard condition level than exceeds class 3 will only get the lowest priority (impact of 1). By looking at the attributes of each segment, and scoring those attributes base on the criteria and impacts specified in the prioritization scheme, RAILER can automatically computer priority rankings for maintenance and repair work actions.



Funding

The funding screen is accessed from the Work Planning -> Configuration -> Funding menu. RAILER allows for the creation of several funding schemes, which can be viewed from the Funding Scheme drop list. To add a funding scheme, click the New  button. To copy an existing funding scheme along with funding information, click the Copy  button. To delete a funding scheme, select it from the Funding Scheme drop list, and click the Delete  button.

The screenshot shows a software window titled 'frmMRBudget'. At the top, there is a 'Funding Scheme:' dropdown menu set to 'Funding1'. Below this is a table with columns for 'Name', '2006', '2007', '2008', '2009', '2010', and '2011'. The table contains two rows: 'O&M' and 'Recap'. The 'Recap' row has a small icon in the first column. Below the table is a horizontal scrollbar.

Name	2006	2007	2008	2009	2010	2011
O&M	\$20,000.00	\$20,000.00	\$20,000.00	\$25,000.00	\$10,000.00	
Recap	\$0.00	\$150,000.00	\$200,000.00	\$50,000.00	\$0.00	

Funding sources can be added to a given funding scheme by clicking the Add Funding Source button. A funding source can be deleted by clicking the Delete Funding Source button. Once the expected funding for each year is specified, RAILER's work planning module can use that information in the creation of multi-year work plans to determine which work actions can be accomplished and which will be deferred based on their cost and priority.

M&R Plan

Work Plan Generation

Once inspection information is loaded into the system, and the work planning configuration modules (including costs, inflation, policies, prioritization, and funding) are set up, the work plan generation process can begin. The Maintenance & Repair (M&R) screen can be accessed from the Work Planning menu and choosing M&R Plan. The General tab allow for the creation and setup of an M&R plan.

The screenshot shows the 'M&R Plan' application window. The 'Plan ID' is set to 'Railroad Vegetation Control'. The 'General' tab is selected, displaying the following configuration:

- Plan Start Year: 2002
- Plan Horizon: 1 Year(s)
- Target Condition Level: 10 MPH Speed Limit
- Local M&R Policy: Best Practice
- Method of Accomplishment: DOT (Base)
- Prioritization Scheme: Default
- Funding Scheme: Unconstrained

The 'Components' section includes the following checked and unchecked options:

- Appliances
- Drainage
- Grade Crossings
- Rail Crossings
- Turnouts
- Ballast/Subgrade
- F&OTM
- Rail
- Ties

At the bottom of the window, there are buttons for 'Network Scope' and 'Global M&R Selection', and the 'Plan Date' is 10/28/2002.

A new plan can be created by clicking the New  button. An existing plan can be selected from the Plan ID drop down, and that plan can be copied to a new plan by clicking the Copy  button. In addition, an existing plan can be deleted by clicking the Delete  button. For each plan, the user specifies the following general information:

Plan Start Year: The first year the M&R plan take effect

Plan Horizon: How many years the plan will cover

Target Condition Level: The target level based off of standards restrictions that the track will be at after plan is complete

