



*Heartland Corridor, Walton Virginia to  
Columbus Ohio*

# Preliminary Engineering Phase Report



**BIG SANDY NO. 2  
TUNNEL –  
MP NA 6.02  
GREY EAGLE, 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. 2 Tunnel – MP NA–6.02

**Statistics: Pocahontas Division**  
**Single-width Tunnel for Main #2**  
**Length = 380'**  
**Concrete Lined**  
**Degree of Curvature = 8.0 RT (per Track Chart)**  
**Superelevation = 3.5" (per Track Chart)**

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## **1. EXISTING CONDITIONS**

### **1.1 Background**

Valuation maps V-17-WV/70A (16565) and V-17-WV/70B (16566) for the Big Sandy No. 2 Tunnel, also known as Tunnel 2, are dated Dec. 31, 1926. The parcel for the tunnel was acquired in 1903. Construction of the tunnel was completed in 1903, based on the date stamped on the portals. The Buck Creek Branch, which ran west of the tunnel, was retired in 1941. 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 6, June 16, and August 2, 2005.

### **1.2 General Area**

The tunnel is located in a sparsely populated area of Grey Eagle, WV. The more densely populated town of Warfield, KY is located across the river. Main #1 runs outside of the tunnel to the south. A railroad yard is located south of the tunnel and would make a good staging area. Access to the portals is via railroad ROW. An abandoned state road is located over the east portal with a short steel bridge, at a skew, spanning the area between the portal and the north face of the rock cut. Utility lines run over the tunnel.

### **1.3 Structural Conditions**

The tunnel is 380' long with a concrete liner and a nominal width of 18.5'. It is a single width tunnel for one track. The liner is in fairly good condition with some seepage and efflorescence visible at the construction joints. The worst leaking is in the center of the tunnel between 183' and 204' from the east portal. The footing and underlying rock is exposed along all of the south wall and most of the north wall. The shotcrete has been applied to the tunnel liner near the portals and some of the shotcrete has thin, superficial cracking and minor spalling in some areas. Weeps are located in both walls and are functioning.

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 20". The vertical distance from the top of rail to the base of the footing was measured at 64.5".

Liner cores were taken on August 2, 2005. Cores were drilled into the liner at locations 165' and 215' 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 #2 Tunnel Liner Core Investigation</b>			
<b>Distance from East Portal (feet)</b>	<b>Position</b>	<b>Liner Thickness</b>	<b>Notes</b>
165	7 o'clock	25"	Bedrock immediately behind liner
165	2 o'clock	26"	Wood Above Liner
165	12 o'clock	18"	Wood Above Liner
215	5 o'clock	29"	Bedrock immediately behind liner.
215	10 o'clock	26"	No void
215	12 o'clock	26"	Concrete in poor condition

Two samples of concrete were taken from the liner core investigation and tested. The sample from 165' in from the east portal, 2 o'clock position, taken from 8" – 19" into the core had a compressive strength of 3,001psi. The sample from 165' in from the west portal, 5 o'clock position, taken from 14" – 29" into the core had a compressive strength of 6,507psi.

#### **1.4 Track**

The track is of conventional design with wooden crossties and a stone ballast section. The ballast is dirty but in good condition, some mud was pumping through beyond the ties. The continuous welded rail is 141 RE with a tie spacing of 20". The track is curved 8.0 degrees to the right for the entire length of the tunnel. Standing water was observed in low areas. The water in the tunnel was tested and its pH reading was 8.23. 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 tunnel is 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. Sandstone and shale were the predominant materials recovered from the geoprobe sample tubes for Big Sandy No. 2.

The rock quality designation, Q, at the portals was determined to be 22. 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 5,263psi. The geoprobes into the tunnel invert indicate that the top of rock is located between 1.5’ to 3.0’ (averaging about 2.0’) 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 the “Double Stack Load” portion of the composite clearance envelope. The “High-Wide Load” portion of the envelope encroaches on the upper half of the right side by several inches for most of the tunnel.

For vertical clearance, the “Double Stack” portion of the envelope encroaches on the left side of the tunnel crown by an average of 4” and varies up to 12” with the largest encroachments being at the portals. On the right side of the tunnel crown, the “Double Stack” portion of the envelope encroaches consistently on average by 26” and varies up to 29”.

