

Trip Optimizer

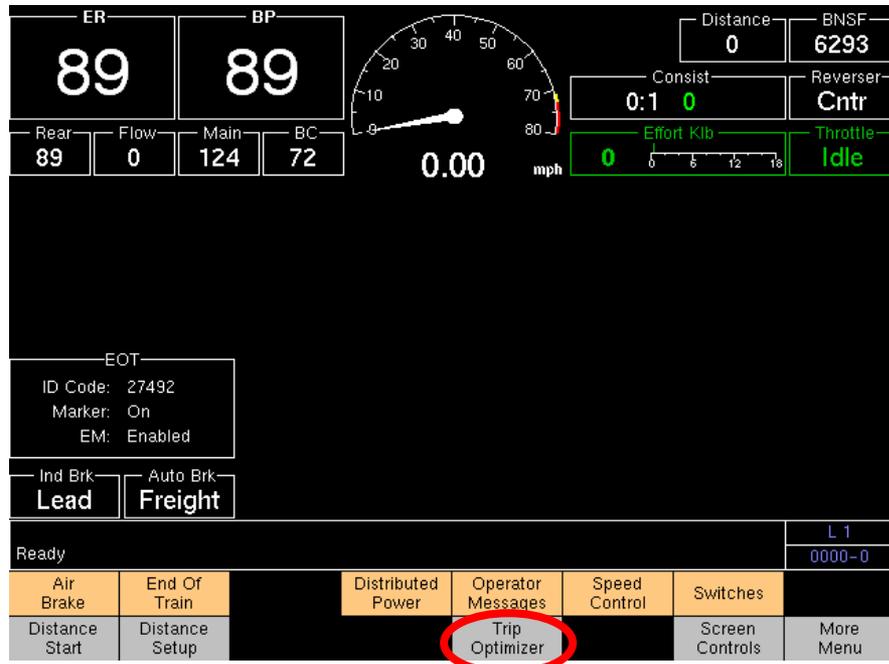
In conjunction with BNSF Railway's ongoing commitment to conserve fuel, over 3100 locomotives in the BNSF fleet have been equipped with Trip Optimizer. Currently, we operate in excess of 2,400,000 miles per month in TO. BNSF will continue to enhance our Energy Management Systems to leverage even more miles by widening the operating conditions and supported train symbols for which TO will function. This job briefing provides an overview of the features in Trip Optimizer. Please direct any questions to the MOP-Fuel for your Division.

SAFETY ALERT

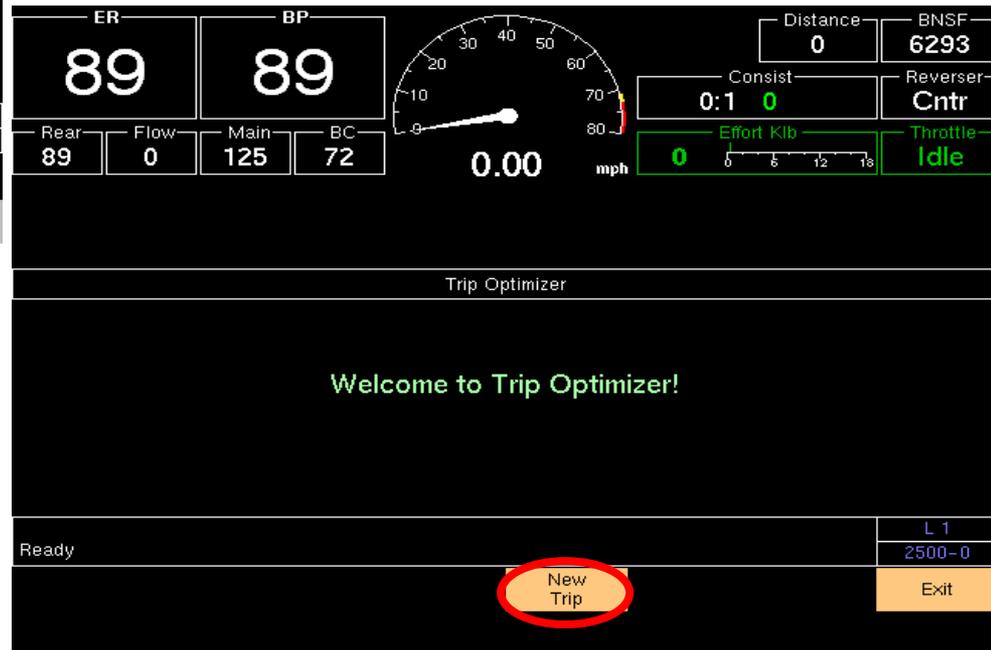
Trip Optimizer is not a substitute for the engineers experience and good judgment. Safe operation of the train, and compliance with rules and special instructions, remains the engineer's first responsibility.

Trip Optimizer - Initialization

To use the system, first press the **Trip Optimizer** key.



Then press the **New Trip** key.



Trip Optimizer – Active Features

What features are active?

- During initialization, you can determine active features by the features listed on the Trip Setup screen.
- Brake Mode: “Auto DB with Air Brake Advise” indicates that air brake advise is active.
- DP Independent Mode: will show “Auto” when this feature is active.

The screenshot displays the Trip Optimizer Trip Setup screen. At the top, there are several gauges and indicators: ER (90), BP (90), Rear (89), Flow (1), Main (140), BC (0), a speedometer (0.00 mph), Distance (0), GE (2005), Consist (2:3 113K), Reverser (Cntr), Lead (Idle Trail Idle), Effort Klb (0), and Throttle (Idle). The Trip Optimizer Trip Setup section shows the following settings:

Trip Starts At	DESTIN
Trip Ends At	KEY WEST
TRAIN ID	FLDKW08
Brake Mode	Auto DB with Air Brake Advise
DP Independent Mode	Auto

At the bottom, there is a prompt: "Please Review Trip Data!f Correct, Press F7 To Continue". Below this, there are two buttons: "Accept Trip" and "Reject Trip".

Train Setup

The screenshot displays the locomotive control interface. At the top, there are several gauges and indicators: ER 90, BP 90, Rear 88, Flow 2, Main 140, BC 72, a speedometer showing 0.00 MPH, Distance 0, BNSF 7911, Consist 2:3 0 K, Lead: Idle, Trail: Idle, Reverser Cntr, Effort Kib 0, and Throttle Idle. Below these is the 'Train Setup' section, which is divided into two main areas: 'Locomotive' and 'Train Data'. The 'Locomotive' table lists four locomotives with their positions and power modes. The 'Train Data' section provides summary statistics for the train. At the bottom, there is a message: 'Please Review Train Data And Update If Needed. Then Press F7 To Continue.' and a row of control buttons: Change Locomotives, Change Power Mode, Change Train Data, Accept, and Cancel Trip. Red arrows point to the 'Change Locomotives', 'Change Power Mode', 'Change Train Data', and 'Pick Up Cars' buttons.