Local M&R Policy: The M&R policy for use by the plan

Method of Accomplishment: The cost book for use by the plan

Prioritization Scheme: The prioritization scheme for use by the plan

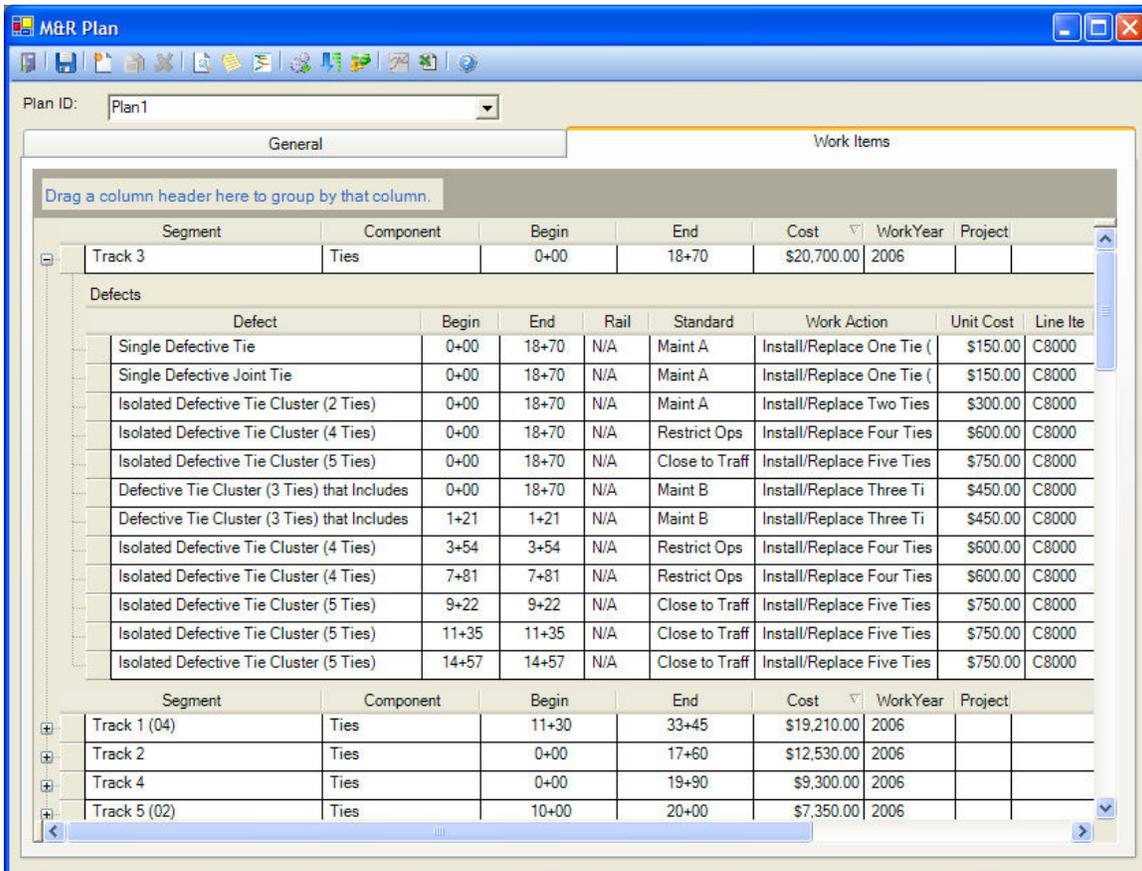
Funding Scheme: The funding scheme for use by the plan

Components: The plan can be configured to address only specific track components as chosen

Network Scope: The plan can be configured to address only specific areas, track, or segments as chosen

Global M&R actions: Global M&R work to be incorporated into the plan is selected here.

Once the plan configuration has been set, it can be saved by clicking the Save  button. Work plan work items are then generated by clicking the Generate Items  button. The program will go through the database of defects for the segments and components selected in the work plan and compare each defect to the target condition level. Each defect below the target condition level will get added to the work item list (below), along with the associated work action and its cost from the designated cost book. Work items are grouped by segment-component (for example Track 3 Tie work). Clicking the plus [+] expands the grouping to show all work items in that grouping.

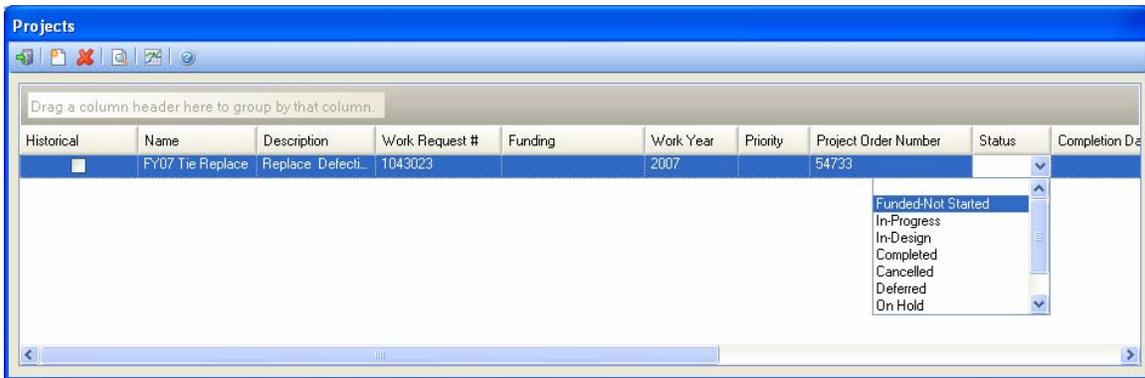


To prioritize all work items based on the criteria established in the Prioritization scheme, click the Prioritize  button. This will compute a priority score for all work items. If running a multi-year plan, (horizon greater than 1 year) the Funding  button can be used to initially fund work items based on the projected budget levels defined for the Funding scheme. For example, the program will look at work items rankings based on priority score, and fund the highest priority items until first year funds get allocated. Then it will inflate unfunded work items to the next year based on the Inflation factors, and fund remaining highest priority items for each year until the designated funds get expended. This process determines the work year for each work item. Note that