For the “High-Wide” portion of the clearance envelope, encroachment exists only on the right side of the tunnel crown (at points lower than the Double Stack portion) by an average of 18” and varying up to 21” throughout the tunnel.

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	11	24
101	3	25
202	0	27
301	2	28
352	6	29

Due to the small distance between the top of rail and the top of rock, a substandard track section is likely being used for much of the tunnel. The clearances in the above table are based on the existing track section; encroachments may be slightly larger if the track is redone with the standard section.

## **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; track realignment, notching the lining, liner replacement, partial daylighting, and a new track to bypass the tunnel. 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 due to the proximity of the top of rock to the surface.

### **2.1 Track Realignment**

The centerline of the track appears to be about 8' from the right wall and 10' from the left wall. If the track were realigned to be in the middle of the tunnel, the magnitude of encroachment at the crown would be evened out between the left side and the right side. The encroachments to the right wall could be eliminated as well.

### **2.2 Notching**

Notching of the concrete liner, if used alone without realignment, appears to be a viable alternative to fix the encroachments on the left side of the crown. However, the magnitude of the encroachments on the right side of the crown would require complete replacement of the entire roof of the lining. Therefore, notching alone would not work. If used in conjunction with realignment of the track, the magnitude of encroachment would be evened out between the right and left sides of the crown. However, the lining thickness is estimated at 18" and the "evened-out" encroachments would still cut too deeply into the liner to make this a truly viable alternative. It is unlikely that notching can be employed at any location in this tunnel.

### **2.3 Liner Replacement**

To obtain the desired clearance, the concrete liner crown must be demolished, the native rock excavated to the clearance limits plus the new liner thickness, and a new concrete liner installed. This method appears to be necessary for the entire tunnel.

### **2.4 Partial Daylighting**

The abandoned roadway for Rt. 52 is approximately 10' above the tunnel crown. The existing tunnel and overburden could be removed back through the Rt. 52 roadway to reduce the amount of liner replacement required.

## **2.5 New Track to Bypass Tunnel**

This option would involve paralleling Main Track #1 and bypassing the tunnel entirely. The resulting curvature will be higher than the existing through the tunnel, but in the same range of curvature as the existing curve on Main Track #1. A more detailed discussion and design for this option is included in the Double Track Study report.

## **3. PREFERRED ALTERNATIVE**

Given the magnitude of the vertical encroachment, realigning the track and liner replacement should be used together to provide for the necessary clearance for the tunnel modification alternative. Drainage improvements are recommended to help alleviate the ballast-fouling problem. In the final design phase, it will be looked at in greater detail whether the clearance improvements need to be increased further to account for replacing the existing track section with a track section of standard thickness.

Based on our discussion with NS, the bypass around the tunnel would not be dismissed at this time despite the curvature. At this time our recommendation is to continue to examine both the bypass and tunnel modification alternatives. The bypass option will require either shifting Main Track #1 to provide room for Main Track #2, or removing the rock ledge under abandoned Rt. 52. The depth of the rock under Rt. 52 is approximately 25', and the width at the roadway is approximately 26'. This option will be looked at in further detail in the Double Track Study and in the final design phase.

### **3.1 Preliminary Design**

The preliminary design uses track shifting and replacement 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.