Locomotive	Position	Power Mode
BNSF 7911	1	Running
BNSF 4907	2	Isolated
BNSF 6844	99	Running
BNSF 4757	100	DB Cutout

Train Data	
Railcars (Line #'s):	96
Loads/Empties:	100/50
Train Weight:	14670 tons
Train Length:	11806 ft
Total Axles:	766
Max Train Speed:	55 mph
Tons/Op. Brake:	78.4

Change Locomotives allows a locomotive to be added, removed, or repositioned.

Change Power Mode key is used to modify power mode: **Running**, **Isolated**, **DB Cutout** or **DB only**

Note: Trailing tonnage does not require editing for **Isolated**, **DB only**, or **DIC** locomotives.

Change Train Data key is used to edit Train Data information.

Pick Up Cars and **Set Out Cars** used to edit information during en route work events.

Form A & B Restriction Validation

The screenshot displays a train control interface with several gauges and a table of restrictions. The gauges include ER (90), BP (89), a speedometer (0.00 mph), Distance (0), BNSF (7506), Flow (0), Main (142), BC (0), Reverser (Cntr), Effort Klb (0), and Throttle (Idle). Below the gauges is a table titled "Trip Optimizer - Restrictions: SELIGMAN" with columns for ID, Type, Start MP, Enc MP, Speed Limit, and Track. At the bottom, there is a prompt "Accept Restrictions And Start Trip Optimizer?" with "L 4" and "2530-0" above it, and "Accept" and "Reject" buttons.

ID	Type	Start MP	Enc MP	Speed Limit	Track
6634	FORM A	290	291	25	MAIN 1
6635	FORM B	294	295	--	MAIN 1
6636	FORM A	312	322.5	35	MAIN 2
6637	FORM B	305	307	--	MAIN 1

Accept Restrictions And Start Trip Optimizer? L 4
2530-0

Accept Reject

Form A & B restriction information will be displayed after the train setup has been accepted. Compare the restrictions displayed with the train documents received. If there is more than 1 page of restrictions use the soft key under **Page Down** and the soft key under **Page Up** to navigate through them.

Trip Optimizer – Functions

1. Airbrake prompting

- TO will prompt for brake applications – min set to 15 psi max
- TO will prompt for brake releases
- TO will allow auto control with up to a 10 psi unplanned application (min set + one split reduction)

2. Auto independent mode for DP trains

- TO will always operate “fence up” while in auto
- TO will always return control to manual with the fence up

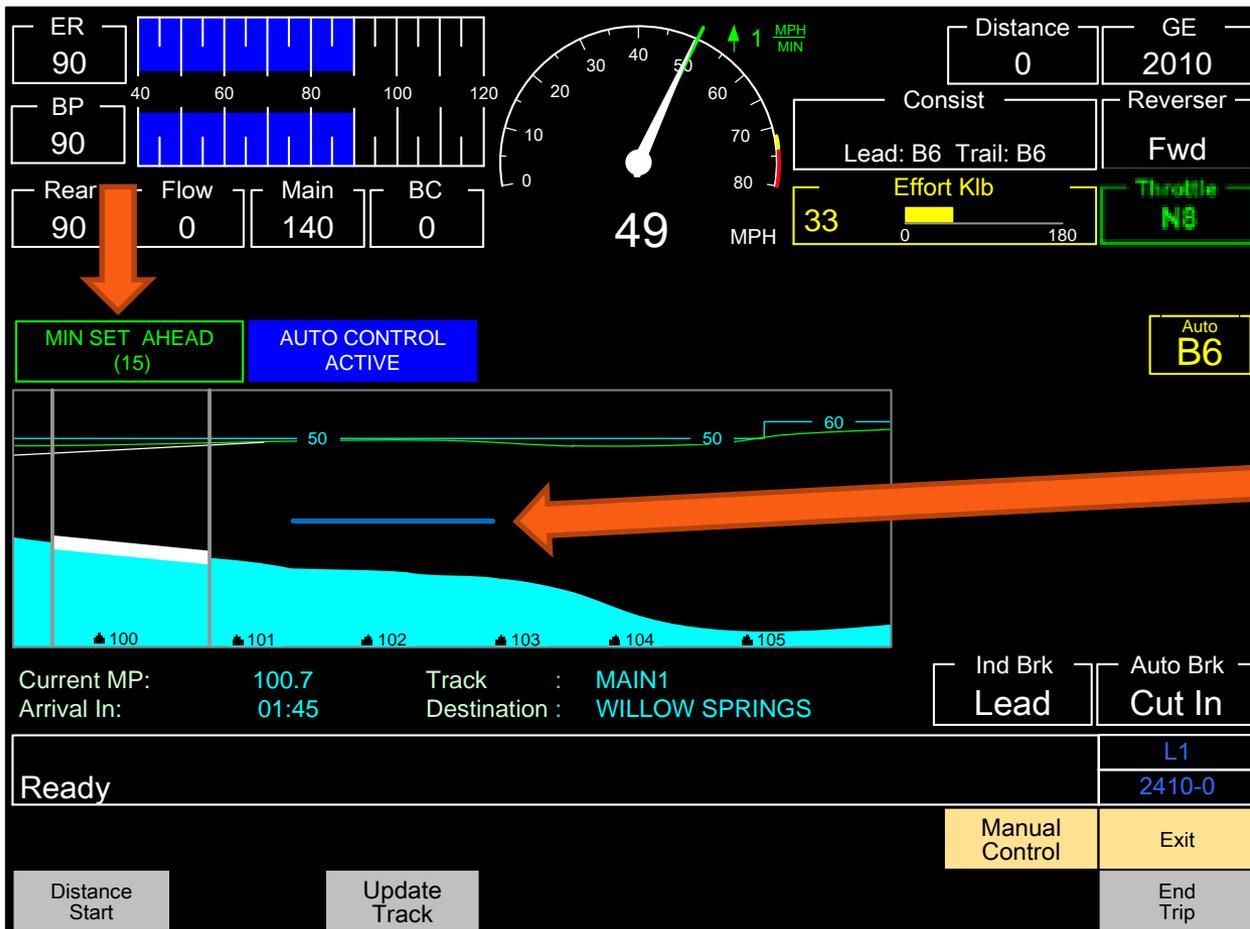
3. Auto through divergence – ATD

- TO will maintain auto control thru main-main divergences (X/O's)
- **Siding and other than main track turnouts remain MANUAL CONTROL ONLY**