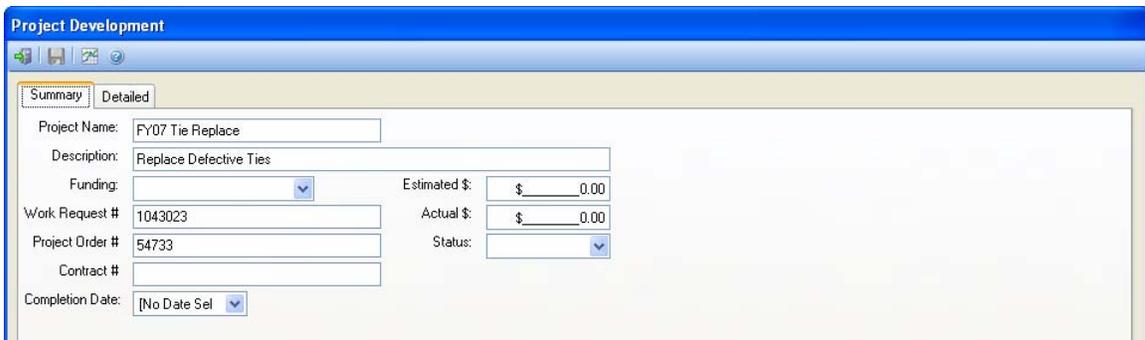
the user can adjust and overwrite any of the fields in the work plan to account for special circumstances.

Projects

After a work plan has been developed which generates a list potential work actions, a project, or multiple projects, can be created to group work actions into executable packages. These projects are tracked, budgeted, and executed together. The list of projects can be viewed by clicking the Projects button  on the M&R Work Plan screen. The grid displays project information, such as project name, description, work request number, project order number, status, completion date, etc.



A new project can be created by clicking the new project button, and entering the project information in the grid. Clicking the details button or double clicking on a project's row brings up the project development window for that project.



Summary information as discussed above is on the Summary tab for the Project Development window, and Detailed information about work actions included in the project is on the Detailed tab. To associate work actions with a project from the detailed tab, select the work action from the lower window, and click the up arrow to include it in the project. A work action can also be removed by clicking the down arrow after selecting it from the top window. In addition, work items can be associated to a project through the main Work Items grid by selecting the project name from the project drop down.

Project Development

Summary Detailed

Segment	Component	Begin	End	Cost	ID	Work Year	Impact	Status	Funding
703	Ties	0+00	21+11	\$500.00		2007			
710	Ties	0+00	10+05	\$999.87		2007			
706-03	Ties	4+63	24+13	\$40.00		2007			

Segment	Component	Begin	End	Cost	ID	Work Year	Impact	Status	Funding
711-03	Ties	28+66	30+25	\$240.00		2007			
711-01	Ties	2+82	26+05	\$1,190.00		2007			
701-03	Ties	12+30	18+13	\$160.00		2007			
Stub Track	Ties	0+00	7+90	\$1,483.03		2007			
701-04	Ties	18+13	39+32	\$640.00		2007			
3-05	Ties	17+79	51+17	\$7,720.00		2007			
2-01	Ties	0+00	12+57	\$300.00		2007			
4-01	Turnouts	33+42	34+48	\$810.30	T9	2007			
3-03	Turnouts	8+16	9+22	\$1,264.08	T2	2007			
714-02	Turnouts	4+51	5+57	\$242.28	T713	2007			
706-02	Turnouts	1+19	2+25	\$808.65	T708	2007			
2-02	Turnouts	12+57	13+63	\$413.04	T6	2007			

Work History

After project work has been finished, the project status can be moved to completed and a completion date entered for the project through the project screen in M&R work plan. After doing this the Historical check box can be checked to transfer the project information to work history. This creates a historical record of all work that has been completed. In addition, Condition Index values and Standard Operations Restrictions are re-computed based on the work items in the project having been completed, and the associated defects no longer existing.

Projects

Drag a column header here to group by that column.

