



*Heartland Corridor, Walton Virginia to  
Columbus Ohio*

# Preliminary Engineering Phase Report



**BIG SANDY NO. 4  
TUNNEL –  
MP NA 12.68  
BULL, WV**

October 14, 2005, Rev. 2



## *Preliminary Engineering Phase Report*

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October 14, 2005

Norfolk Southern Railway  
Heartland Corridor, Walton VA to Columbus OH

**Big Sandy No. 4 Tunnel – MP NA –12.68**

**Statistics: Pocahontas Division  
Single-Track Tunnel for Single Main  
Length = 2,068’  
Concrete Lined  
Tangent Track (per Track Chart)  
Superelevation = 0.0” (per Track Chart)**

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## **1. EXISTING CONDITIONS**

### **1.1 Background**

Valuation maps V-17-WV/73B (16575) and V-17-WV/74A (16576) for the Big Sandy No. 4 Tunnel, also known as Tunnel 4, are dated Dec. 31, 1926. Parcels for the tunnel were acquired in 1902. It is assumed that construction of the tunnel was completed shortly thereafter, probably in 1904. Additional information on this tunnel was obtained from various sources such as topographic maps, aerial photos, inspection reports, track charts, and field investigations that were performed on April 2, June 16, and August 1, 2005.

### **1.2 General Area**

The tunnel is located in a rural area with few residences nearby in Bull, WV. A county road crossing is located 172' from the east portal. The area near the crossing would be suitable as a staging area. Access to the west portal is difficult as the access road leading to it runs through Bull Creek. The track crosses a bridge over Bull Creek at MP NA-13.20 west of the west portal. Overhead utility cables cross the track 115' from the east portal. A concrete retaining wall, ranging in height from 3.5'- 5', extends 140' from the east portal on the north side of the tracks.

### **1.3 Structural Conditions**

The tunnel is 2,068' long with a concrete liner and a nominal width of 16.75'. It is a single width tunnel for one track. There is severe deterioration of the south wall for the first 150' from the west portal. Water is flowing freely from the cracks and spalls in this section. Leakage through cracks and construction joints in the crown and walls is evident on both sides of the tunnel within 150' of the east and west portals. The remainder of the tunnel is in fairly good condition. The footing and underlying rock are exposed in the majority of the tunnel with undermining in some locations. A signal cable is mounted on the north wall.

A small portion of the tunnel invert material was excavated to fully expose the base of the tunnel liner footing. The footing thickness was found to be 17". The vertical distance from the top of rail to the base of the footing was measured at 26".

Liner cores were taken on August 2, 2005. Cores were drilled into the liner at locations 250' and 1818' into the tunnel from the east portal. The cores were taken at three of the 2, 5, 7, 10 or 12 o'clock positions at each location. A borescope was inserted into the holes to view inside the liner. The video from the borescope was recorded onto a DVD. The liner probe investigation is summarized in the table below:

<b>Summary of Big Sandy #4 Tunnel Liner Core Investigation</b>			
<b>Distance from East Portal (feet)</b>	<b>Position</b>	<b>Liner Thickness</b>	<b>Notes</b>
250	7 o'clock	27"	
250	2 o'clock	24"	Concrete in poor condition
250	12 o'clock	20"	Concrete in poor condition, no void.
1818	5 o'clock	33"	Concrete in poor condition, no void.
1818	10 o'clock	28"	Concrete in poor condition
1818	12 o'clock	23"	Concrete in poor condition. 7" void behind liner, then bedrock.

Two samples of concrete taken from the liner core investigation were tested. A sample from 250' in from the east portal, 12 o'clock position, taken from 5" – 17" into the core had a compressive strength of 2,748psi. A sample from 1818' in from the east portal, 10 o'clock position, taken from 4" – 13" into the core had a compressive strength of 3,516psi.

#### **1.4 Track**

The track is of conventional design with wooden crossies and a stone ballast section. The ballast is fouled with mud pumping through it in areas. The continuous welded rail is 136 RE with a tie spacing of 20". The track is tangent for the entire length of the tunnel. Temporary drainpipes have been installed on each side of the track at both portals. Standing water is present in the subgrade. The water in the tunnel was tested and its pH reading was 7.44. This is a fairly neutral reading and indicates that the water is not unusually corrosive. The ballast from this tunnel was tested and classified as being "Very Strong", requiring many blows of a geological hammer to break intact rock specimens.

#### **1.5 Geotechnical**

The tunnels in the west-central part of the Pocahontas Division (Williamson, Hatfield, Big Sandy Nos. 1-4, and 7) are located in the Appalachian Plateaus Physiographic Province, a region characterized by deeply incised plateaus underlain by flat-lying sedimentary rock. The tunnel itself is lined and no rock was exposed. The description of the site geology at each tunnel is based on our observations of the rockmass at the portals and adjacent cuts and the 1968 West Virginia Geologic Map prepared by the West Virginia Geologic and Economic Survey.

The tunnels are excavated through the Kanawha Formation, a medium- to thick-bedded fine- to medium-grained sandstone, with interbeds of shale, siltstone, and coal. Bedding in the Kanawha Formation is subhorizontal and gently rolls back and forth towards the northwest and southeast.

Joints in the rock cuts in both formations are typically steeply dipping and widely spaced. Most joints are less than 15 feet in length and are not through-going across the exposure face. A medium- to thick-bedded shale was visible at each portal of the Big Sandy tunnels. The shale was overlain and underlain by a medium- to thick-bedded, very fine- to fine-grained sandstone. Shale was the predominant material recovered from the geoprobe sample tube in each of the west-central Pocahontas Division tunnels identified above, including at Big Sandy No. 4.

The rock quality designation, Q, at the portals was determined to be 17 at the east portal and 22 at the west portal. A Q rating between 10 and 40 is considered “Good” with 10 bordering on “Fair” and 40 bordering on “Very Good.” A sample of rock was obtained from the tunnel portal on June 16, 2005. Lab testing of the sample indicates that the rock is sandstone and has a compressive strength of 6,609psi. The geoprobes into the tunnel invert indicate that the top of rock is located between 2.1’ to 4.5’ (averaging about 3.3’) below the top of ballast throughout the tunnel. Top of ballast is typically about 0.8’ below top of low rail.

## 1.6 Clearances

The laser car measurements indicate that the existing tunnel has adequate horizontal clearance for both the “High-Wide Load” and “Double Stack Load” portions of the composite clearance envelope for the entire tunnel.

For vertical clearance, the “Double Stack” portion of the envelope encroaches mainly on the left side throughout the tunnel. The greatest encroachment is between station 19+02 and the west portal where the encroachment is as much as 16”. For the remainder of the tunnel (approximately 90% of the tunnel) the encroachment averages only 4”. Some areas have no encroachment at all. The right side of the “Double Stack” envelope does not encroach except from station 19+02 to the west portal and the east portal. The maximum encroachment in this area is 3”.

The clearance templates show that the “High-Wide” portion of the envelope passes through most of the tunnel without encroaching. However, between station 19+02 and the west portal encroachment on the left side ranges from 4” to 8”. Cross sections of the tunnel clearance encroachments are shown in the drawings at the end of this report. The maximum encroachments are summarized in the table below:

Distance (ft) from East Portal	Crown Encroachment (radial inches)	
	Left Side	Right Side
0	9	3
202	0	0
404	1	0
601	2	0
801	5	0
1002	5	0
1201	6	0

Distance (ft) from East Portal	Crown Encroachment (radial inches)	
	Left Side	Right Side
1401	4	0
1603	3	0
1803	3	0
2003	15	2
2050	16	3

## 2. CLEARANCE IMPROVEMENT ALTERNATIVES

Given the magnitude of the vertical clearance deficiency, there are several general alternatives that can be used to obtain the clearance; realigning the track, replacing the liner roof, notching the lining, and undercutting. Combinations of the general methods may be required to obtain a design that is cost effective and that can be constructed within reasonable track outages. Track lowering by excavating or undercutting does not appear feasible for the majority of the tunnel due to the proximity of the top of rock to the surface, however it could remain an option at the west portal where the depth to top of rock is somewhat greater. The rock cover at the west portal is also very shallow for approximately 200'. The removal of the roof and the limited overburden of rock could also provide clearance improvements.

### 2.1 Track Realignment

The track can be realigned to position the centerline of the track underneath the peak of the crown. This will even out the amount of encroachment on the right and left sides, potentially eliminating the encroachment at some locations, and in other locations it would minimize the encroachment to a point where steel ties or minor notching alone may provide all of the needed clearance.

### 2.2 Notching the Crown

Minor notching in the upper quadrants of the tunnel may be possible to gain the needed clearance, on the order of 4" or less. Considering the average encroachment is 4" throughout the majority of the tunnel, the minor notching method would be sufficient. In other portions of the tunnel, such as near the portals where the encroachment is greater, rock bolts and a deep notching scheme would be necessary, if notching were the only method employed.

### 2.3 Undercutting

At the west portal undercutting may be feasible due to the somewhat greater depth to top of rock. Undercutting would provide several more inches of clearance, and if used in conjunction with steel ties, could be a more economical solution than notching and steel ties.

## **2.4 Liner Replacement**

To obtain the desired clearance, the concrete liner must be demolished, the native rock excavated to the clearance limits plus the new liner thickness, and a new concrete liner installed.

## **2.5 Partial Daylighting**

This alternative could be employed to achieve the necessary clearance at the west portal. Approximately 200' of the tunnel at the west portal has very shallow cover above the liner. This portion of the tunnel is where the encroachment is the greatest. The tunnel liner and overburden of rock would be removed back to the toe of the mountain to provide the clearance.

An existing concrete lined stream that runs across the top to the tunnel at the toe of the mountain will require modifications to prevent it from overflowing into the new daylighted area.

