

# DESIGN CRITERIA & GUIDELINES FOR MAIN TRACKS AND DETOURS

## Vertical Alignment:

1. Proposed grades (g) should not be greater than exceed one percent (1%).
2. Proposed rate of change (r) of vertical curves should comply with the following:
  - A. Sag vertical curves (r) = 0.05
  - B. Summit (crest) vertical curves (r) = 0.10

$$r = \frac{g_1 - g_2}{L \text{ (stations)}}$$

## Horizontal Alignment:

1. All horizontal curves should include spirals of correct length and the appropriate and proper superelevation on the proposed curves (reference NS plan 7-2).
2. All reverse curvature must include a minimum of 220 feet of tangent track between spirals of reverse curves.

## INFORMATION TO BE SHOWN ON PLANS

The proposed alignment should show stationing for all PI, TS, SC, CS and ST.

1. PI - Point of intersection
2. TS - Tangent to spiral
3. SC - Spiral to curve
4. CS - Curve to spiral
5. ST - Spiral to tangent

The following data should be shown on all horizontal curves:

1. The design speed in miles per hour (MPH).
2. The station of the PI
3. I - Angle at the intersection of the tangents
4. D - Degree of curve of the central circular curve
5. R - Radius of curve of the central circular curve
6. L - Length of the spiral
7.  $\Delta$  - Central angle of the whole spiral
8. SE - Superelevation (in inches)
9. Lc - Length of the circular curve
10. Ts - Distance from the TS to PI

All horizontal curves distances should be calculated using the chord definition.

A typical roadbed section should be shown on the plans in compliance with Norfolk Southern Plans 1-19, 1-20, or 1-21.

Existing and proposed top of rail profile should be shown at 100' stations and at other locations, such as point of switches, etc.

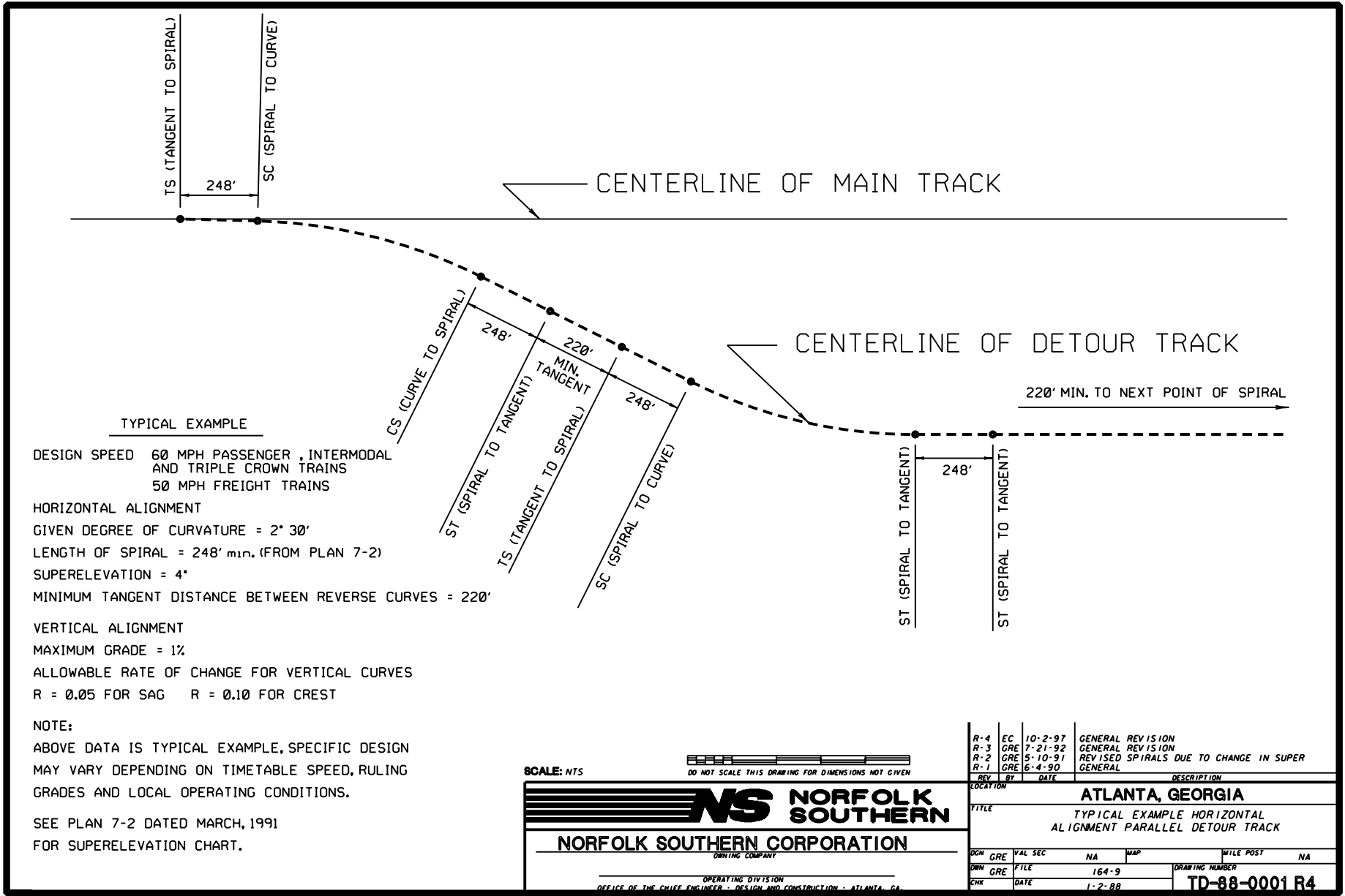
Cross-sections:

1. Cross-sections should be shown at a maximum of 100' intervals and should be taken perpendicular to the centerline of the main track and extend to the right of way or construction limits, whichever is greater. A cross-section should be shown at all drainage structures, and other special circumstances that require sections at less than 100' intervals. Information included on each section should show top of rail elevation, existing and proposed groundline elevation points, and the horizontal distances from the centerline of the main track to each elevation point. Also each cross-section should show the proposed and existing right of way line.
2. Also, cross-sections should be taken at all drainage culverts and structures, and other special circumstances (i.e. abrupt change in topography, soil condition, etc.). Cross-sections on drainage structures should include the invert flow line elevations on both ends of the structures.

The proposed and existing right of way should be shown on the plans of the proposed alignment or relocation.

The horizontal alignment for existing tracks should be shown for a minimum of 500' beyond the construction limits of the proposal.

February 1999



**TYPICAL EXAMPLE**

DESIGN SPEED 60 MPH PASSENGER, INTERMODAL AND TRIPLE CROWN TRAINS  
50 MPH FREIGHT TRAINS

HORIZONTAL ALIGNMENT  
GIVEN DEGREE OF CURVATURE = 2° 30'  
LENGTH OF SPIRAL = 248' MIN. (FROM PLAN 7-2)  
SUPERELEVATION = 4"  
MINIMUM TANGENT DISTANCE BETWEEN REVERSE CURVES = 220'

VERTICAL ALIGNMENT  
MAXIMUM GRADE = 1%  
ALLOWABLE RATE OF CHANGE FOR VERTICAL CURVES  
R = 0.05 FOR SAG R = 0.10 FOR CREST

NOTE:  
ABOVE DATA IS TYPICAL EXAMPLE, SPECIFIC DESIGN MAY VARY DEPENDING ON TIMETABLE SPEED, RULING GRADES AND LOCAL OPERATING CONDITIONS.

SEE PLAN 7-2 DATED MARCH, 1991 FOR SUPERELEVATION CHART.