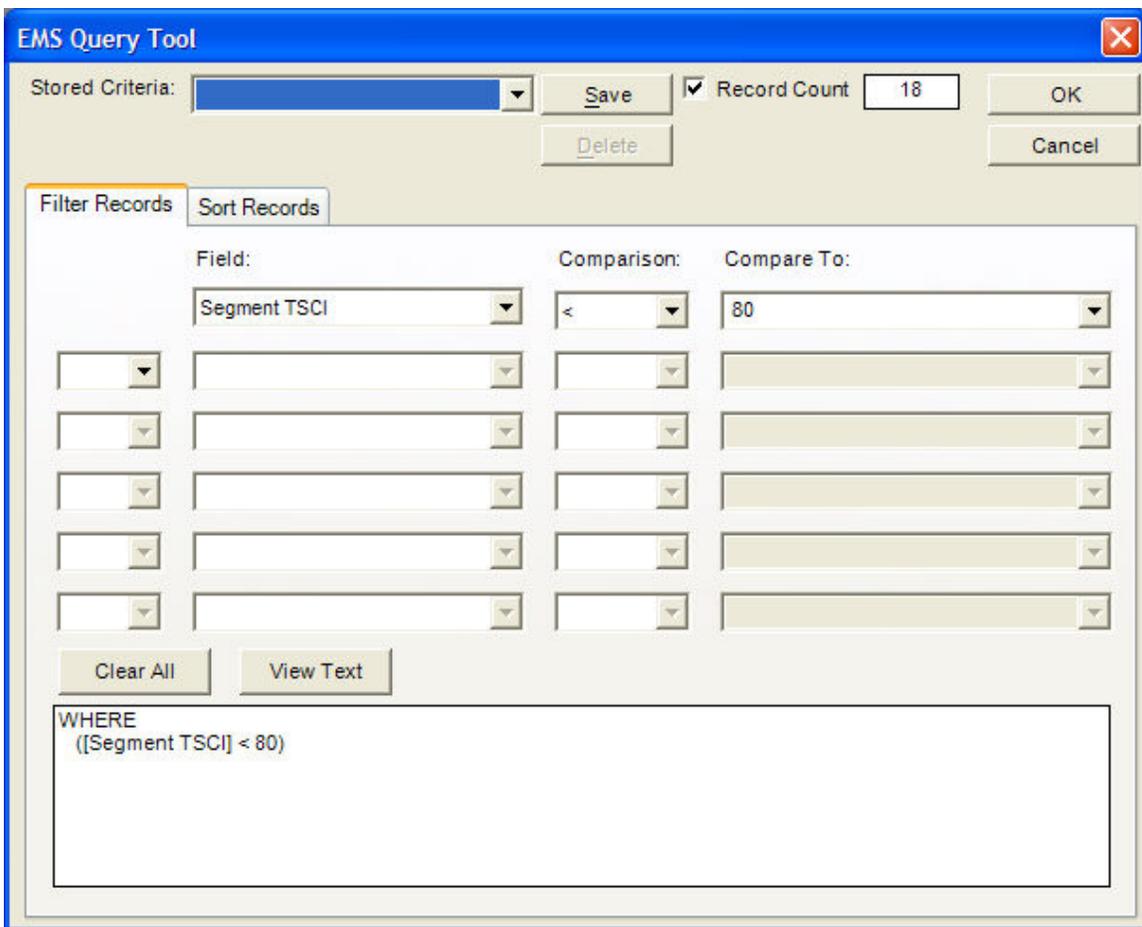
Historical	Name	Description	Work Request #	Funding	Work Year	Priority	Project Order Number	Status	Completion Date
<input checked="" type="checkbox"/>	FY07 Tie Replace	Replace Defecti...	1043023		2007	0	54733	Completed	05/07/2007

After a project has been transferred to work history, it can be viewed through the Work Planning -> Work History window.

Reporting

Reports Query

When the user clicks the Reports  button, the reports query tool is displayed. This tool allows the user to create filters to select only a portion of the records in the report be displayed based off of user-defined criteria. In the example below, the report while return only segments where the TSCI is less than 80. Once the criteria has been chosen, click the OK button to run and display the report results.



EMS Query Tool

Stored Criteria: Save Record Count 18 OK
Delete Cancel

Filter Records Sort Records

Field:	Comparison:	Compare To:
Segment TSCI	<	80
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

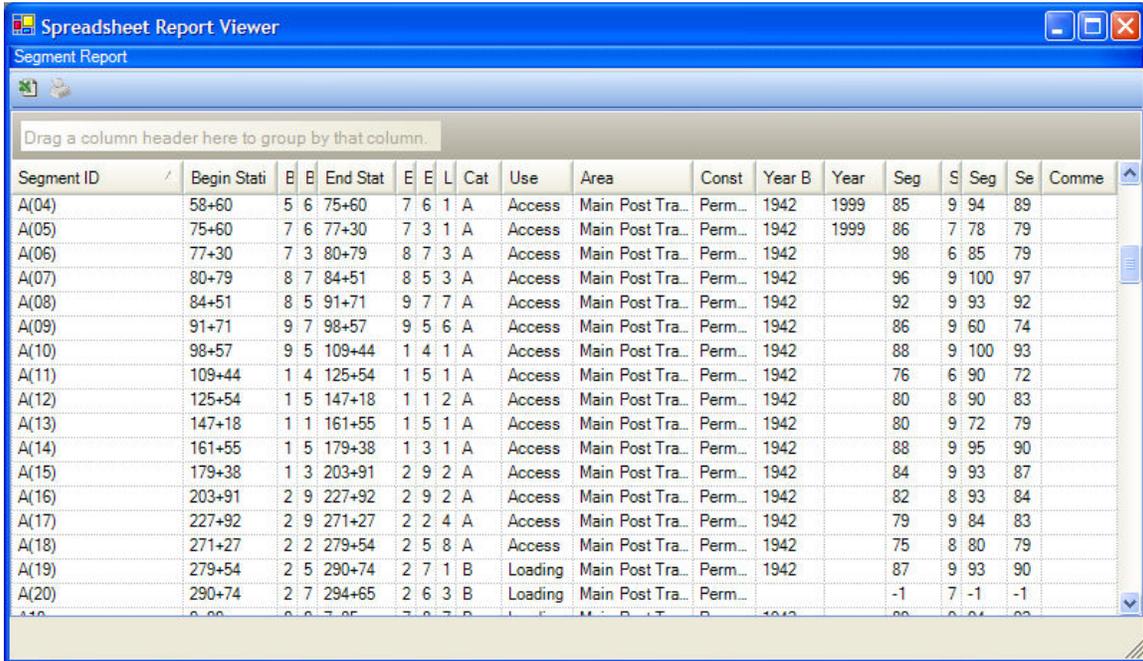
Clear All View Text

```
WHERE  
([Segment TSCI] < 80)
```