## **3. PREFERRED ALTERNATIVE**

Given the magnitude of the vertical encroachment, realigning the track is recommended to eliminate or reduce the encroachment. Minor notching and some deep notching would then be employed to eliminate the remaining vertical clearance deficiencies in the tunnel. Minor notching may not be feasible at the west portal, where the encroachment is greater; partial daylighting, crown replacement, or deep notching will be looked at in further detail at the west portal in the final design phase. Drainage improvements are also recommended.

### **3.1 Preliminary Design**

The preliminary design uses realignment and minor and deep notching of the liner crown. The existing track structure is planned to be flooded with ballast to the top of the rail to provide access into the tunnel for the contractor to work and to protect the track during the construction.

The preliminary design also proposes invert improvements consisting of ballast replacement by means of undercutting, track surfacing and lining and the installation of a new drainage system. Due to the proximity of the excavation required for the drainage trench to the tunnel footing, it is assumed that underpinning will be required to stabilize the wall during construction. The extent of underpinning will be further evaluated during final design. It is estimated that approximately 40% of the cost for the tunnel improvements are for underpinning for drainage.

### **3.2 Schedule**

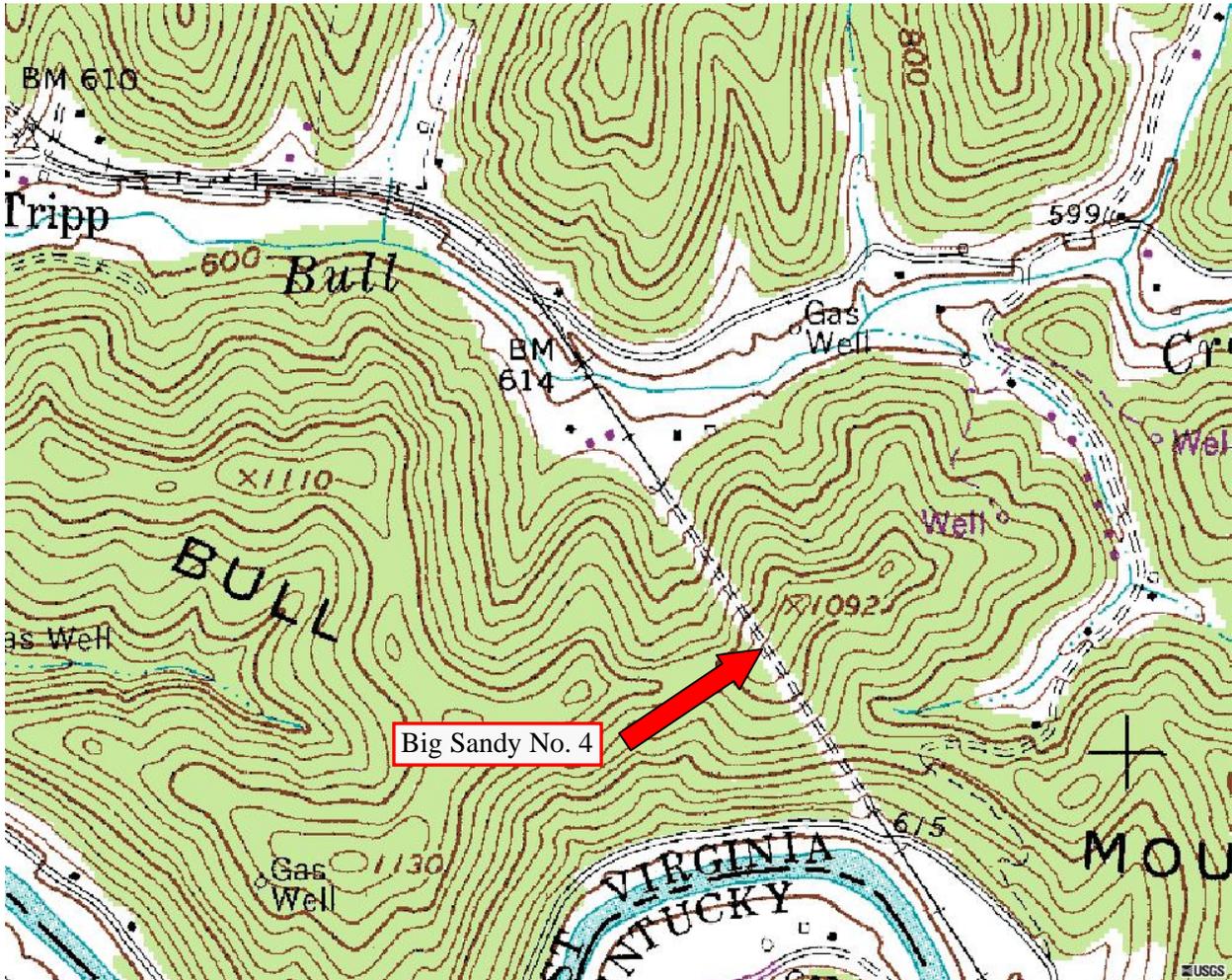
The estimated schedule for completing improvements on this tunnel is forty-two (42) weeks including mobilization and demobilization. The schedule assumes the track will be closed for eight hours, five days a week. For deep notching, the installation of rock dowels at a given location would precede the deep notching, but the two operations could occur within the tunnel at different locations at the same time. Realignment would be achieved as part of the undercutting and surfacing and lining operations. Minor notching could be accomplished at a

rate of approximately 200' per day. Drainage improvement operations would be undertaken at the same time as the notching, but at different locations in the tunnel.

### **3.3 Estimate**

The total estimated cost for achieving clearance at this location is \$4.5 million (2005 rates) or \$2,154 per foot of tunnel. The work items include mobilization, surveying, liner removal, rock removal, rock dowels, crown installation, rock cut for drainage trench, underpinning of one wall at the drainage trench, tunnel drainage system, ballast cleaning, and demobilization. The total cost is made up of tunnel, track, signal, and site work items at \$2.76 million, plus a 30% construction contingency, a 10% engineering allowance, and a 14% construction management allowance.

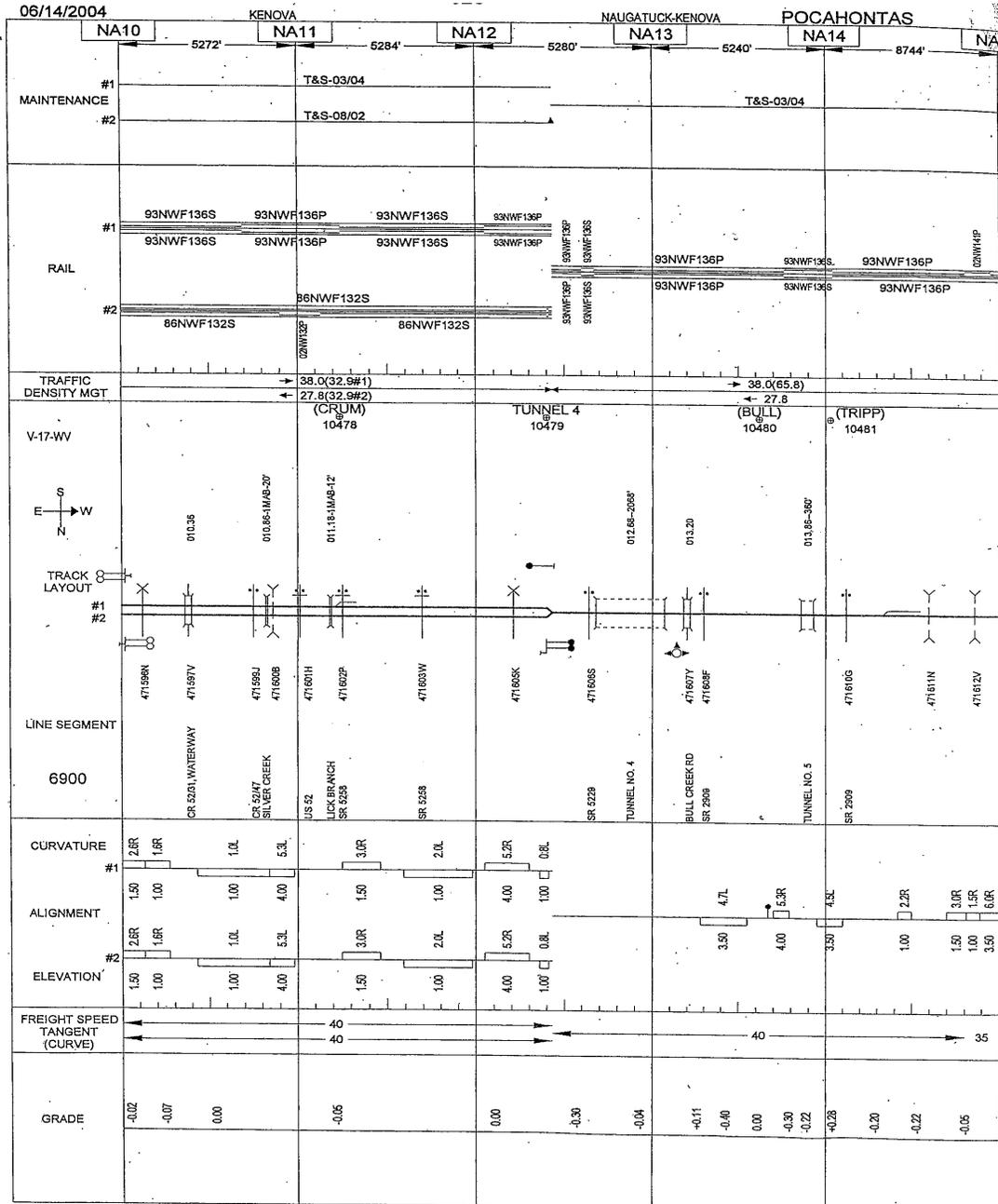
**4. USGS TOPOGRAPHIC MAP**



**5. AERIAL PHOTO**



### 6. TRACK CHART



**7. PHOTOS**



Photo 1. East Portal



Photo 2. View from East Portal



Photo 3. West Portal



Photo 4. View from West Portal

*Preliminary Engineering Phase Report  
MP NA-12.68 Big Sandy No. 4*



Photo 5. Utilities and Road Crossing at East Portal



Photo 6. Deteriorated Section of South wall Near West Portal

**Preliminary Engineering Phase Report  
MP NA-12.68 Big Sandy No. 4**

**8. ESTIMATE**
**Big Sandy No. 4**

Tunnel Length **2068** ft  
Tunnel Width **16.75** ft  
# of Tracks **1**

	Contractor		Railroad	
Work Window	<b>8</b>	hrs	<b>10</b>	hrs
Setup & Demobilization Allowance	<b>2</b>	hrs	<b>2</b>	hrs
Production Time	6	hrs	8	hrs