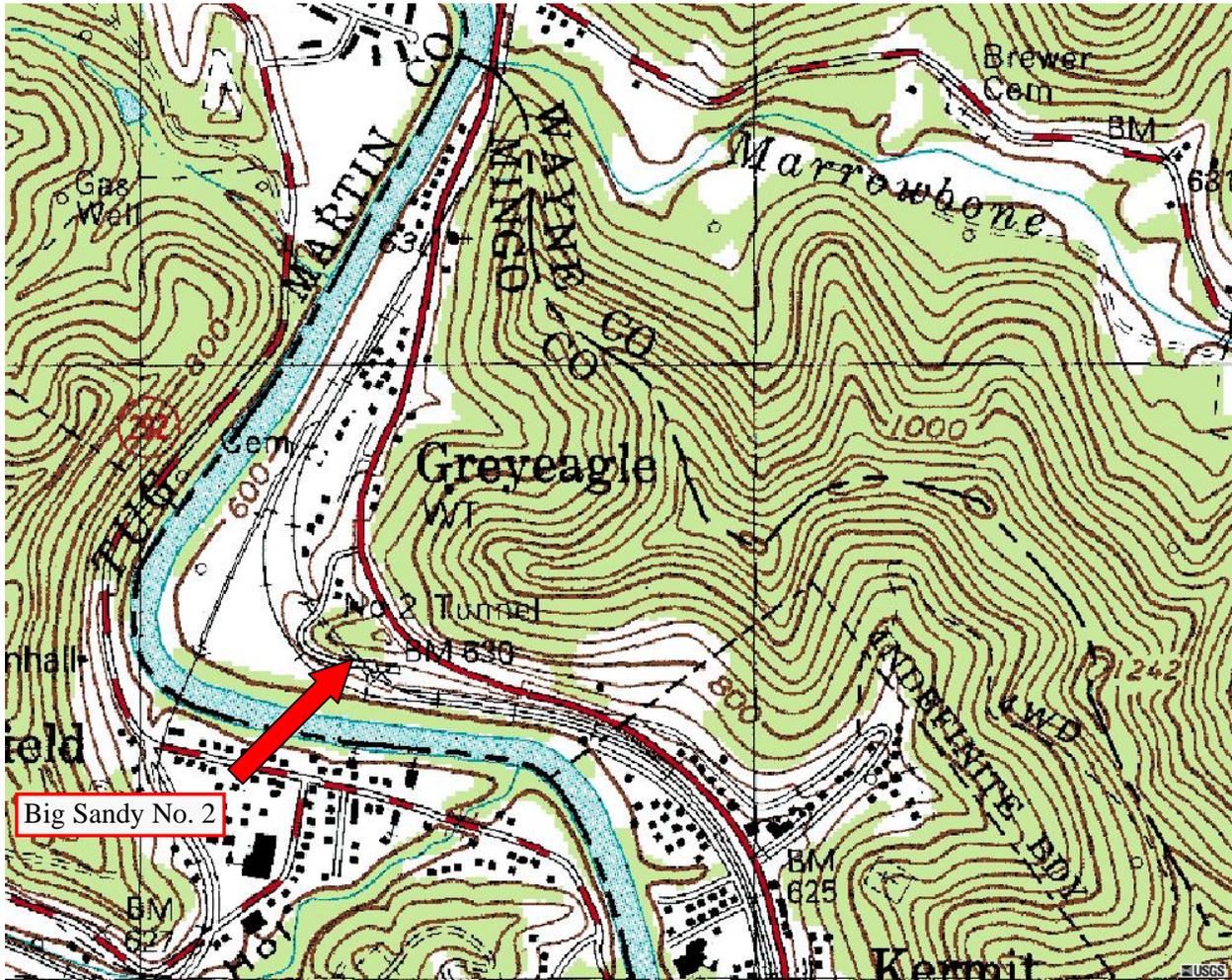
### **3.2 Schedule**

The estimated schedule for completing improvements on this tunnel is twelve (12) weeks including mobilization and demobilization. The schedule assumes the track will be closed for eight hours, five days a week. The schedule assumes 12' of crown removal each day on one side of the tunnel, with liner removal, rock removal, installation of rock dowels and installation of shotcrete all occurring on the same day for each 12' segment. Drainage improvement operations would be undertaken at the same time as the crown removal, but at different locations in the tunnel.

### **3.3 Estimate**

The total estimated cost for achieving clearance at this location is \$2.1 million, or \$5,587 per foot of tunnel. The work items include mobilization, surveying, liner removal, rock removal, rock dowels, crown installation, rock cut for drainage trench, tunnel drainage system, ballast cleaning, and demobilization. The total cost is made up of tunnel, track, signal, and site work items at \$1.3 million, plus a 30% construction contingency, a 10% engineering allowance, and a 14% construction management allowance.