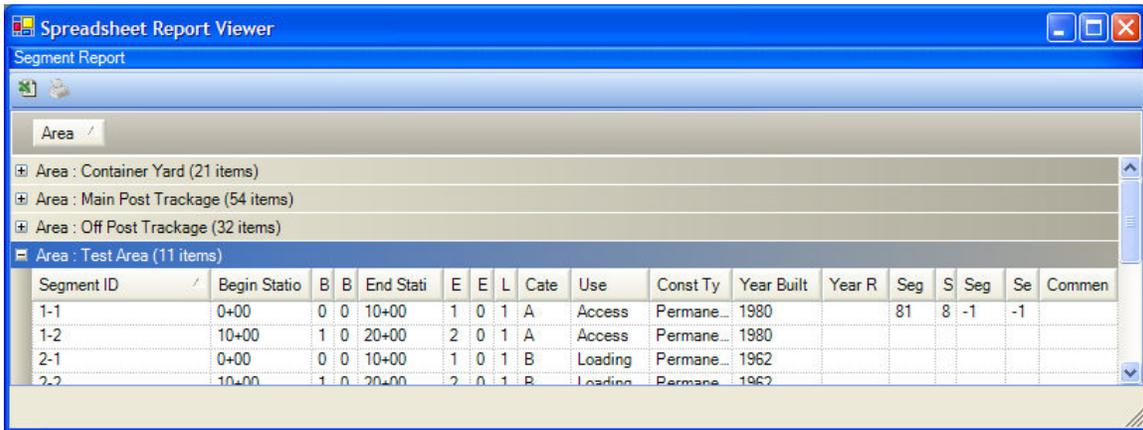
Spreadsheet Reports

When the user clicks the Reports  button from the Network, Area, Track, or Segment screen, a spreadsheet style report is generated, where information is displayed in the report viewer in a tabular format. Note that prior to the report

viewer screen, the Reports Query screen is displayed to define the scope of the report.



Spreadsheet style reports can be grouped by a given field by dragging the column header of that field into the space above. Click the plus [+] next to the group to expand info for that group. Reports can also be sorted by column by clicking the column header to sort ascending or descending.

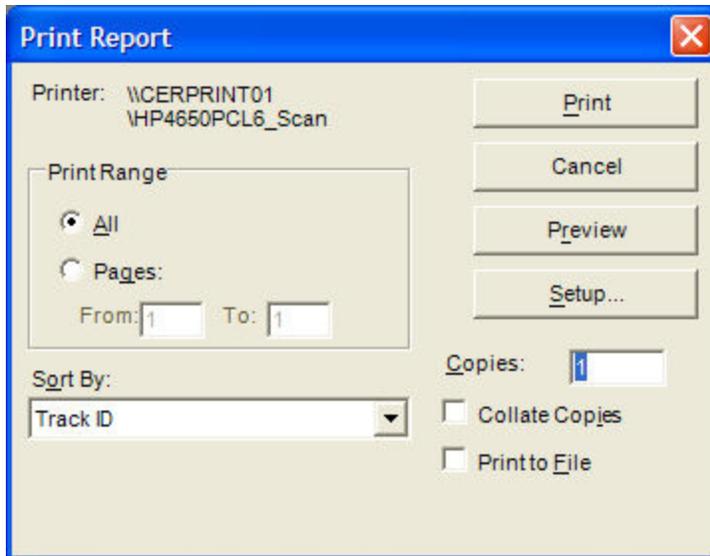


Finally, clicking the Export to Excel  button will export report information to Microsoft Excel.

Fixed Format Reports

When the user clicks the Reports  button from the Inventory or Inspection screens, they are presented with the option of running a spreadsheet report or fixed format report. Spreadsheet style reports are tabular reports as discussed here.