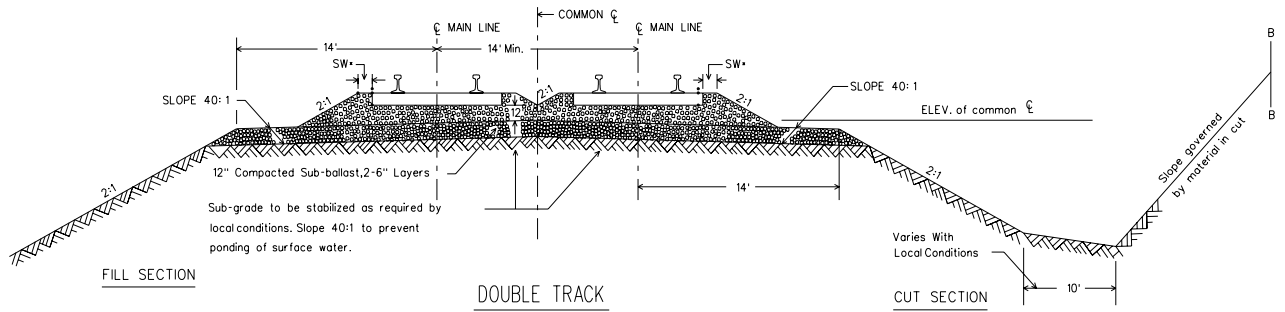
SCALE: NTS

DO NOT SCALE THIS DRAWING FOR DIMENSIONS NOT GIVEN

**NS NORFOLK SOUTHERN**  
NORFOLK SOUTHERN CORPORATION  
OPERATING DIVISION  
OFFICE OF THE CHIEF ENGINEER - DESIGN AND CONSTRUCTION - ATLANTA, GA

R-4	EC	10-2-97	GENERAL REVISION
R-3	GRE	7-21-92	GENERAL REVISION
R-2	GRE	5-10-91	REVISED SPIRALS DUE TO CHANGE IN SUPER
R-1	GRE	6-4-90	GENERAL
REV	BY	DATE	DESCRIPTION
LOCATION			ATLANTA, GEORGIA
TITLE			TYPICAL EXAMPLE HORIZONTAL ALIGNMENT PARALLEL DETOUR TRACK
DGN	GRE	VAL SEC	NA
DWN	GRE	FILE	164-9
CHK	DATE	1-2-88	DRAWING NUMBER
CADD FILE: FIELD BOOK: V1*			TD-88-0001 R4



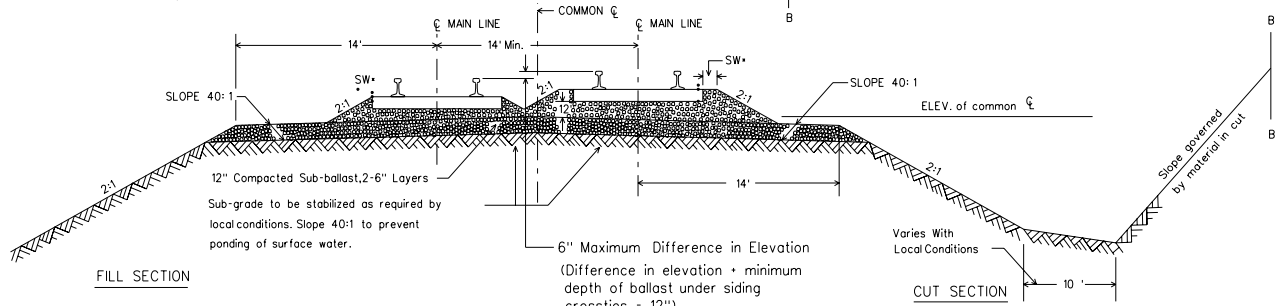
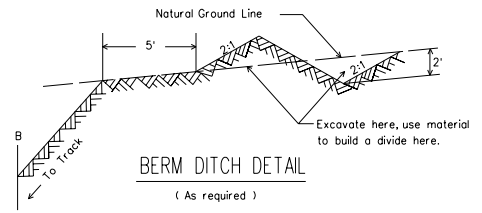


DOUBLE TRACK

SHOULDER WIDTH (SW) \*

BALLAST WIDTH FROM END OF TIE TO EDGE OF SLOPE

	Jointed Rail	Welded Rail
SW (Inside of Curve)	0"	6"
SW (Outside of Curve)	6"	12"
SW (Tangent both sides)	0"	6"