4. USGS TOPOGRAPHIC MAP



**5. AERIAL PHOTO**





**7. PHOTOS**



Photo 1. East Portal



Photo 2. View from East Portal



Photo 3. West Portal



Photo 4. View from West Portal

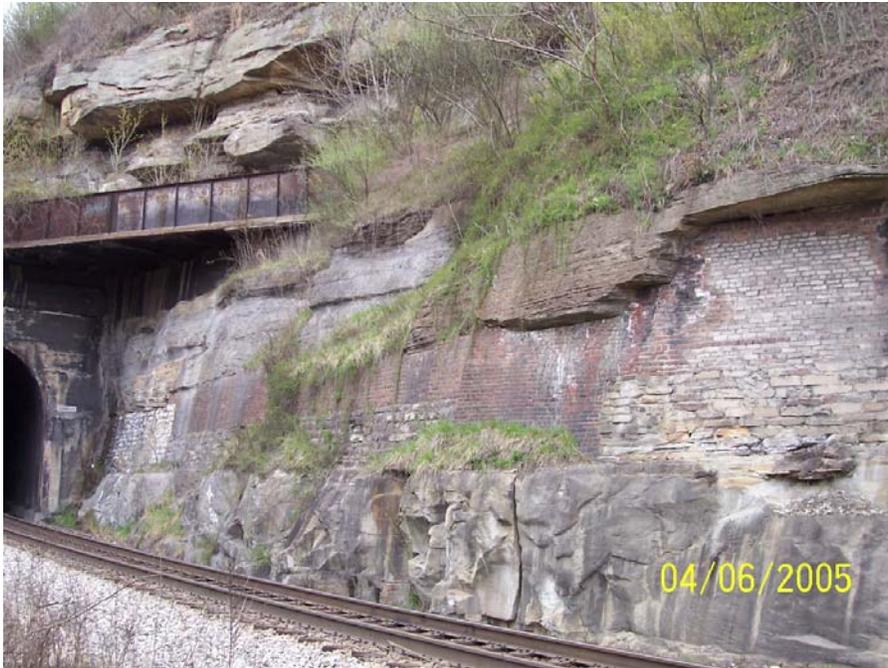


Photo 5. Support Wall Outside East Portal, North Side



Photo 6. Water Seeping from Horizontal Construction Joint South Side

**Preliminary Engineering Phase Report  
MP NA-6.02 Big Sandy No. 2**

**8. ESTIMATE**
**Big Sandy No. 2**

Tunnel Length **380** ft  
Tunnel Width **18.5** 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>		\$46,993.25
Surveying	DY	<b>5</b>	\$1,300.00	\$6,500.00
Minor Notching	LF			
Deep Notching	LF			
Rock Dowels 14' with Chain Link Mesh - Crown	EA	<b>443</b>	\$412.39	\$182,827.73
Rock Dowels 14' with Chain Link Mesh - Wall	EA			
Rock Dowels 16'	EA			
Crown Removal	SF	<b>11043</b>	\$10.81	\$119,334.40
Wall Hydrodemolition	SF			
Wall Removal	SF			
Rock Removal - Crown	CY	<b>409</b>	\$247.75	\$101,327.24
Rock Removal - Wall	CY			
Crown Installation	SF	<b>11043</b>	\$19.52	\$215,541.16
Wall Installation	SF			
Under Pinning	LF	<b>380</b>	\$540.82	\$205,513.07
Rock Cut Drainage Trench	LF	<b>780</b>	\$101.30	\$79,015.20
Tunnel Drainage	LF	<b>780</b>	\$17.17	\$13,390.13
Demobilization	DY	<b>5</b>	\$3,283.20	\$16,416.00
<b>Total Tunnel Work Items</b>	<b>LF</b>	<b>380</b>	<b>\$2,597.00</b>	<b>\$986,858.18</b>

<b>Trackwork Items</b>	UOM	Quantity	Unit Rate	Total
Mobilization	DY			
Undercutting	PF	<b>760</b>	\$34.25	\$26,029.72
Install Steel Ties	EA			
Track Shift < 8' & > 1'	TF	<b>2000</b>	\$8.99	\$17,987.12
Surfacing & Lining	PF	<b>4000</b>	\$2.58	\$10,304.06
Ballasting Track	TN	<b>760</b>	\$42.54	\$32,331.32
<b>Total Trackwork Items</b>				<b>\$86,652.22</b>