Fixed format reports are formatted in a printable style. After choosing a fixed format report, the Reports Query screen will be displayed as with the spreadsheet style reports. After entering the select criteria, the following screen is displayed:



The image shows a 'Print Report' dialog box with a blue title bar and a close button (X) in the top right corner. The dialog contains the following elements:

- Printer:** \\CERPRINT01
HP4650PCL6_Scan
- Print Range:** A section with two radio buttons: All and Pages. Below the radio buttons are two text input fields: 'From: 1' and 'To: 1'.
- Sort By:** A dropdown menu currently showing 'Track ID'.
- Copies:** A text input field containing the number '1'.
- Collate Copies:** An unchecked checkbox.
- Print to File:** An unchecked checkbox.
- Buttons:** Print, Cancel, Preview, and Setup... are arranged vertically on the right side of the dialog.

The user can choose to Print the report, or Preview a copy of the printed report with the Preview Button:

RAILER fixed format reports include:

Detailed Inspection Report: From the inspection screen, this report shows a detailed printout for an inspection record.

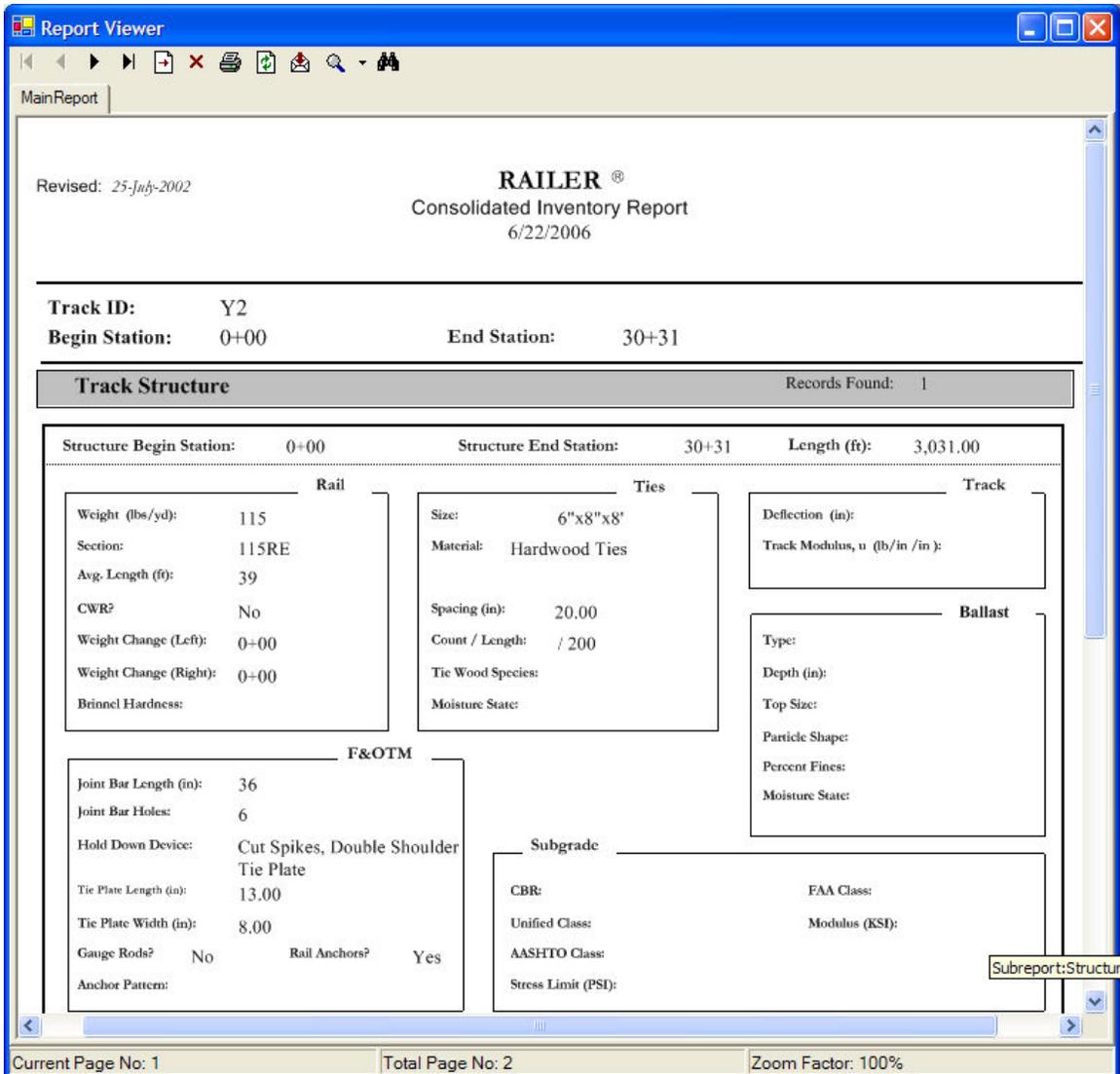
RAILER®
Track Inventory Location Report
6/22/2006

Track ID: Y2

Location	Inventory Item	Identification
0+00	Begin Track	Y2
0+00	Begin Segment	Y2(01)
1+37	Begin Segment	Y2(02)
1+37	Turnout (Facing Point)	T-E(Y1)
2+54	Begin Curve	6.25 degree curve
5+46	Appliance	Derail
7+61	Begin Grade Crossing (Road	Yard Access
7+77	End Grade Crossing (Road	Yard Access
9+09	End Curve	6.25 degree curve

Current Page No: 1 Total Page No: 1 Zoom Factor: 100%

Consolidated Inventory Report: From the inventory screen, this report shows a detailed account of all inventory component and track attributes for a given track.