<b>Tunnel Work Items</b>	UOM	Quantity	Unit Rate	Total
Mobilization	%	<b>5%</b>		\$90,662.79
Surveying	DY	<b>5</b>	\$1,300.00	\$6,500.00
Minor Notching	LF	<b>2800</b>	\$67.28	\$188,370.90
Deep Notching	LF	<b>600</b>	\$255.48	\$153,287.82
Rock Dowels 14' with Chain Link Mesh - Crown	EA			
Rock Dowels 14' with Chain Link Mesh - Wall	EA			
Rock Dowels 16'	EA	<b>250</b>	\$309.69	\$77,423.20
Under Pinning	LF	<b>2068</b>	\$529.52	\$1,095,056.53
Rock Cut Drainage Trench	LF	<b>2468</b>	\$96.05	\$237,045.60
Tunnel Drainage	LF	<b>2468</b>	\$15.87	\$39,155.64
Demobilization	DY	<b>5</b>	\$3,283.20	\$16,416.00
<b>Total Tunnel Work Items</b>	<b>LF</b>	<b>2068</b>	<b>\$920.66</b>	<b>\$1,903,918.49</b>

<b>Trackwork Items</b>	UOM	Quantity	Unit Rate	Total
Mobilization	DY			
Surveying	DY			
Track Preparation/Restoration	DY			
Undercutting	PF	<b>4136</b>	\$18.88	\$78,089.16
Install Steel Ties	EA			
Track Shift < 8' & > 1'	TF			
Remove Track	TF			
Field Welds	EA			
Surfacing & Lining	PF	<b>12408</b>	\$2.08	\$25,760.16
Ballasting Track	TN	<b>4136</b>	\$37.77	\$156,222.64
<b>Total Trackwork Items</b>				<b>\$260,071.96</b>

**Preliminary Engineering Phase Report  
MP NA-12.68 Big Sandy No. 4**

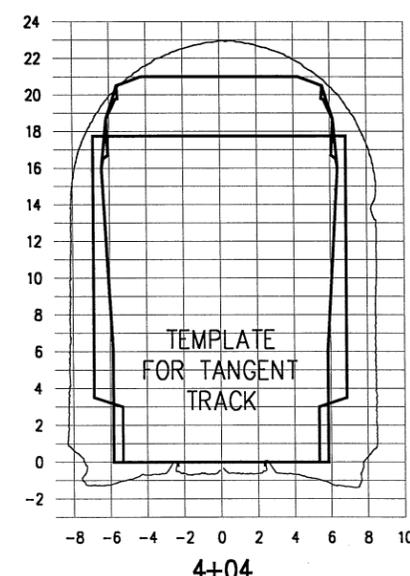
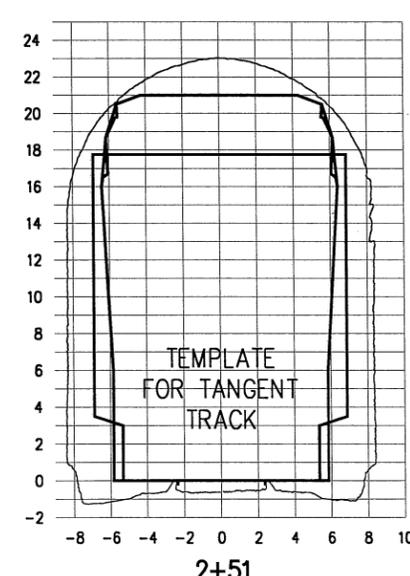
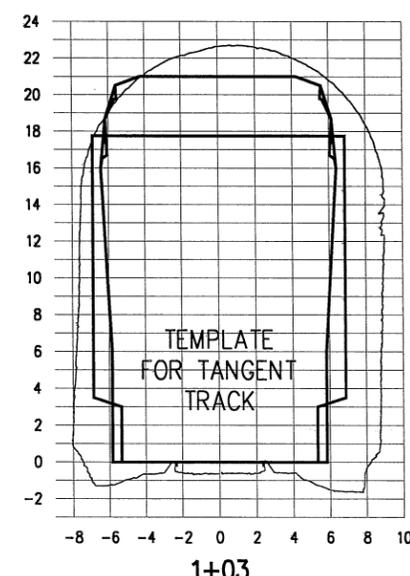
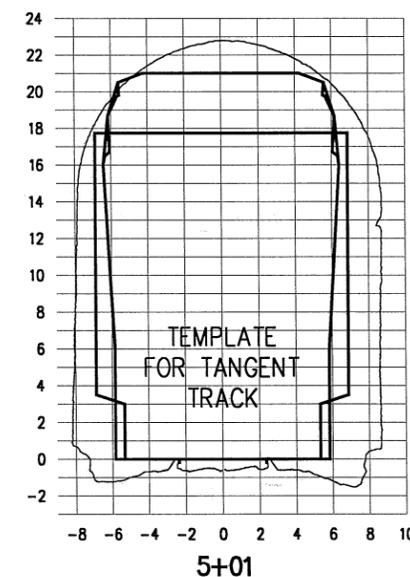
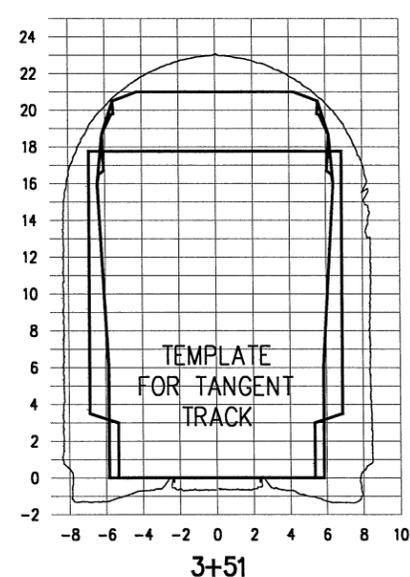
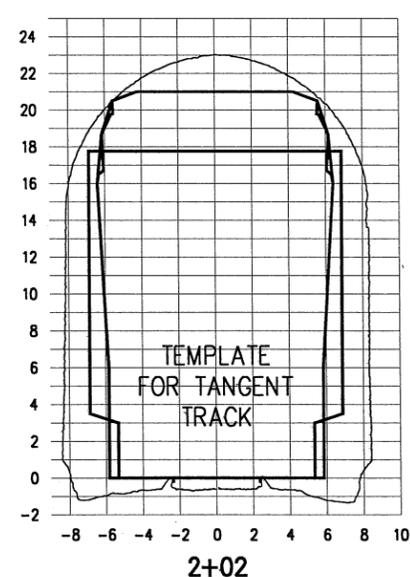
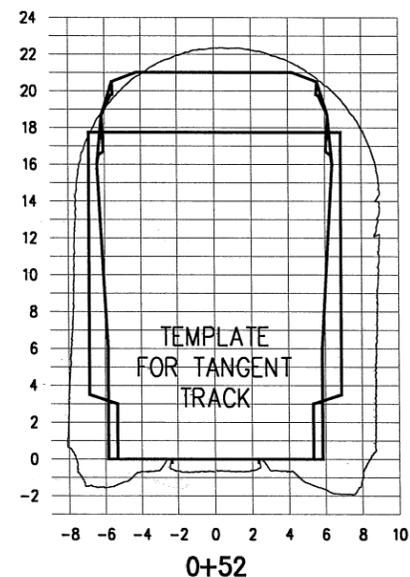
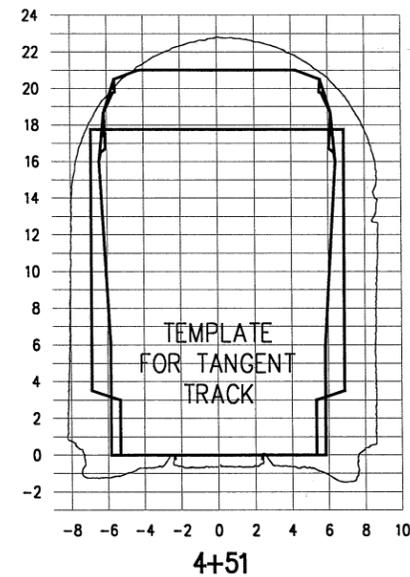
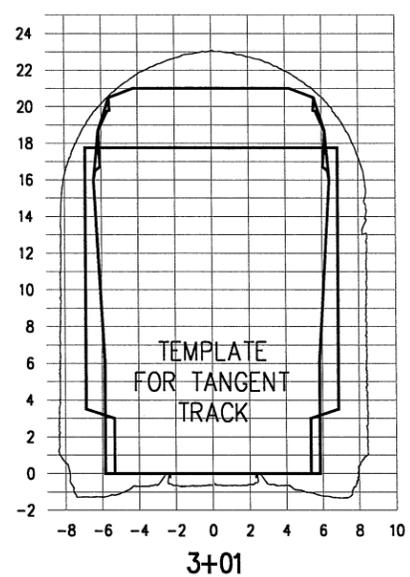
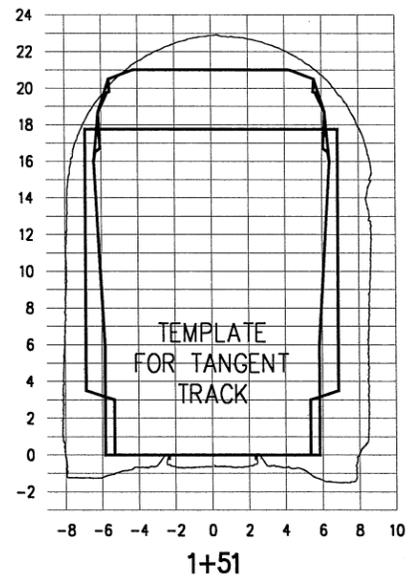
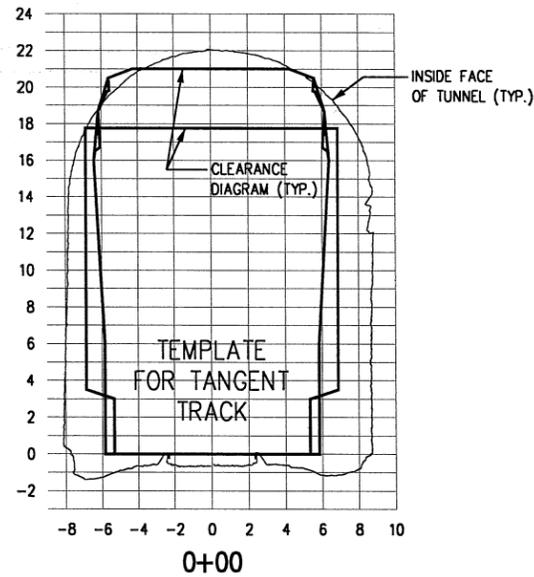
<b>Signal Items</b>	UOM	Quantity	Unit Rate	Total
Mobilization	DY			
Relocate Cables / Track Leads	LF	2068	\$11.82	\$24,452.96
Cut-in	EA			
New CP	EA			
Modify CP	EA			
Grade Crossing - Single to Double Track	EA			
Signal Location Modification	EA			
New Cut Section	EA			
Demobilization	DY			
<b>Total Signal Items</b>				<b>\$24,452.96</b>