**Preliminary Engineering Phase Report  
MP NA-6.02 Big Sandy No. 2**

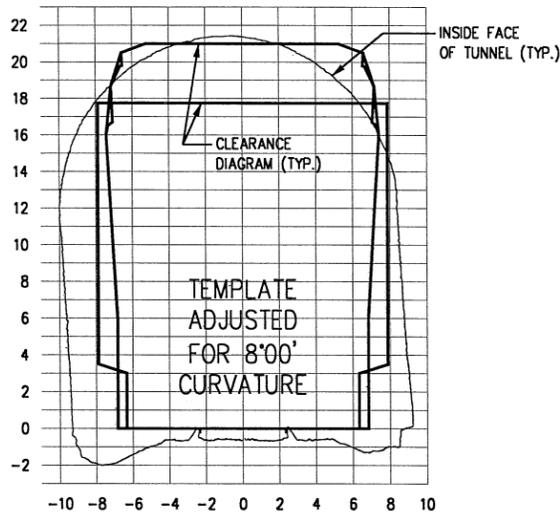
<b>Signal Items</b>	UOM	Quantity	Unit Rate	Total
Mobilization	DY			
Relocate Cables / Track Leads	LF	380	\$12.43	\$4,722.59
Cut-in	EA			
New CP	EA			
Modify CP	EA			
Grade Crossing - Single to Double Track	EA			
Signal Location Modification	EA			
New Cut Section	EA			
Demobilization	DY			
<b>Total Signal Items</b>				<b>\$4,722.59</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	4800	\$20.52	\$98,486.68
Rock Excavation	CY			
Sub-Ballast	CY			
Drainage	LF			
Demobilization	DY			
<b>Total Site Items</b>				<b>\$112,929.08</b>

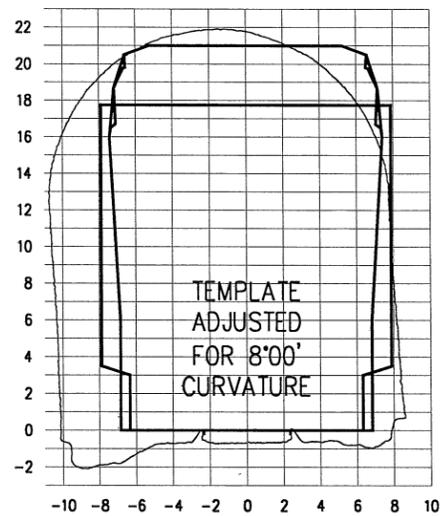
<b>Special Items</b>	UOM	Quantity	Unit Rate	Total
Mobilization	DY			
Flagging	DY	60	\$821.50	\$49,290.00
Flood Track with Ballast for Protection	TN	1520	\$39.58	\$60,163.03
Remove Flooded Ballast	TN	1520	\$10.73	\$16,316.30
Temporary Bridges	EA			
New Railroad Bridges	EA			
Invert/Crown Void Grouting	DY			
Demobilization	DY			
<b>Total Specialty Items</b>				<b>\$125,769.33</b>

<b>Subtotal All Items</b>		<b>\$1,316,931.41</b>
<b>Construction Contingency</b>	<b>30%</b>	<b>\$395,079.42</b>
<b>Engineering Allowance</b>	<b>10%</b>	<b>\$171,201.08</b>
<b>Construction Management Allowance</b>	<b>14%</b>	<b>\$239,681.52</b>
<b>Total</b>		<b>\$2,122,893.43</b>