Condition Analysis Reports

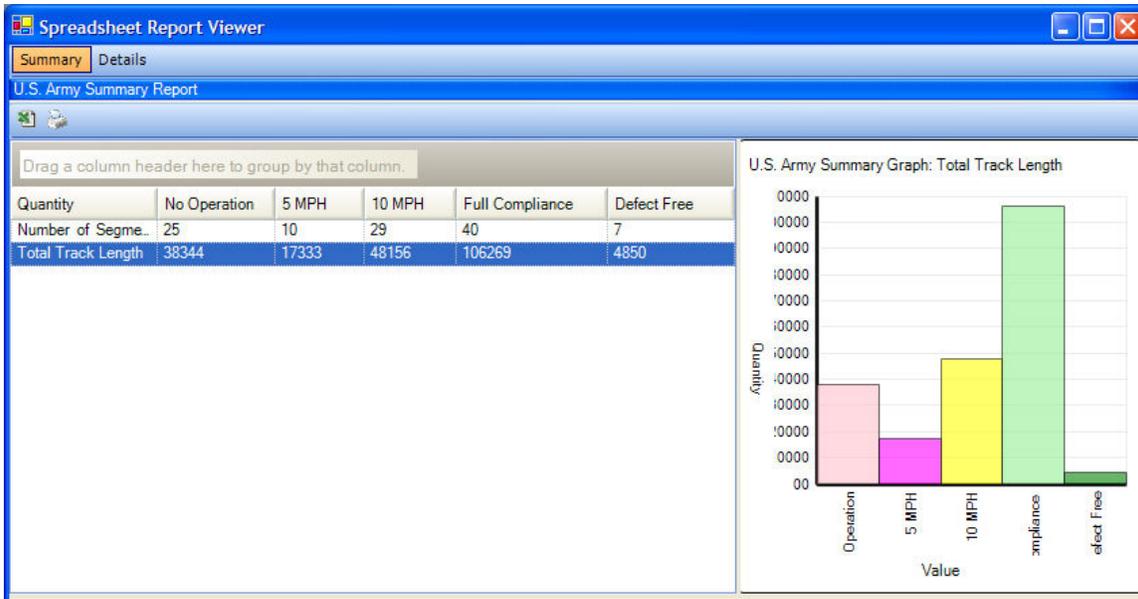
Condition Analysis reports are access from the Reports menu in RAILER. Condition Analysis reports include:

Condition Index: A breakdown of track segments in the network by TSCI ranges

ISR: A breakdown of track segments in the network by Army Installation Status Ratings, using information from the TSCI values

Standard Level: A breakdown of track segments in the network by operating restriction levels imposed by standards.

Each report shows a summary of information about the number of segments and total track length that fall into each category. The chart displays the results breakdown for the highlighted row.



In addition, the Details view displays the detailed information about each segment, as shown below.

The screenshot shows the 'Details' view of a report titled 'Standard Level Report'. It displays a table with the following columns and data:

Track ID	Segment ID	Use	Category	Begin Station	End Station	Length	Last Insp	US Army
1	1-1	Access	A	0+00	10+00	1000	6/21/2006	2: 10 MPH
4	4-1	Loading	A	0+00	10+00	1000	6/15/2006	0: No Operation
5	5-1	Access	A	0+00	10+00	1000	6/21/2006	0: No Operation
5	5-2	Access	A	10+00	20+00	1000	5/21/2006	0: No Operation
A	A(01)	Access	A	0+00	16+02	1602	6/27/2005	0: No Operation
A	A(02)	Access	A	16+02	44+43	2841	6/27/2005	2: 10 MPH
A	A(03)	Access	A	44+43	58+60	1417	6/28/2005	3: Full Complian..
A	A(04)	Access	A	58+60	75+60	1700	6/28/2005	2: 10 MPH
A	A(05)	Access	A	75+60	77+30	170	6/28/2005	3: Full Complian..
A	A(06)	Access	A	77+30	80+79	349	6/28/2005	0: No Operation
A	A(07)	Access	A	80+79	84+51	372	6/28/2005	1: 5 MPH
A	A(08)	Access	A	84+51	91+71	720	6/28/2005	2: 10 MPH
A	A(09)	Access	A	91+71	98+57	686	6/28/2005	0: No Operation
A	A(10)	Access	A	98+57	109+44	1087	6/28/2005	0: No Operation
A	A(11)	Access	A	109+44	125+54	1610	6/28/2005	1: 5 MPH
A	A(12)	Access	A	125+54	147+18	2164	6/28/2005	0: No Operation