<b>Site Items</b>	UOM	Quantity	Unit Rate	Total
Mobilization	DY	1	\$2,483.60	\$2,483.60
Erosion & Sedimentation Control	EA	1	\$11,958.80	\$11,958.80
Site Grading	CY			
Rock Excavation	CY			
Sub-Ballast	CY			
Drainage	LF			
Demobilization	DY			
<b>Total Site Items</b>				<b>\$14,442.40</b>

<b>Special Items</b>	UOM	Quantity	Unit Rate	Total
Mobilization	DY			
Flagging	DY	206	\$821.50	\$169,229.00
Flood Track with Ballast for Protection	TN	8272	\$38.37	\$317,372.11
Remove Flooded Ballast	TN	8272	\$8.88	\$73,423.37
Temporary Bridges	EA			
New Railroad Bridges	EA			
New Highway Bridges	EA			
Invert/Crown Void Grouting	DY			
Demobilization	DY			
<b>Total Specialty Items</b>				<b>\$560,024.48</b>

<b>Subtotal All Items</b>		<b>\$2,762,910.29</b>
<b>Construction Contingency</b>	<b>30%</b>	<b>\$828,873.09</b>
<b>Engineering Allowance</b>	<b>10%</b>	<b>\$359,178.34</b>
<b>Construction Management Allowance</b>	<b>14%</b>	<b>\$502,849.67</b>
<b>Total</b>		<b>\$4,453,811.39</b>

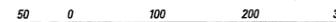
## 9. DRAWINGS



- NOTES:
- HORIZONTAL DATUM IS PARALLEL TO TRACK. WHERE TRACK IS SUPERELEVATED, DATUM IS NOT PARALLEL WITH GROUND.
  - CROSS SECTION GIVEN FOR STA. 0+00 IS A COMPOSITE FOR THE TUNNEL FROM STA. 0+00 THROUGH 0+50. ALL OF THE SECTIONS FOLLOW THIS CONVENTION.

**NOT FOR CONSTRUCTION**

SCALE: 1" = 100'

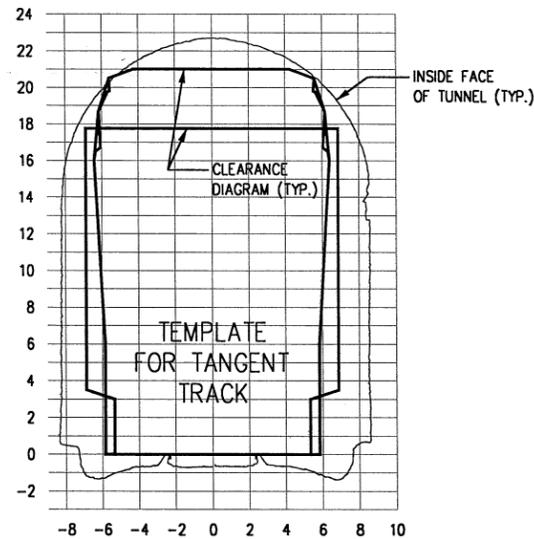


**Hatch Mott MacDonald**

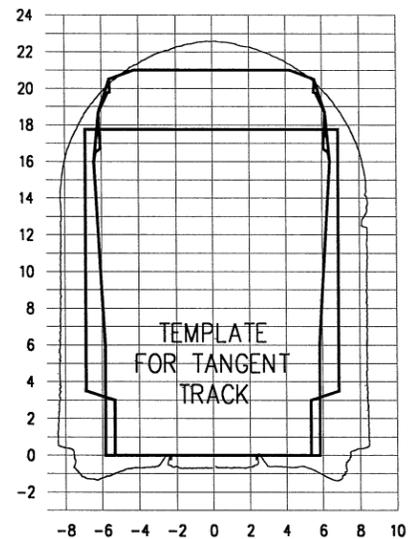
**NS NORFOLK SOUTHERN**

OWNING COMPANY  
POCAHONTAS  
OPERATING DIVISION  
OFFICE OF THE CHIEF ENGINEER - DESIGN AND CONSTRUCTION - ATLANTA, GA.

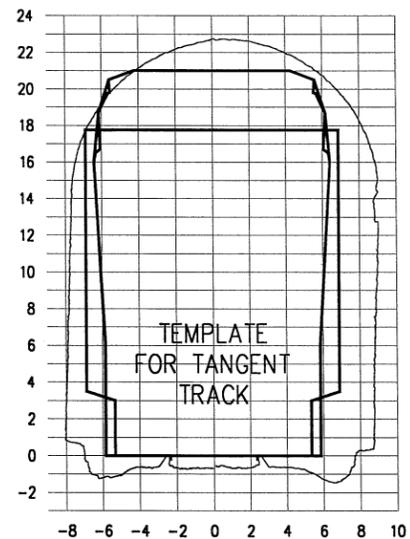
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DRW	FILE No.	NA-12.68
CHK	DATE	APRIL 29, 2005