SINGLE MAIN TRACK AND PASSING SIDING

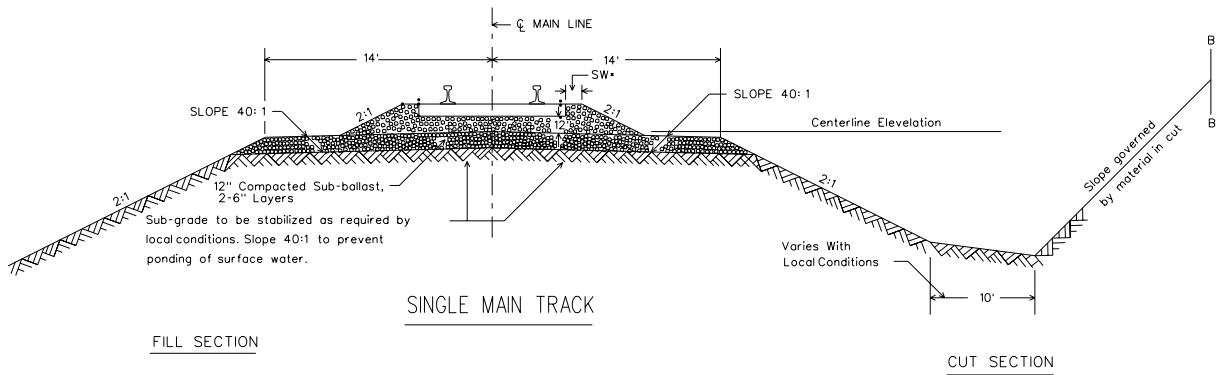
- (1) Sub-grade may be stabilized with lime, lime-fly ash, cement or stone.
- (2) Tamping of ballast must not disturb compacted sub-ballast.
- (3) Top of sub-grade is to be crowned.

NORFOLK SOUTHERN RAILWAY COMPANY  
**ROADBED SECTION**  
 DOUBLE MAIN TRACKS

JANUARY 1989

Atlanta, Georgia

REVISION  
 CHANGED DEPTH OF BALLAST UNDER TIE FROM 15" TO 12"  
 DATE 6-25-90

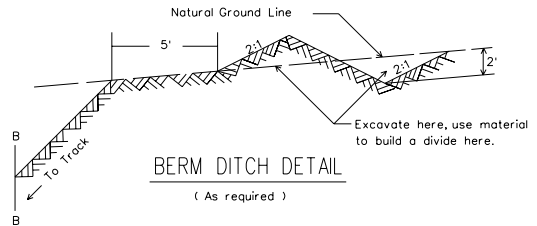


SHOULDER WIDTH (SW)\*

BALLAST WIDTH FROM END OF TIE TO EDGE OF SLOPE

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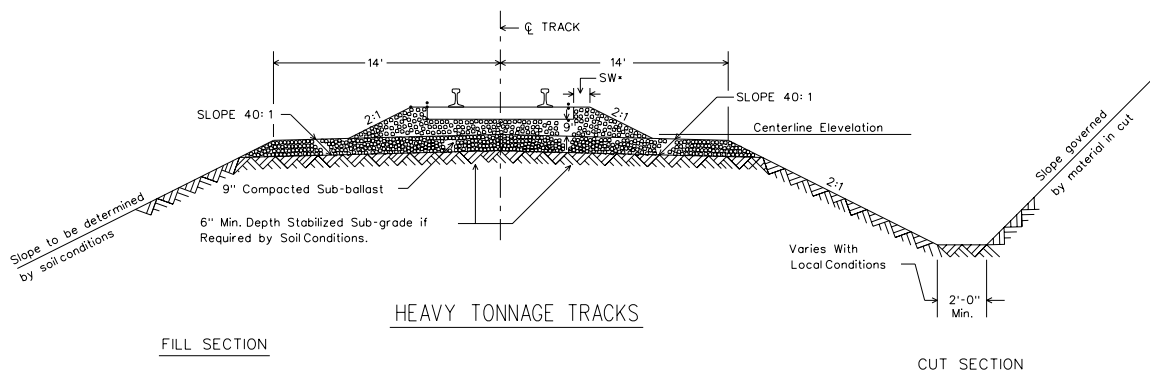


NORFOLK SOUTHERN RAILWAY COMPANY  
**ROADBED SECTION**  
 FOR SINGLE MAIN TRACK

JANUARY 1989

Atlanta, Georgia

REVISION  
 CHANGED DEPTH OF BALLAST UNDER TIE FROM 15" TO 12"  
 DATE 6-25-90



SHOULDER WIDTH (SW) \*

BALLAST WIDTH FROM END OF TIE TO EDGE OF SLOPE

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NORFOLK SOUTHERN RAILWAY COMPANY

**ROADBED SECTION**

FOR HEAVY TONNAGE TRACKS  
OTHER THAN MAIN TRACKS

JANUARY 1989

Atlanta, Georgia

REVISION	
DATE	