Updating Condition Indices (CI)

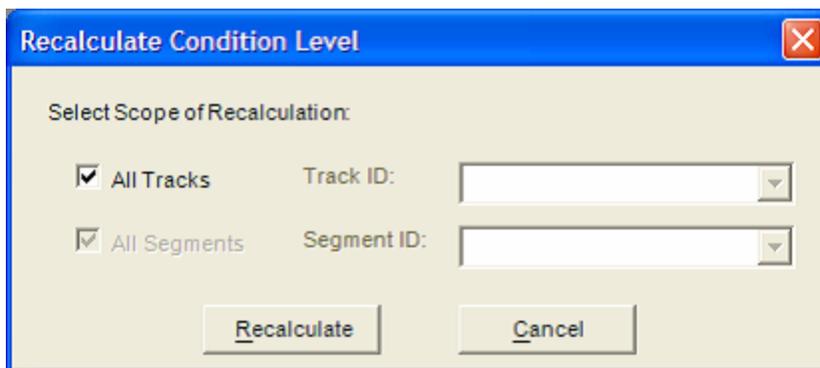
Calculating Condition Indices

After an inspection is completed, RAILER can use that inspection information to calculate the condition indices (RJCI, TCI, BSCI, and GCCI) for each segment, and roll-those CIs up into the TSCI for each segment, track, area, and network.

It will also calculate the standard condition level for each segment based off of the primary standard.

To recalculate CIs in RAILER:

1. Choose CI Update from the Analysis menu. The Recalculate Condition Level screen will appear.
2. CIs can be computed for a single track or segment, or for all tracks and segments.
3. Click the Recalculate button. This operation could take several minutes to complete.



Recalculate Condition Level

Select Scope of Recalculation:

All Tracks Track ID:

All Segments Segment ID:

Support

Sources of RAILER Support



University of Illinois

If RAILER software was obtained from the University of Illinois, contact the following for software support:

Scott McDonald
Tel: (800)895-9345
Email: techctr@uiuc.edu
University of Illinois Technical Support Center
302 East John Street, Suite 302
Champaign, IL 61820



SMS Center of Expertise for RAILER

The SMS Center of Expertise for Builder was created to provide a full range of customer support to DoD RAILER users. Services include:

- Support for implementation of RAILER
- Support for Inspection and re-inspection of Railroad track
- Condition assessment analysis
- Technical support for RAILER users
- Training
- Development of annual and long range work plans
- Budget forecasting and justification
- Development of GIS applications and presentations
- Database maintenance
- Software customization for specific organization requirements

The SMS POC for RAILER implementation is:

Michael Grussing, P.E.
Civil Engineer/Principle Investigator
US Army Corps of Engineers,
Engineer Research and Development Center,
Construction Engineering Research Laboratory
P.O. Box 9005
Champaign, IL 61826-9005
Phone: 217.398.5307
Email: michael.n.grussing@erdc.usace.army.mil

Software Development



Engineer Research and Development Center - Construction Engineering Research Labs (ERDC-CERL)

The Principles on RAILER development are:

Michael Grussing, P.E.
Civil Engineer/Principle Investigator
US Army Corps of Engineers,
Engineer Research and Development Center,
Construction Engineering Research Laboratory
P.O. Box 9005
Champaign, IL 61826-9005
Phone: 217.398.5307
Email: michael.n.grussing@erdc.usace.army.mil

Lance Marrano
System Engineer/Project Manager
US Army Corps of Engineers,
Engineer Research and Development Center,
Construction Engineering Research Laboratory
P.O. Box 9005
Champaign, IL 61826-9005
Phone: 217.373.4465
Email: lance.r.marrano@erdc.usace.army.mil

Acknowledgements

RAILER version 6.0 would not be possible without support from sponsors in the Army and Navy. The developers would like to thank Mr Mike Dean and Mr Phil Columbus with the Army Office of Assistant Chief of Staff for Installation Management (OACSIM) and Mr Bill Gannon from Naval Facilities Engineering Service Center (NFESC) for their support in program upgrades and features.

The developers also express thanks to all those who have provided feedback and suggestions during the beta testing period and Grade Crossing Condition Index Development to greatly improve the quality of the application. Specific thanks goes to:

Nick Byrnes
Mike Crawford
Jeremiah Dirnberger
Lulu Edwards
Riley Edwards

Bernie Forcier
Bill Gannon
John Hoegemeier
Sarah Jersey
Julie Kelley
Tom Pinnick
Greg Ramsay
Don Uzarski
Matt Waggoner

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