4. Recoverability Re-plan

- TO will re-plan from current speed to the desired planned speed

Air Brake Advisement – Application



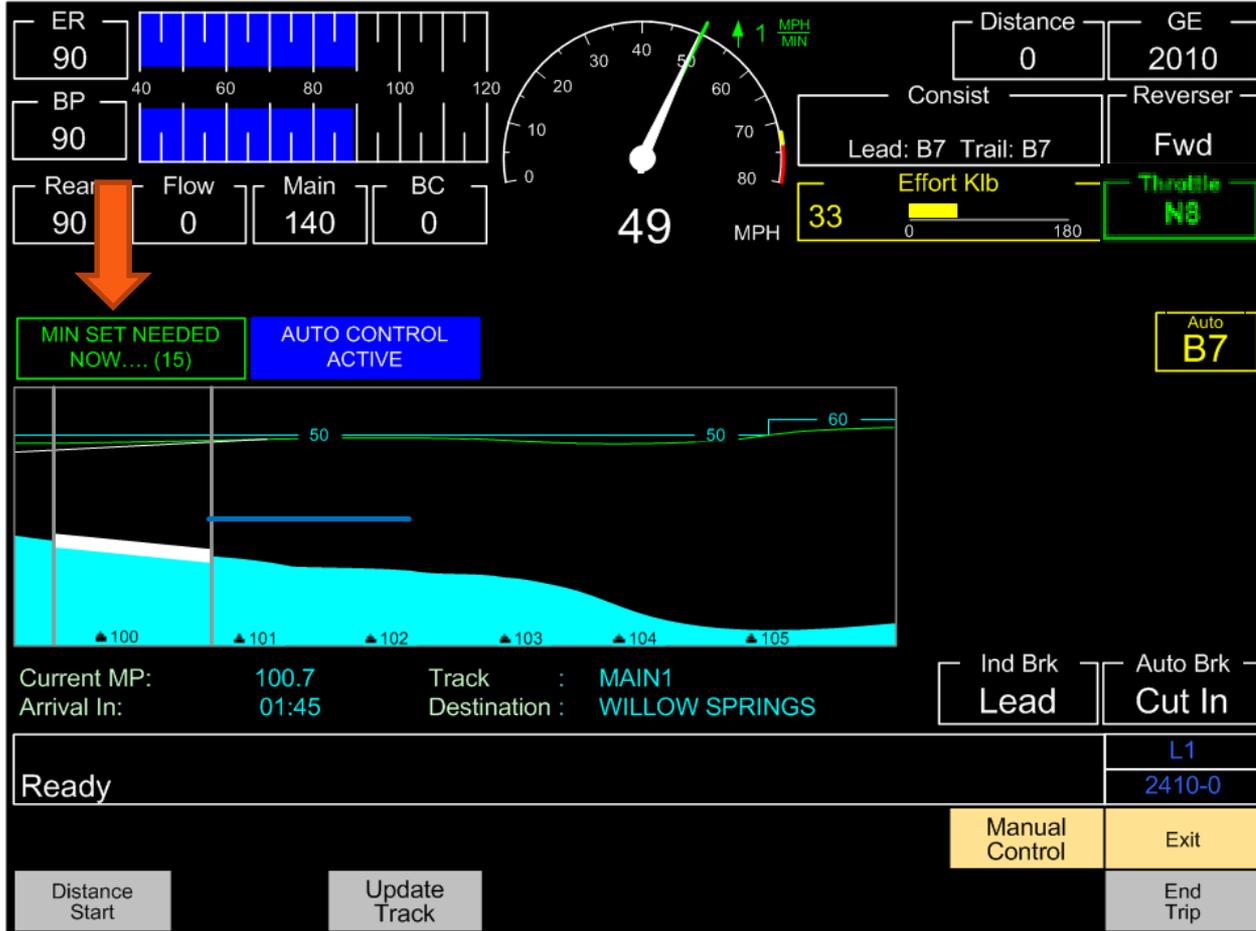
TO will prompt **MIN SET AHEAD** with a 15 sec countdown timer. At the end of the countdown, an audible alert signals the ideal time for the application.

Notice the blue “breaking” line.

If an application greater than a min set is needed, the prompt will display **TARGET ER...**