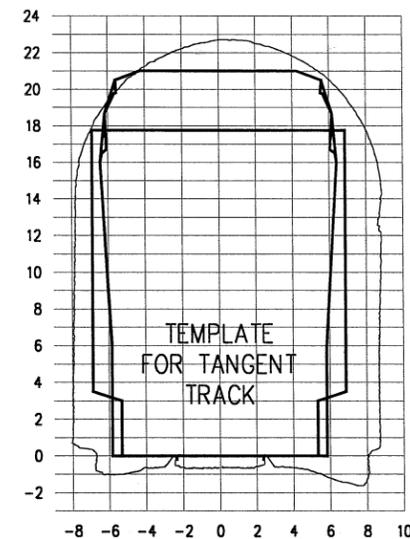
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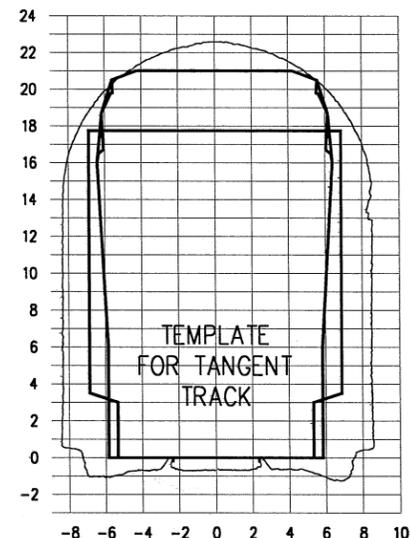
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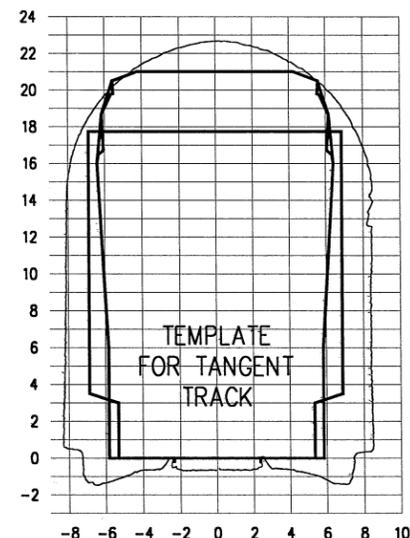
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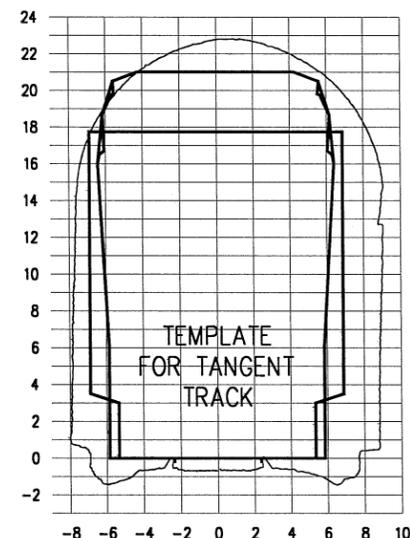
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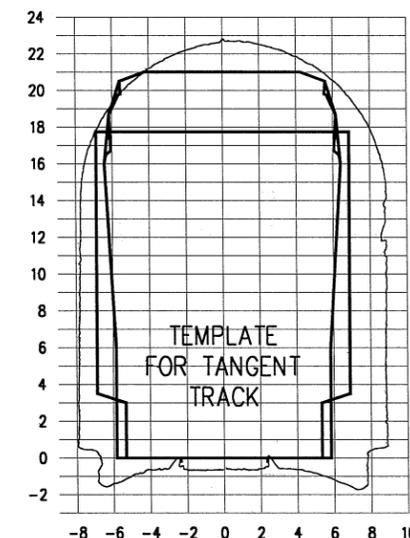
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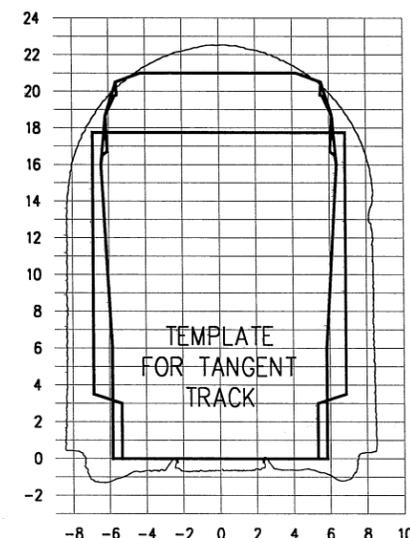
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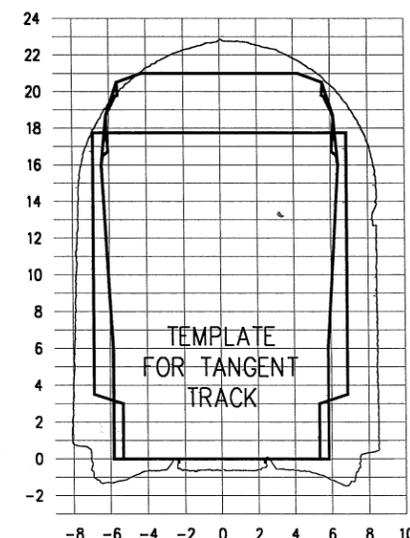
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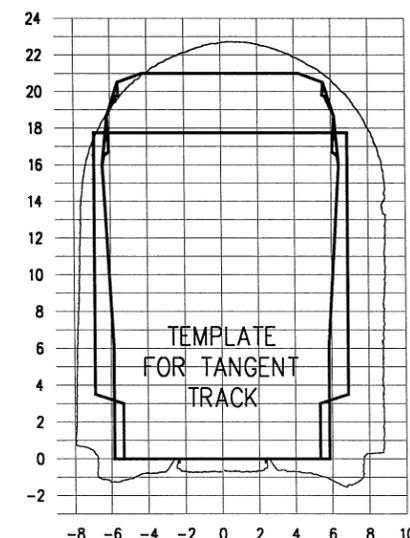
10+53



6+50



8+01



9+50

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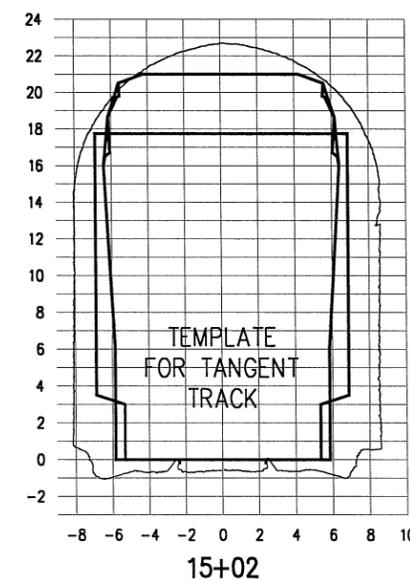
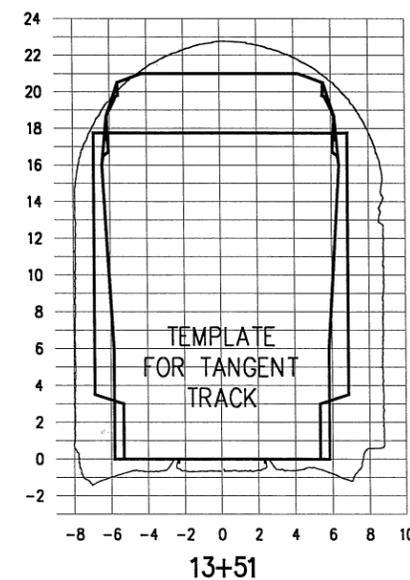
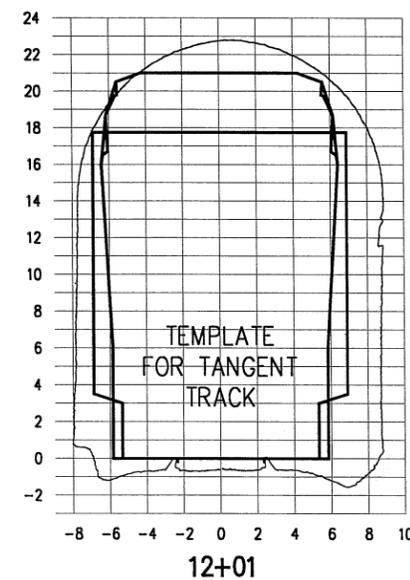
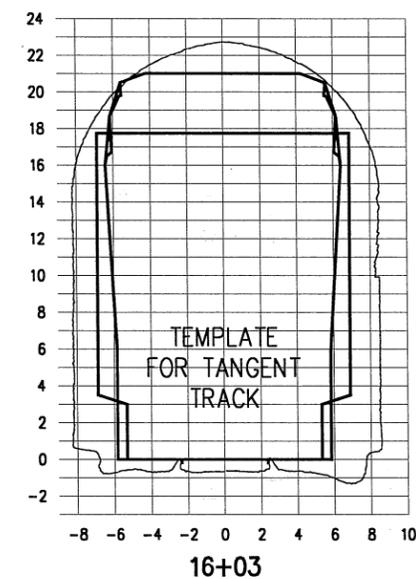
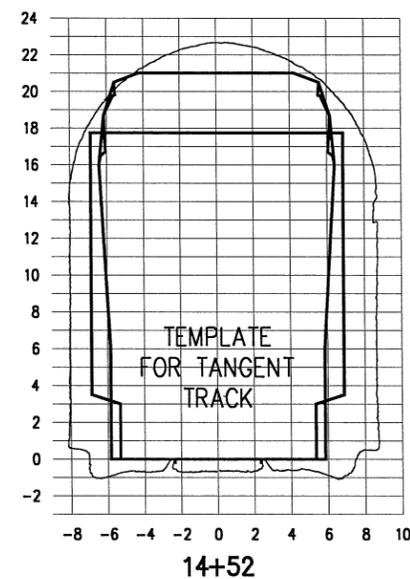
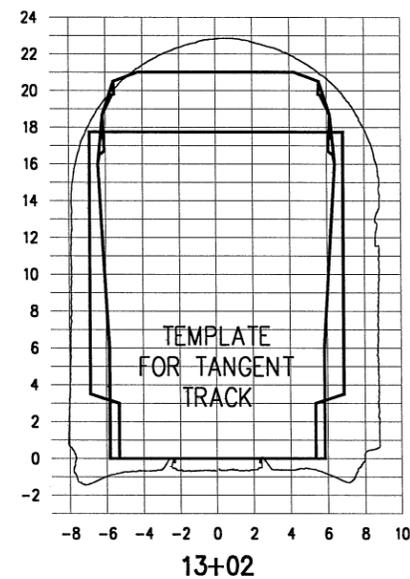
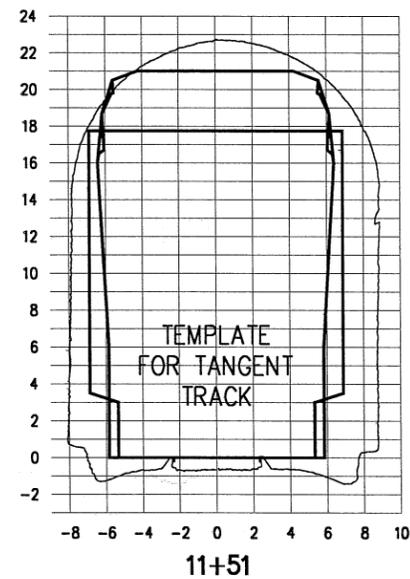
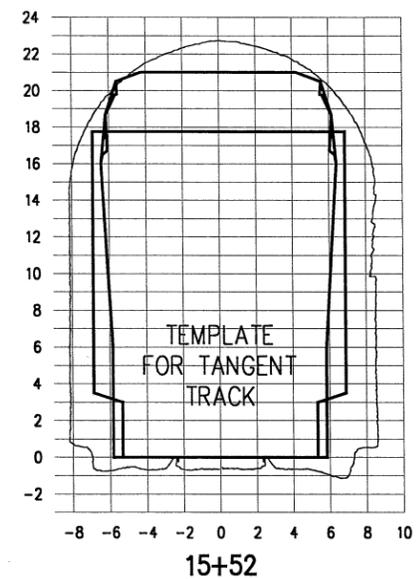
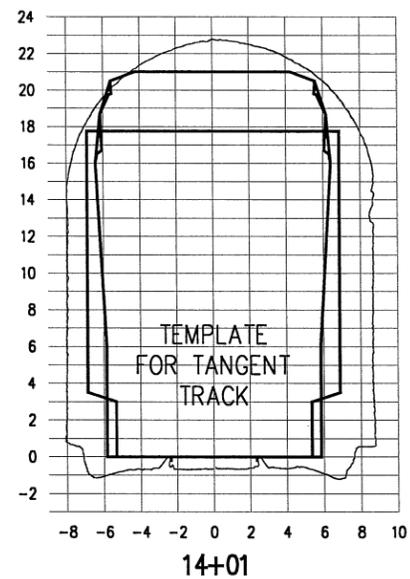
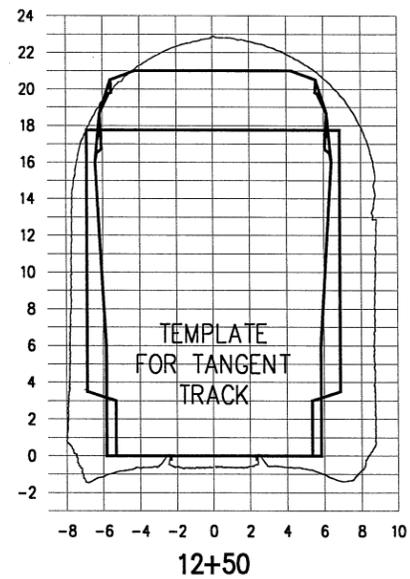
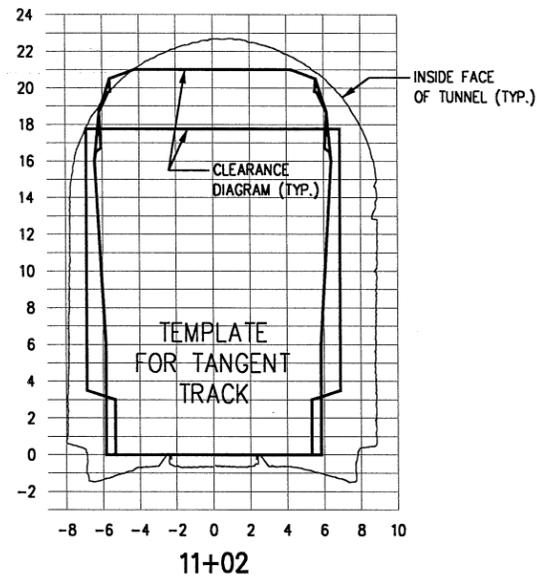
**NOT FOR CONSTRUCTION**