TARGET ER... (15) 80

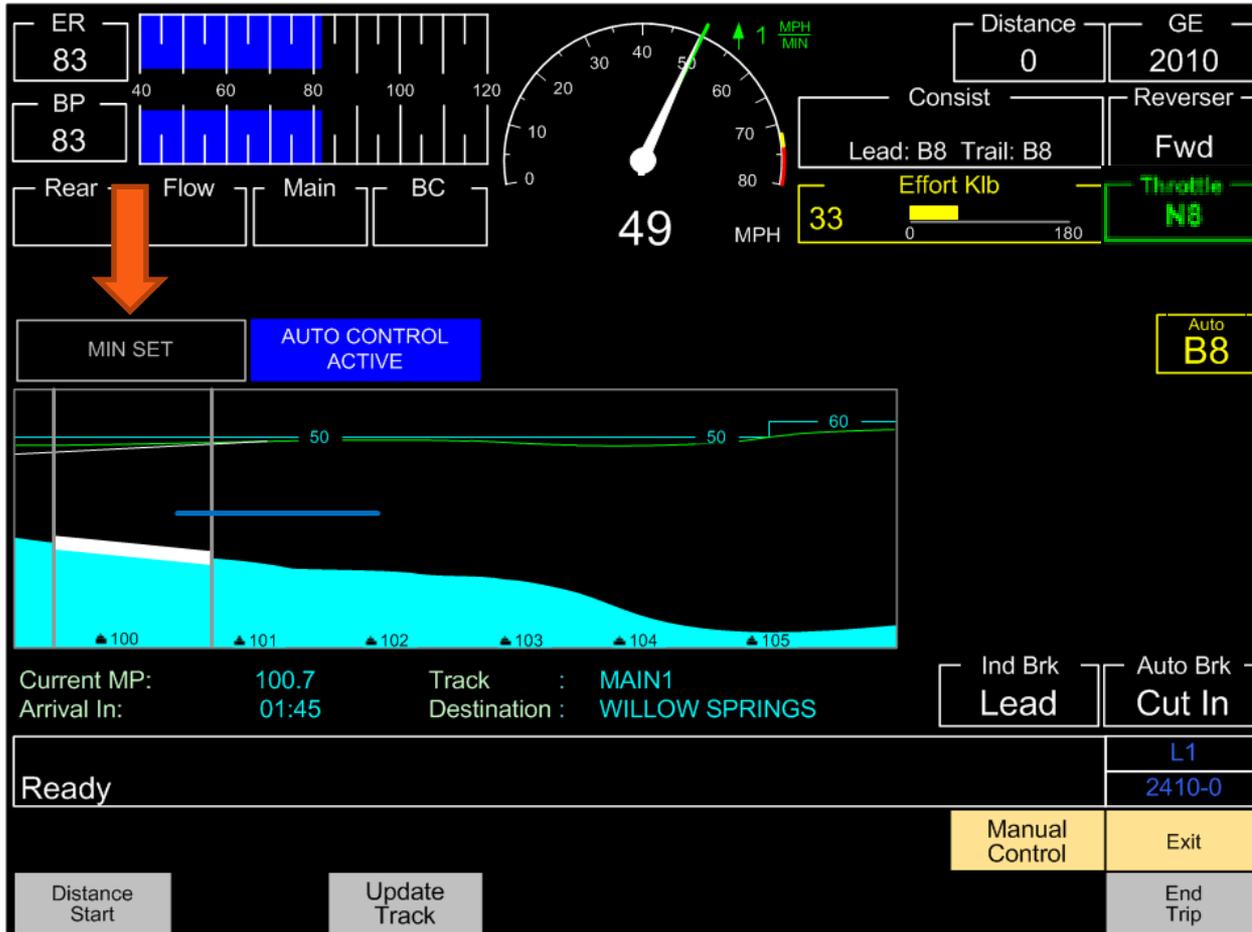
Air Brake Advisement – Application



If the requested application was not performed within the 15 sec countdown, the prompt will begin to flash and indicate **MIN SET NEEDED NOW** with an *additional 15 sec* countdown.

The requested application should be performed as soon as possible during the flashing countdown.

Air Brake Advisement – Application

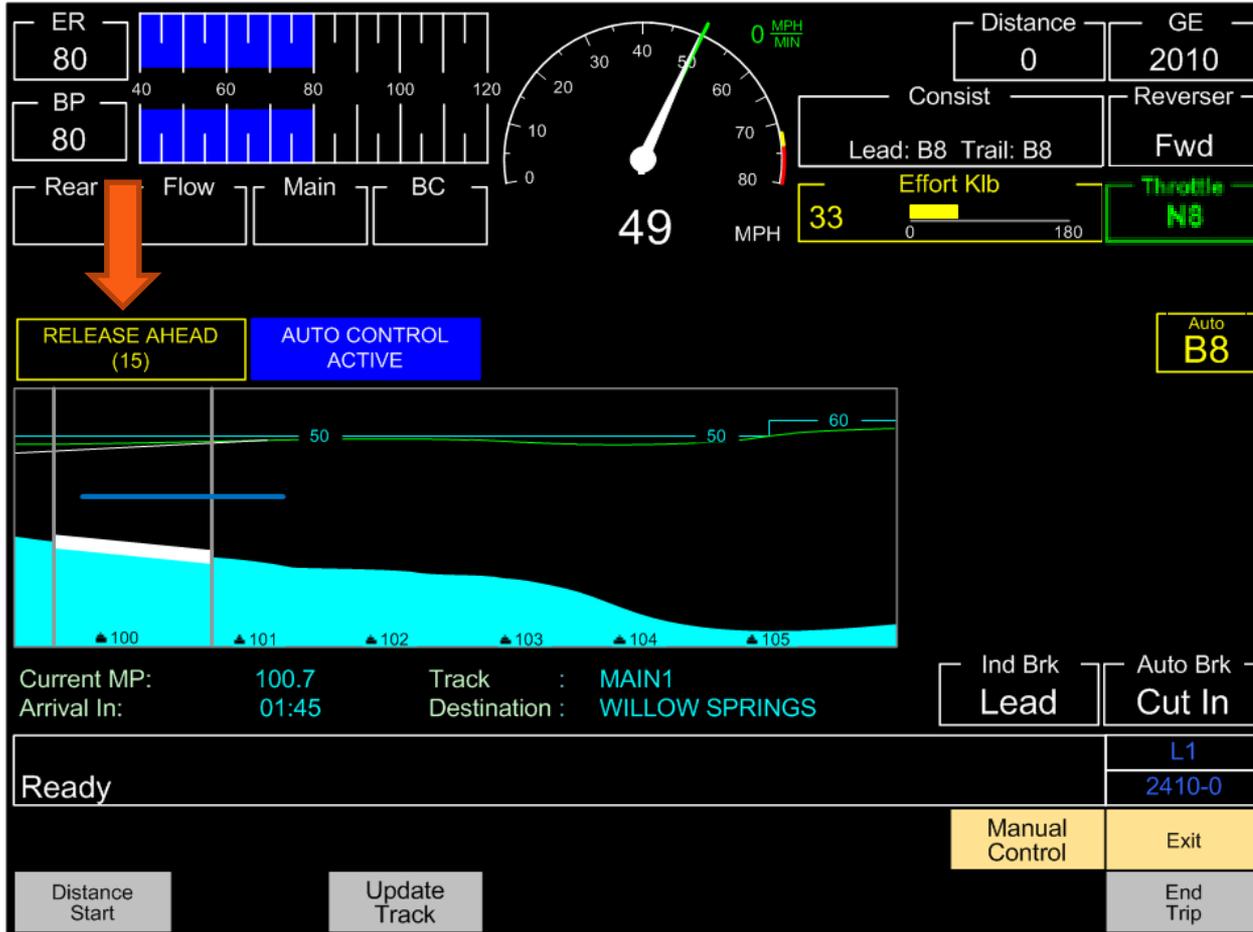


When the requested application is performed, the prompt will gray out.

If the requested application is not performed before the flashing 15 sec times out, the prompt will display **MANUAL CONTROL NEEDED NOW** and remove the air prompt from the screen.

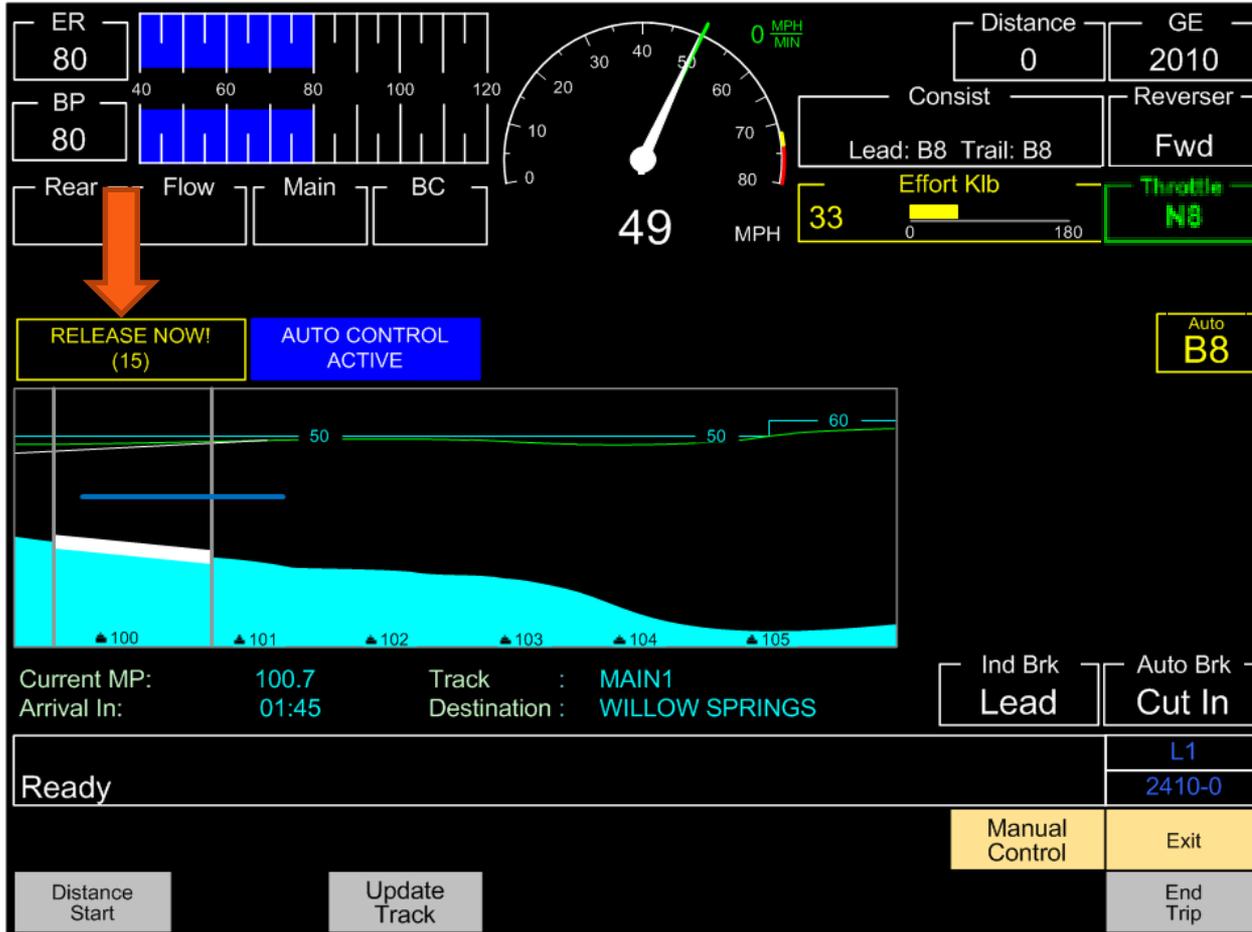
TARGET ER 80

Air Brake Advisement - Release



TO will prompt **RELEASE AHEAD** with a 15 sec countdown timer. At the end of the countdown, an audible alert signals the ideal time for the release.

Air Brake Advisement - Release



If the release is not performed during the 15 sec countdown, prompt will flash **RELEASE NOW** with an additional 15 sec countdown.

The release should be performed as soon as possible during the flashing countdown.

Distributed Power

Distributed Power Operation		
DP Mode	Run - Auto	
ID	A-2010	B-1244
Throttle	N3	N5 [N5]
Load/ TE	30	67
Consist TE	2:3 60K	1:1 67K
BP	90	90
Flow	1	0
Remote		Norm
ER	90	90
BC	0	0
MR	140	140
Ready		L1 2300-0
	Remote Sand	Exit
		Remote Menu

DP Trains while in Auto:

- TO will operate the DP consist independent of the lead consist (Fence Up).

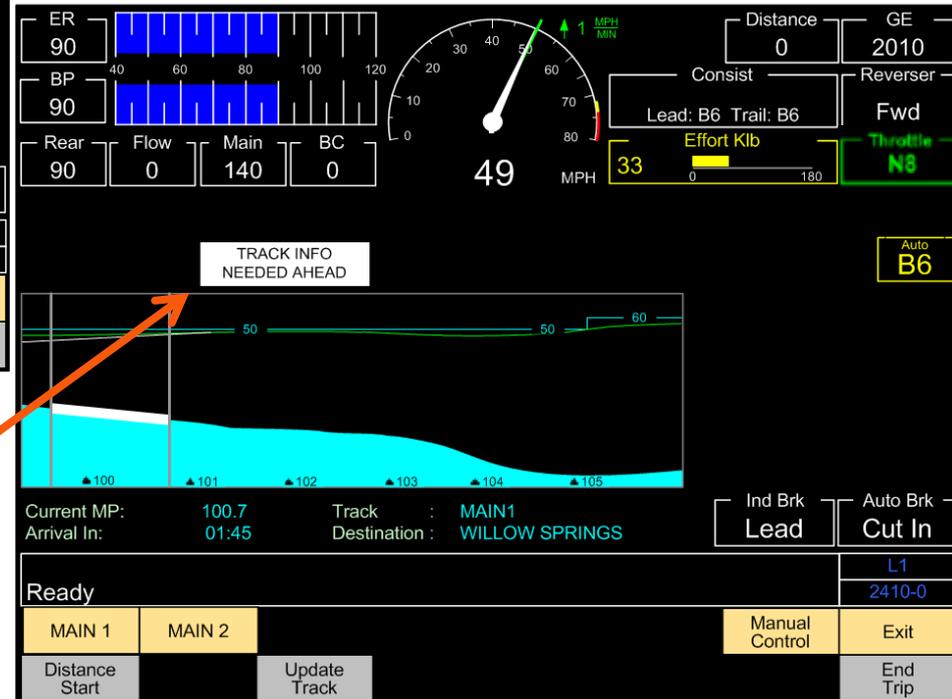
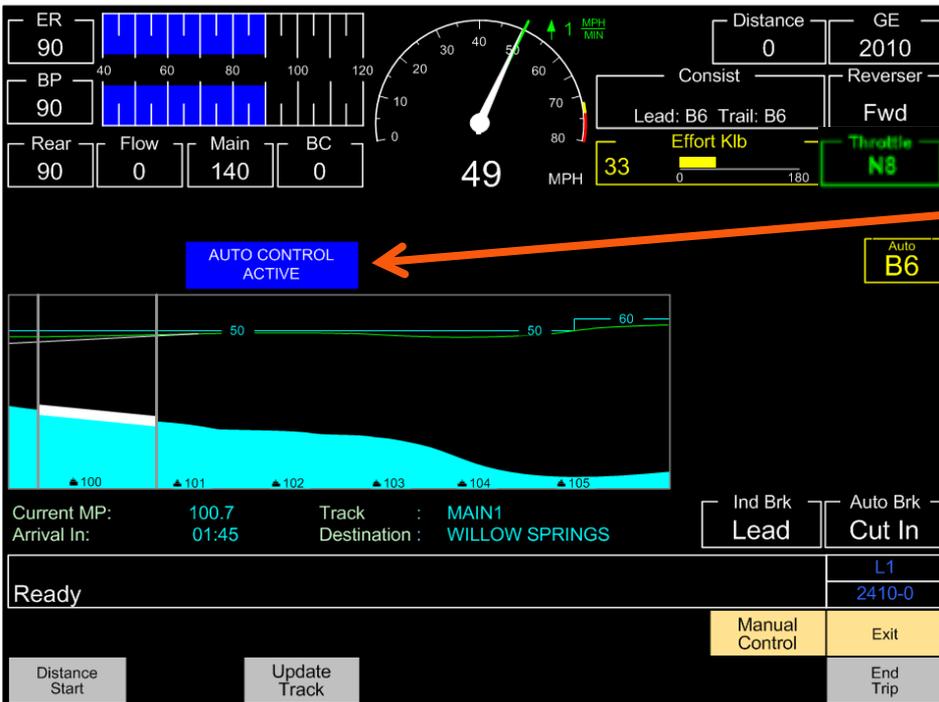
DP trains transitioning from auto to manual:

- **TO will ALWAYS return to manual control with the FENCE UP.**

Note TO notch command in brackets. []

AUTO Through Divergence

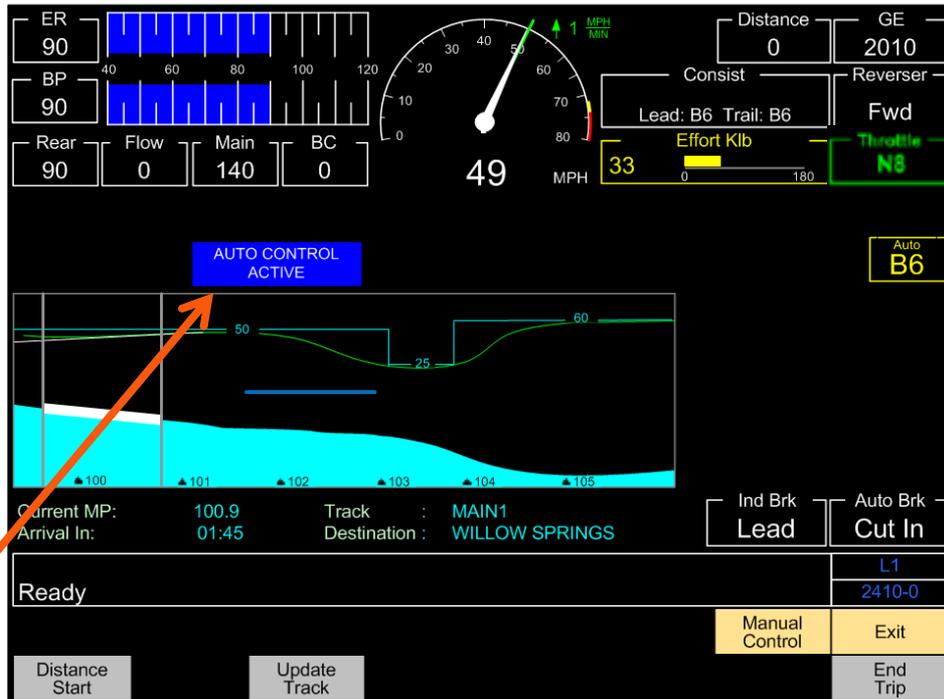
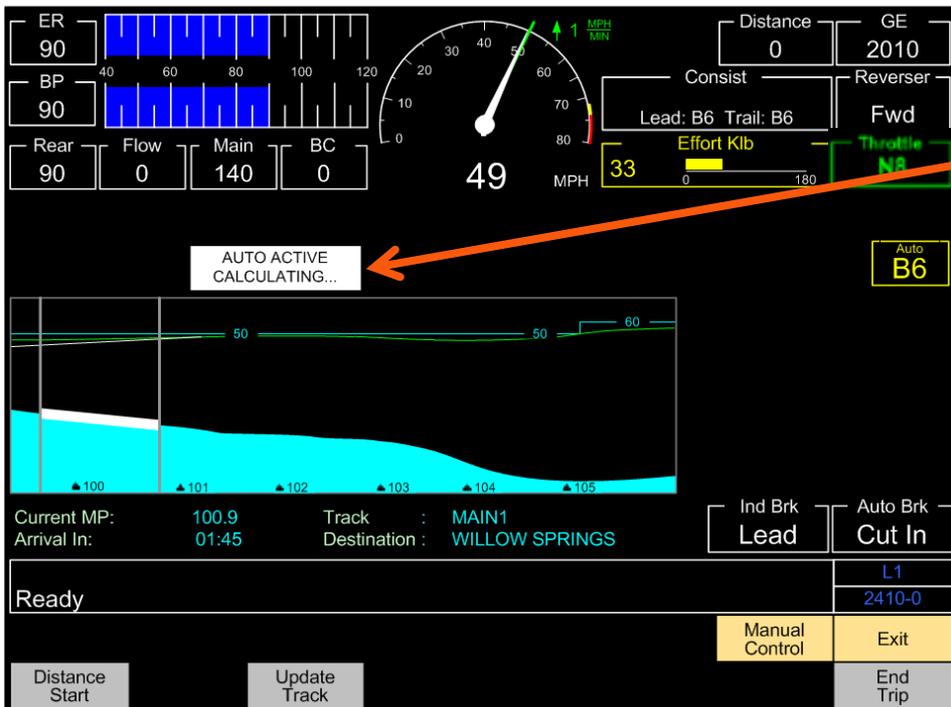
When approaching a crossover, the SVP will transition from
AUTO CONTROL ACTIVE



to
TRACK INFO NEEDED AHEAD
approximately 1500ft before the approach
signal.