SCALE: 1"=100'



OWNING COMPANY  
POCAHONTAS  
OPERATING DIVISION  
OFFICE OF THE CHIEF ENGINEER - DESIGN AND CONSTRUCTION - ATLANTA, GA

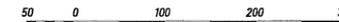
PI	D.J.L.	8505	PRELIMINARY ENGINEERING PHASE REPORT
REV	BY	DATE	DESCRIPTION
LOCATION			BIG SANDY NO. 4, BULL, WV
TITLE			TUNNEL CLEARANCE CROSS SECTIONS - 2 OF 4
DGN	FILE NO.	VRN	16575 & 16576
OWN	FILE NO.	DATE	APRIL 29, 2005
CHK	DATE	FILE POST	NA-12.68
		DRAWING NUMBER	



- NOTES:
- HORIZONTAL DATUM IS PARALLEL TO TRACK. WHERE TRACK IS SUPERELEVATED, DATUM IS NOT PARALLEL WITH GROUND.
  - CROSS SECTION GIVEN FOR STA. 0+00 IS A COMPOSITE FOR THE TUNNEL FROM STA. 0+00 THROUGH 0+50. ALL OF THE SECTIONS FOLLOW THIS CONVENTION.

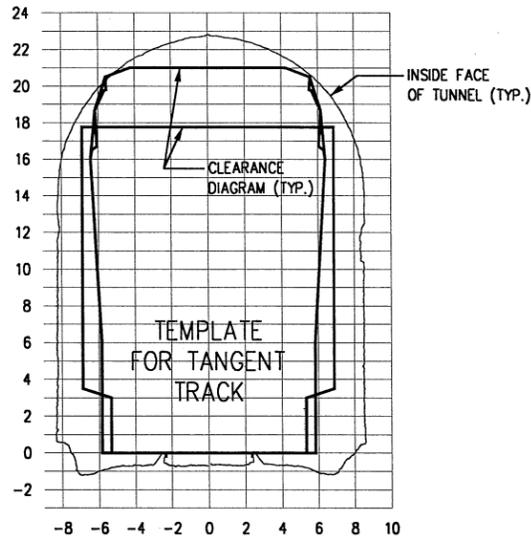
**NOT FOR CONSTRUCTION**

SCALE: 1" = 100'

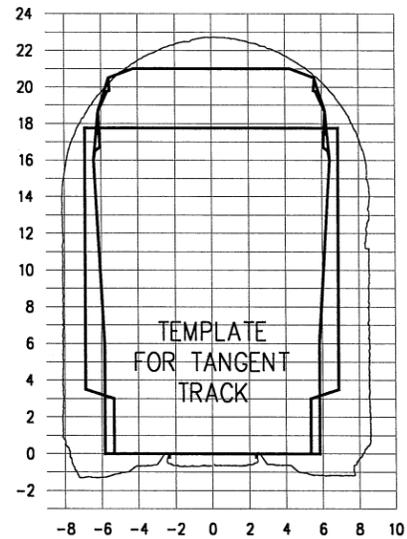


DESIGN COMPANY  
POCAHONTAS  
OPERATING DIVISION  
OFFICE OF THE CHIEF ENGINEER - DESIGN AND CONSTRUCTION - ATLANTA, GA

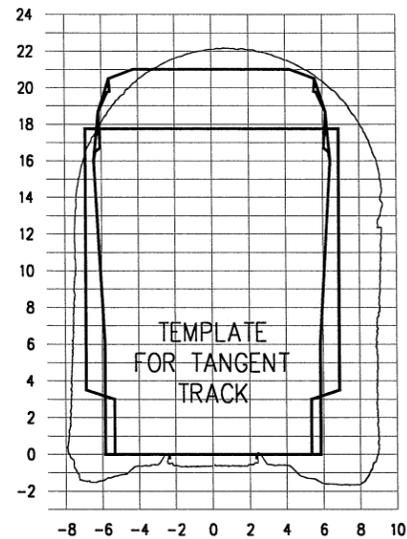
PI	DJL	8/5/05	PRELIMINARY ENGINEERING PHASE REPORT
REV	BY	DATE	DESCRIPTION
LOCATION BIG SANDY NO. 4, BULL, WV			
TITLE TUNNEL CLEARANCE CROSS SECTIONS - 3 OF 4			
DGN	FILE NO.	16575 & 16576	WILE POST NA-12.68
CHK	DATE	APRIL 29, 2005	DRAWING NUMBER



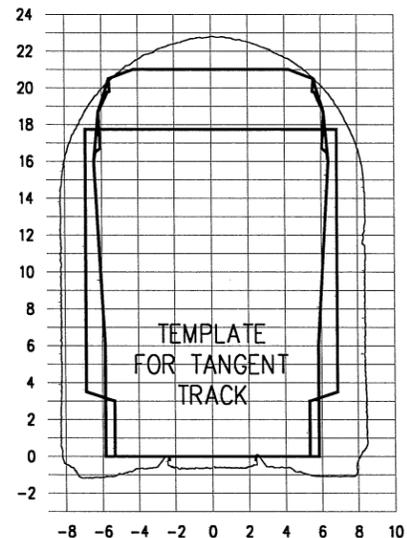
16+52



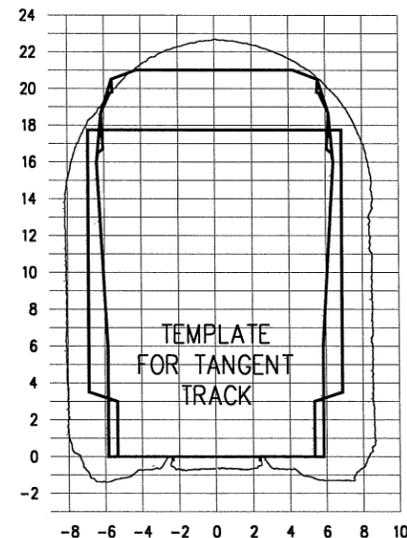
18+03



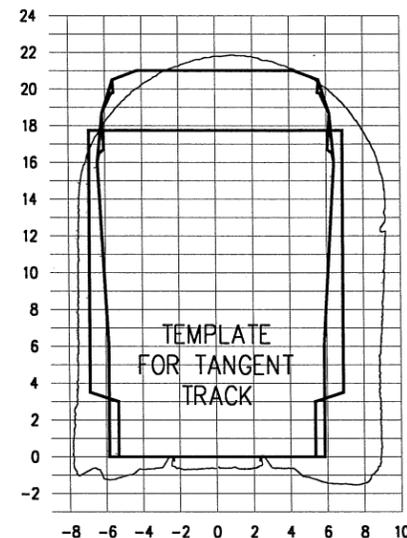
19+51



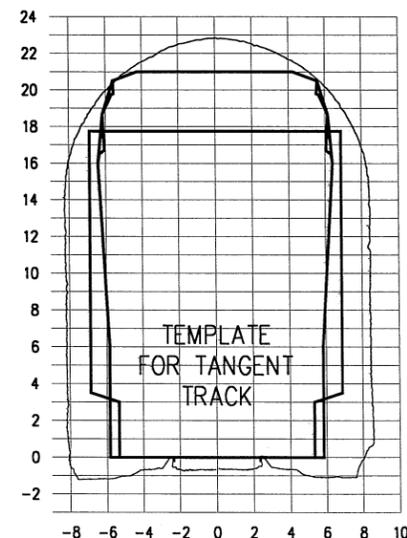
17+03



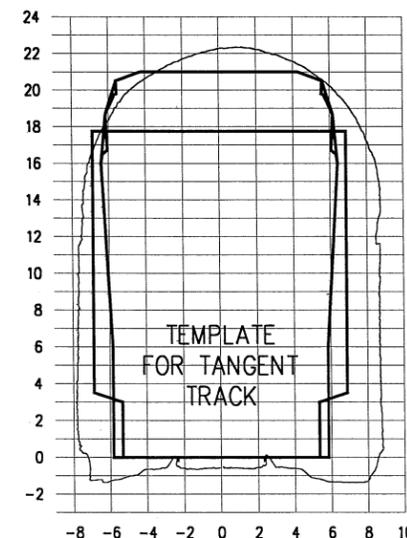
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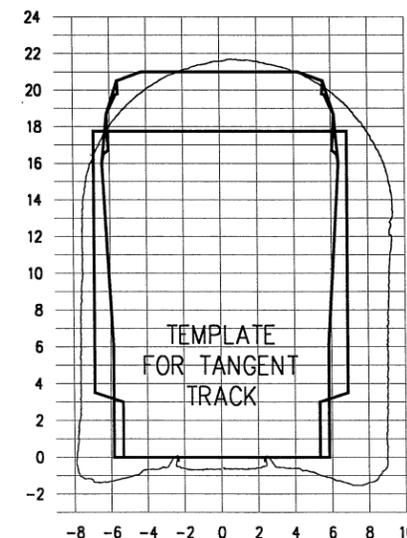
20+03



17+50



19+02



20+50

- NOTES:
- HORIZONTAL DATUM IS PARALLEL TO TRACK. WHERE TRACK IS SUPERELEVATED, DATUM IS NOT PARALLEL WITH GROUND.
  - CROSS SECTION GIVEN FOR STA. 0+00 IS A COMPOSITE FOR THE TUNNEL FROM STA. 0+00 THROUGH 0+50. ALL OF THE SECTIONS FOLLOW THIS CONVENTION.

**NOT FOR CONSTRUCTION**

SCALE: 1" = 100'



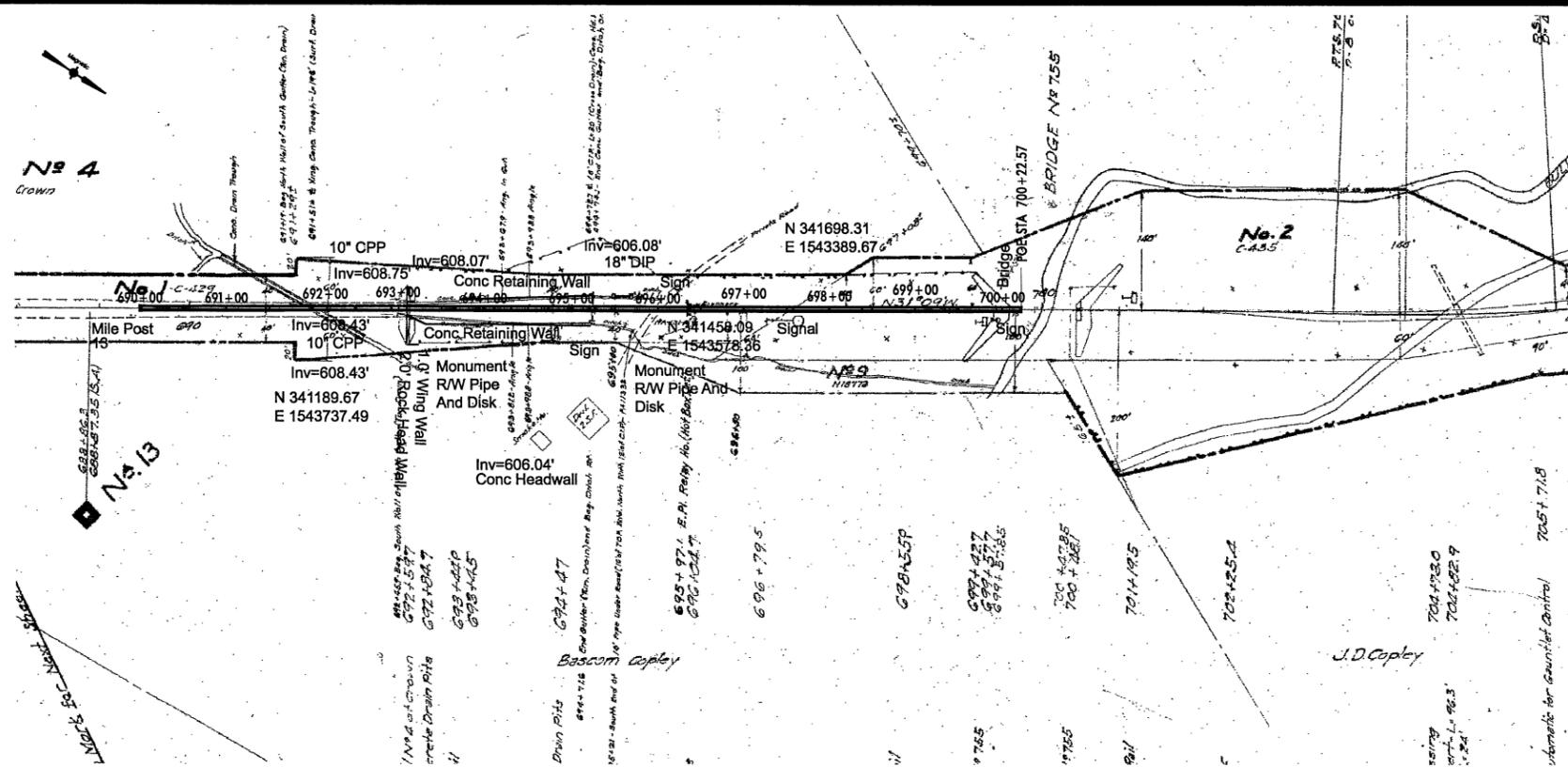
**NORFOLK SOUTHERN**

OPERATING DIVISION  
POCAHONTAS  
OFFICE OF THE CHIEF ENGINEER - DESIGN AND CONSTRUCTION - ATLANTA, GA.

PI	DJL	8505	PRELIMINARY ENGINEERING PHASE REPORT
REV	BY	DATE	DESCRIPTION
LOCATION			BIG SANDY NO. 4, BULL, WV
TITLE			TUNNEL CLEARANCE CROSS SECTIONS - 4 OF 4
DGN	FILE NO.	16575 & 16576	FILE POST NA-12.68
CHK	DATE	APRIL 29, 2005	DRAWING NUMBER



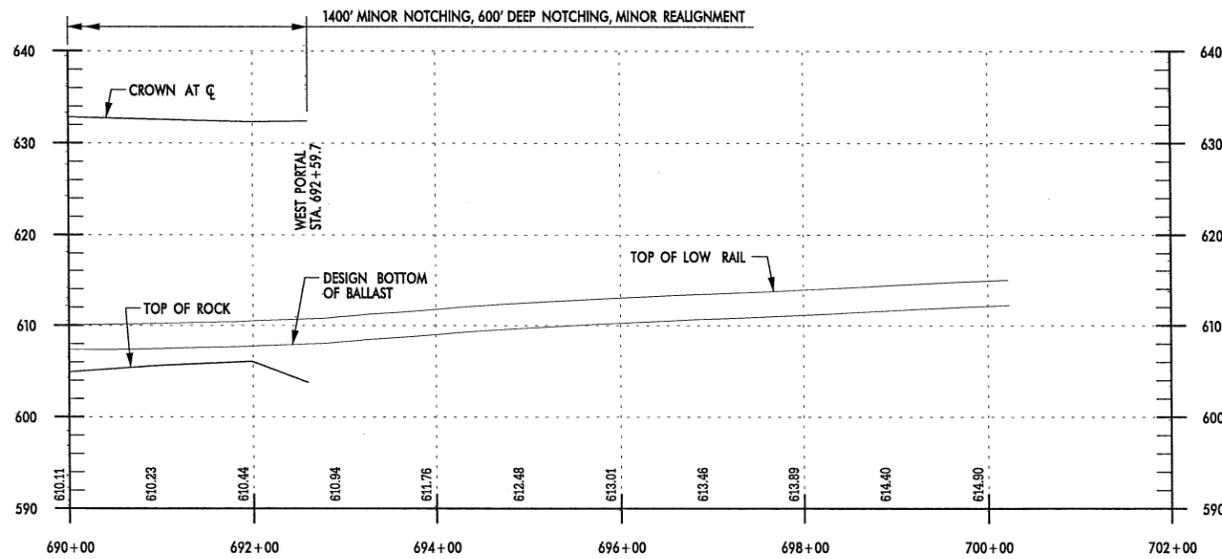
No. 4  
Crown



**BIG SANDY NO. 4 PLAN**  
SCALE: 1"=100'

**BIG SANDY NO. 4 CURVE DATA**

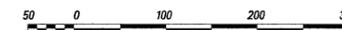
Description:			
Horizontal Alignment Name:	1		
Style:			
Input Factor:	1.0000		
	STATION	NORTHING	EASTING
Element:	Linear		
	POB (..... 1)	662+57.13	338648.43 1545395.61
	POE (..... 2)	700+22.57	341802.17 1543338.31
	Tangent Direction:	326°52'56"	
	Tangent Length:	3765.44	



**BIG SANDY NO. 4 PROFILE**  
SCALE: 1"=100' HORIZ.  
1"=10' VERT.

**NOT FOR CONSTRUCTION**

SCALE: 1"=100'