AUTO Through Divergence

If a crossover movement is selected, the SVP will transition to **AUTO ACTIVE CALCULATING....**

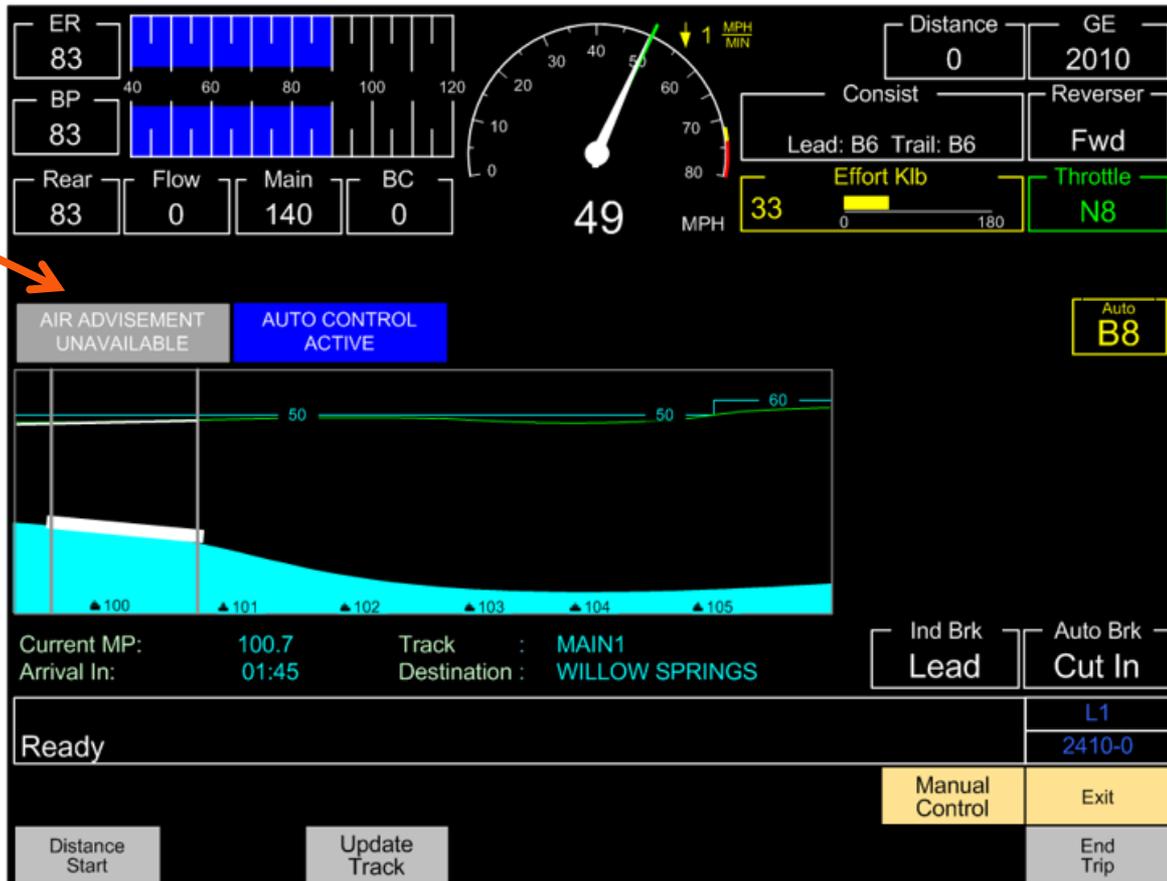


When calculations are complete, the rolling map and plan will update, the SVP will transition back to **AUTO CONTROL ACTIVE** and TO will regulate to the new plan

Trip Optimizer – AIR ADVISEMENT UNAVAILABLE

AIR ADVISEMENT
UNAVAILABLE

When this is displayed, TO will
not provide air brake prompting.



Trip Optimizer – NO AUTO DB

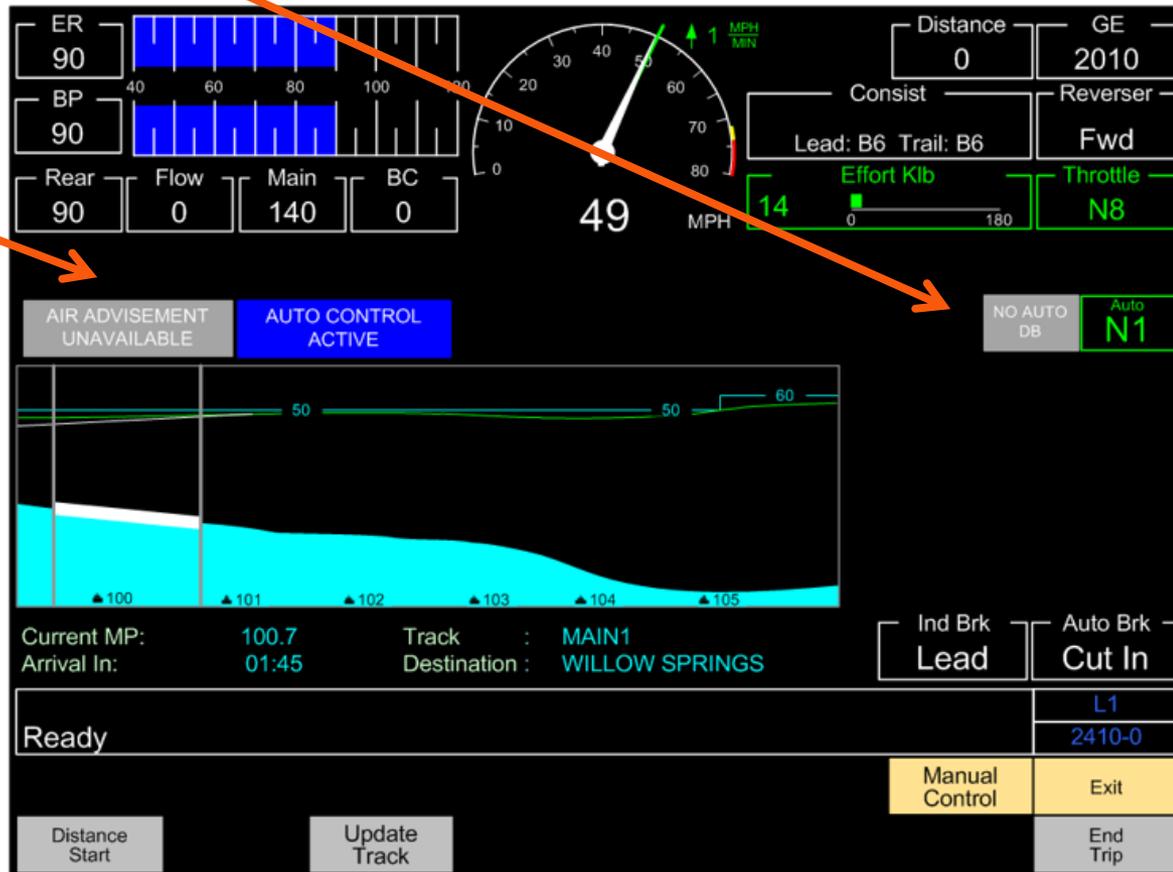
When **NO AUTO DB** is displayed:

- TO will not use Dynamic Braking in Auto Control

AIR ADVISEMENT UNAVAILABLE

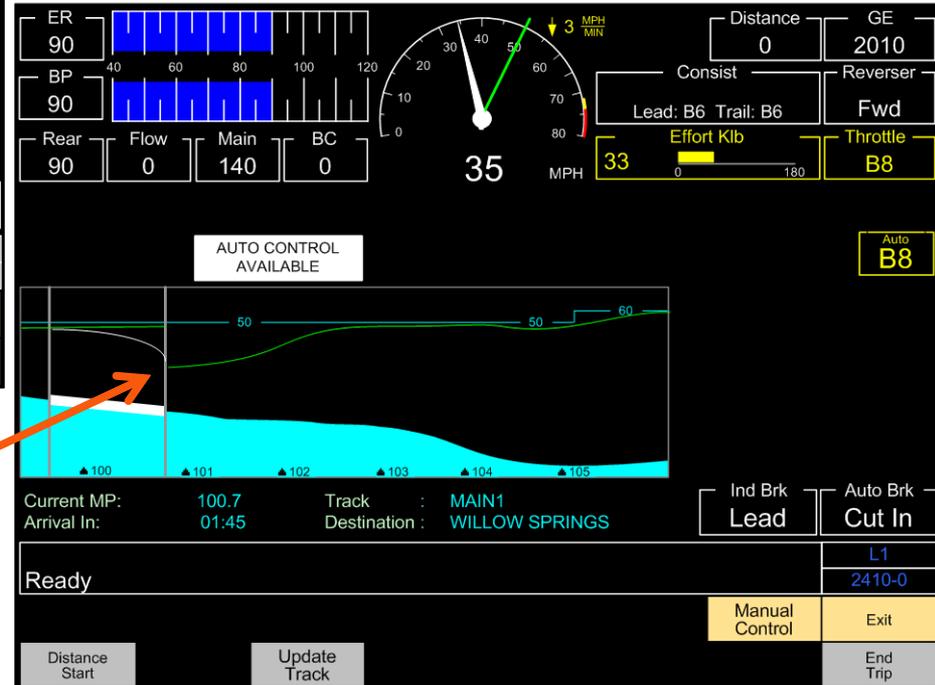
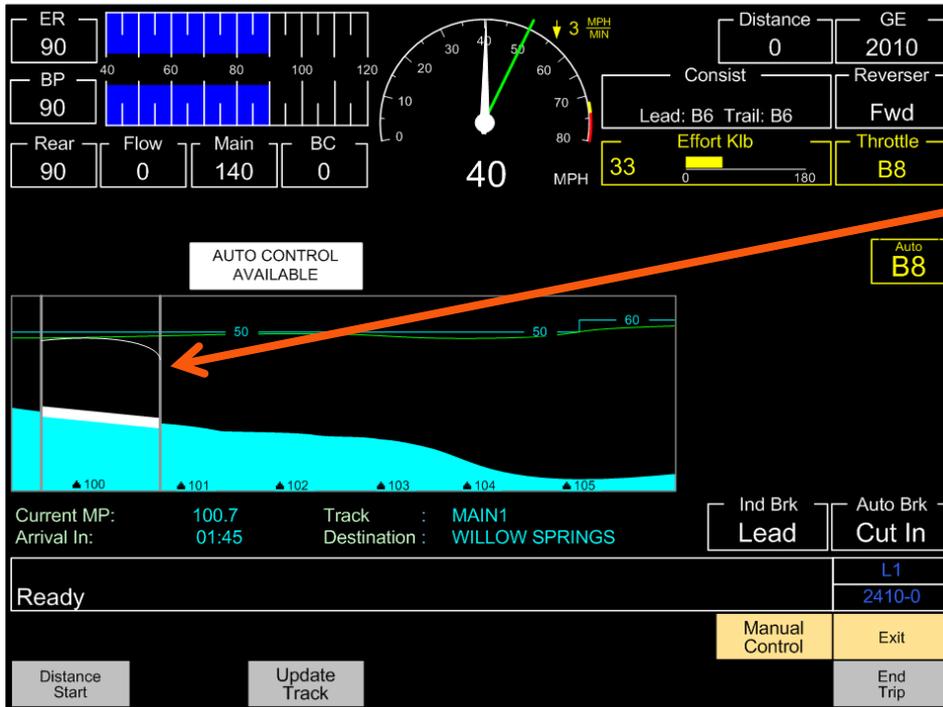
will also display.

- If DB or air is needed to control train speed, then Manual Control **MUST** be taken immediately to slow train.



Recoverability Re-plan

Train is being operated in manual and has dropped below the planned speed for that location.



TO will calculate recovery plan from current speed back to the planned speed.

In Route Work Events

Distance 0 GE 2005

Consist 2:30 K
Lead: Idle Trail: Idle

Reverser Cntr
Effort Klb 0 Throttle Idle

Set Out Cars

Remove From Train

From Line #: 1
To Line #: 10
Loads Removed: 30
Empties Removed: 30

Use Number Keys To Enter A New Value For The Selected Parameter ,
Arrow Keys To Change Selection , When Finished, Press F7 to Continue.

L1 new-xx

Back Space Accept Cancel

Set Out:

1. **From Line #:** Enter line number of the first car of the set out.
2. **To Line #:** Enter line number of the last car of the set out.
3. **Load+Empty Removed:** Enter the total number of loads/empties set out.
4. **Accept changes.**

Distance 0 GE 2005

Consist 2:30 K
Lead: Idle Trail: Idle

Reverser Cntr
Effort Klb 0 Throttle Idle

Pick Up Cars

Add To Train :

Add After Line #: 40
Line #'s Added: 5
Loads Added: 15
Empties Added: 15
Block Weight: 475 tons
Block Length: 302 ft

Use Number Keys To Enter A New Value For The Selected Parameter ,
Arrow Keys To Change Selection , When Finished, Press F7 to Continue.

L1 new-xx

Back Space Accept Cancel

Pick Up:

1. **Add After Line #:** Enter line number of the car (currently in your train) that the pickup will follow.
2. **Line #'s Added:** Enter number of cars added (line numbers).
3. **Lds/Mty Added:** Enter loads and empties added.
4. **Axles Added:** Enter total axles added.
5. **Block Weight:** Enter total tons added.
6. **Block Length:** Enter total feet added.
7. **Accept changes.**