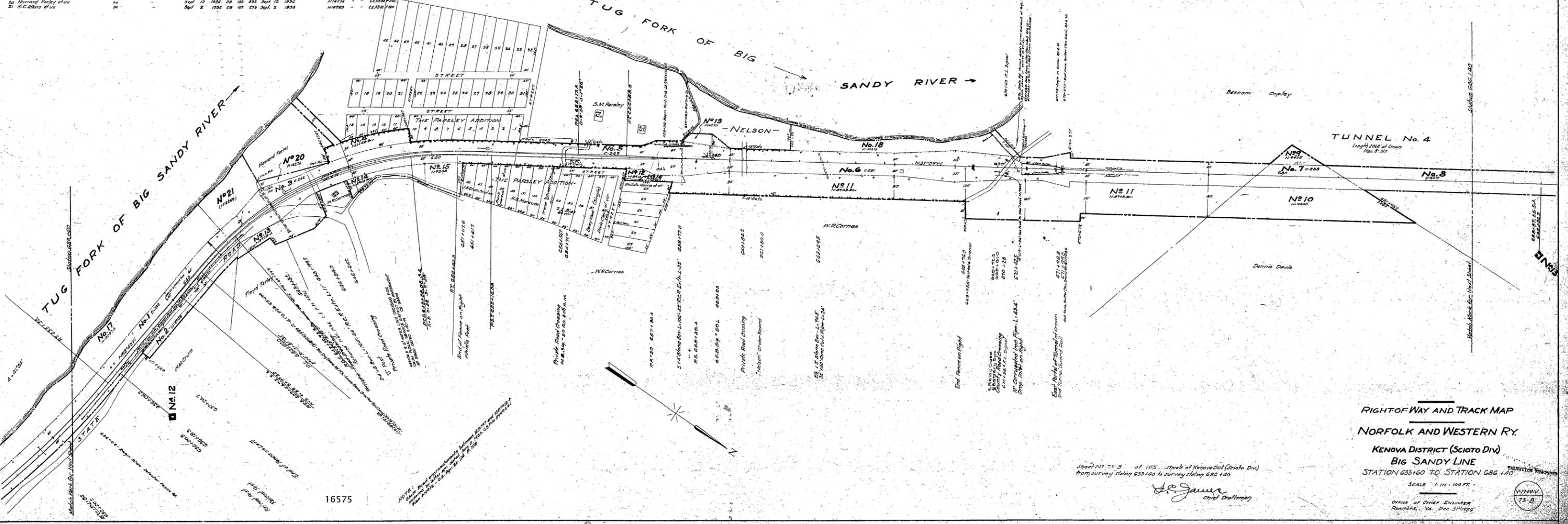
OWNING COMPANY  
**POCAHONTAS**  
OPERATING DIVISION  
OFFICE OF THE CHIEF ENGINEER - DESIGN AND CONSTRUCTION - ATLANTA, GA.

PROJECT NO.	16575 & 16576	MILE POST	NA-12.68
DATE	APRIL 22, 2005	DRAWING NUMBER	
LOCATION: <b>BIG SANDY NO. 4 TUNNEL, BULL, WV</b> TITLE: <b>PLAN AND PROFILE SHEET 2 OF 2</b>			

No.	Grantor	Grantee	Instrument	Date	Record	Cont. No.	Remarks
1	W. H. Crum et vir	N. & W. Ry. Co.	Deed	Sept. 4, 1908	28 111 Oct. 4, 1908	10082	
2	W. H. Crum et vir	"	"	April 27, 1916	28 100 282 May 6, 1916	"	
3	Calwell & Dalton	"	"	June 17, 1916	28 101 497 July 5, 1916	"	Mineral rights
4	Charles W. Evans & Sarah J. Evans	"	"	Sept. 9, 1908	28 106 211 Oct. 10, 1908	10084	
5	Polly Henny	"	"	Sept. 9, 1912	28 97 431 Oct. 4, 1912	10085-A	
6	V. J. Berlin & wife	"	Release	Sept. 9, 1912	28 97 440 Oct. 5, 1912	"	
7	William A. Henny	"	"	Sept. 9, 1908	28 94 377 Nov. 15, 1908	10087-A	
8	Mahala Evans et vir	"	"	Sept. 9, 1908	28 99 496 Oct. 14, 1908	10088	
9	John Raymond	"	"	Sept. 4, 1908	28 95 428 Oct. 15, 1908	10089	
10	Elizabeth Salmons	"	"	Sept. 4, 1908	28 95 508 Oct. 15, 1908	10084	
11	Samuel Salmons	"	"	Dec. 9, 1904	28 109 March 1, 1905	10064-A	
12	Samuel Salmons et vir	"	Deed	April 8, 1905	28 141 8 June 11, 1905	10082-A	
13	do	"	"	April 8, 1905	28 141 8 June 11, 1905	10089-A	
14	W. H. Crum et vir	"	"	Oct. 18, 1904	28 136 301 Oct. 29, 1904	10083-A	
15	Phyllis Harris et vir	"	"	July 2, 1907	28 128 458 July 25, 1907	10087-A	
16	William Parsley & S. M. Parsley	"	"	Nov. 18, 1904	28 157 203 Dec. 29, 1904	10085-A	
17	W. H. Crum et vir	"	"	March 18, 1905	28 140 18 April 27, 1905	10086-A	
18	do	"	"	Oct. 18, 1904	28 136 301 Oct. 29, 1904	10083-A	
19	do	"	"	May 15, 1905	28 141 73 June 11, 1905	10088-A	Mineral rights, to parcel 11.
20	W. H. Crum et vir	"	"	July 17, 1907	28 128 458 July 25, 1907	10087-A	
21	W. H. Crum et vir	"	Deed	June 12, 1909	28 102 200 July 11, 1909	"	
22	do	"	"	Nov. 23, 1907	28 170 28 Nov. 30, 1907	"	
23	do	"	"	Sept. 2, 1906	28 185 277 Sept. 2, 1906	"	
24	do	"	"	Sept. 12, 1906	28 188 438 Sept. 12, 1906	"	
25	do	"	"	Sept. 2, 1904	28 188 276 Sept. 2, 1904	"	

This map was not prepared or intended for use as a real estate title map. The railway company does not represent or suggest that the property lines and right-of-way lines shown on the map are accurate or that any other information on the map is correct. The company does not represent that it has checked this map for accuracy.

Location	Changes Made	Plan No.	Additions	Retirements
680-61	Del. Water Facilities & Power Co.			PA 6400 747 2 1904
680-62	Del. Water Facilities & Power Co.			PA 6501 101 1 1904
680-63	Del. Water Facilities & Power Co.			PA 6502 101 1 1904
680-64	Del. Water Facilities & Power Co.			PA 6503 101 1 1904
680-65	Del. Water Facilities & Power Co.			PA 6504 101 1 1904
680-66	Del. Water Facilities & Power Co.			PA 6505 101 1 1904
680-67	Del. Water Facilities & Power Co.			PA 6506 101 1 1904
680-68	Del. Water Facilities & Power Co.			PA 6507 101 1 1904
680-69	Del. Water Facilities & Power Co.			PA 6508 101 1 1904
680-70	Del. Water Facilities & Power Co.			PA 6509 101 1 1904
680-71	Del. Water Facilities & Power Co.			PA 6510 101 1 1904
680-72	Del. Water Facilities & Power Co.			PA 6511 101 1 1904
680-73	Del. Water Facilities & Power Co.			PA 6512 101 1 1904
680-74	Del. Water Facilities & Power Co.			PA 6513 101 1 1904
680-75	Del. Water Facilities & Power Co.			PA 6514 101 1 1904
680-76	Del. Water Facilities & Power Co.			PA 6515 101 1 1904
680-77	Del. Water Facilities & Power Co.			PA 6516 101 1 1904
680-78	Del. Water Facilities & Power Co.			PA 6517 101 1 1904
680-79	Del. Water Facilities & Power Co.			PA 6518 101 1 1904
680-80	Del. Water Facilities & Power Co.			PA 6519 101 1 1904
680-81	Del. Water Facilities & Power Co.			PA 6520 101 1 1904
680-82	Del. Water Facilities & Power Co.			PA 6521 101 1 1904
680-83	Del. Water Facilities & Power Co.			PA 6522 101 1 1904
680-84	Del. Water Facilities & Power Co.			PA 6523 101 1 1904
680-85	Del. Water Facilities & Power Co.			PA 6524 101 1 1904
680-86	Del. Water Facilities & Power Co.			PA 6525 101 1 1904
680-87	Del. Water Facilities & Power Co.			PA 6526 101 1 1904
680-88	Del. Water Facilities & Power Co.			PA 6527 101 1 1904
680-89	Del. Water Facilities & Power Co.			PA 6528 101 1 1904
680-90	Del. Water Facilities & Power Co.			PA 6529 101 1 1904
680-91	Del. Water Facilities & Power Co.			PA 6530 101 1 1904
680-92	Del. Water Facilities & Power Co.			PA 6531 101 1 1904
680-93	Del. Water Facilities & Power Co.			PA 6532 101 1 1904
680-94	Del. Water Facilities & Power Co.			PA 6533 101 1 1904
680-95	Del. Water Facilities & Power Co.			PA 6534 101 1 1904
680-96	Del. Water Facilities & Power Co.			PA 6535 101 1 1904
680-97	Del. Water Facilities & Power Co.			PA 6536 101 1 1904
680-98	Del. Water Facilities & Power Co.			PA 6537 101 1 1904
680-99	Del. Water Facilities & Power Co.			PA 6538 101 1 1904
680-100	Del. Water Facilities & Power Co.			PA 6539 101 1 1904



16575

RIGHT-OF-WAY AND TRACK MAP  
NORFOLK AND WESTERN RY.

KENOVA DISTRICT (SCIOTO DIV)  
BIG SANDY LINE  
STATION 633+00 TO STATION 686+00

SCALE 1" = 100 FT.

OFFICE OF CHIEF ENGINEER  
RICHMOND, VA. Dec 31/1906



J. C. Janner  
Chief Draftsman

Sheet No. 73-B of 105 sheets of Kenova Dist. (Scioto Div)  
from survey station 633+00 to survey station 686+00