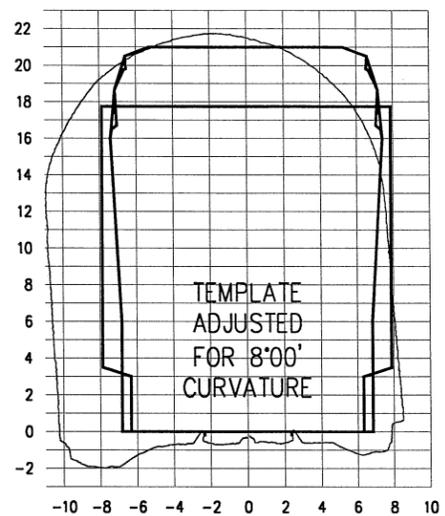
## 9. DRAWINGS



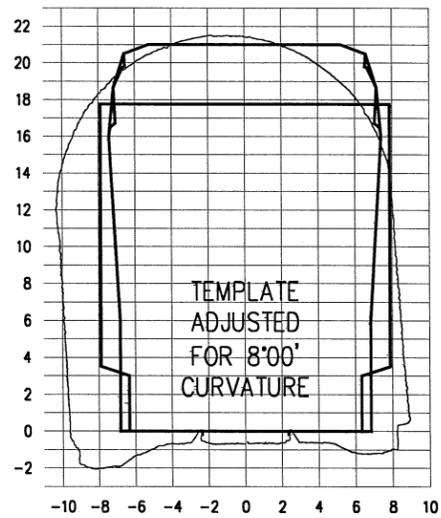
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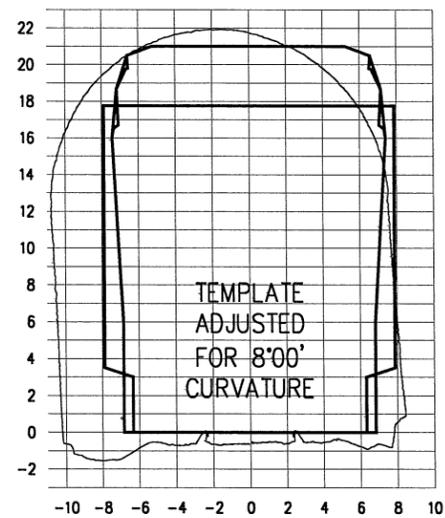
1+51



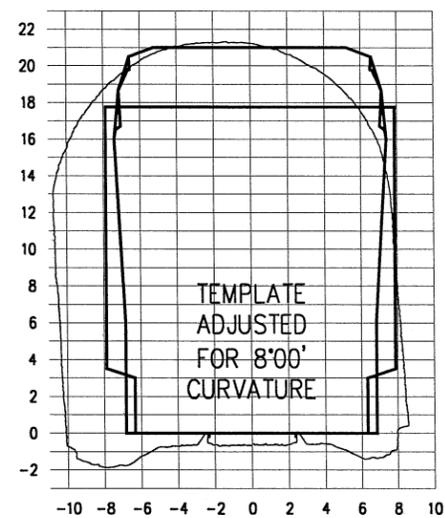
3+01



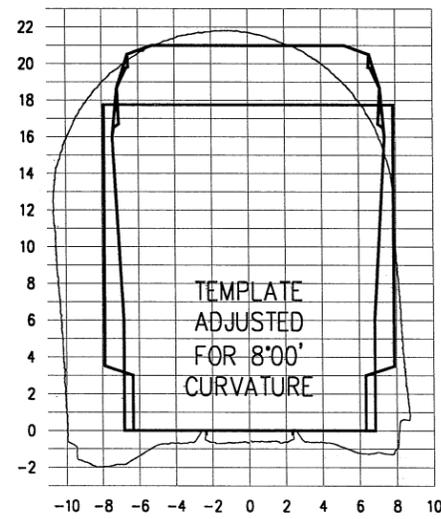
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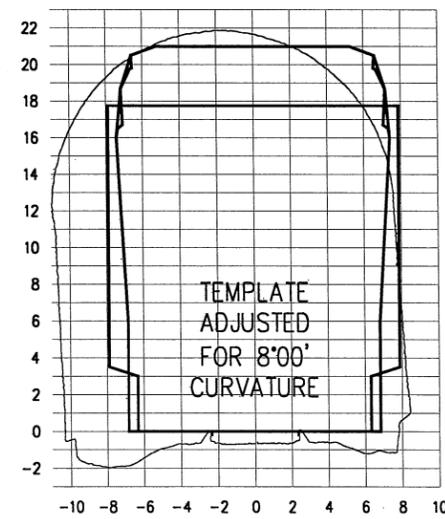
2+02



3+52



1+01



2+51

NOTES:

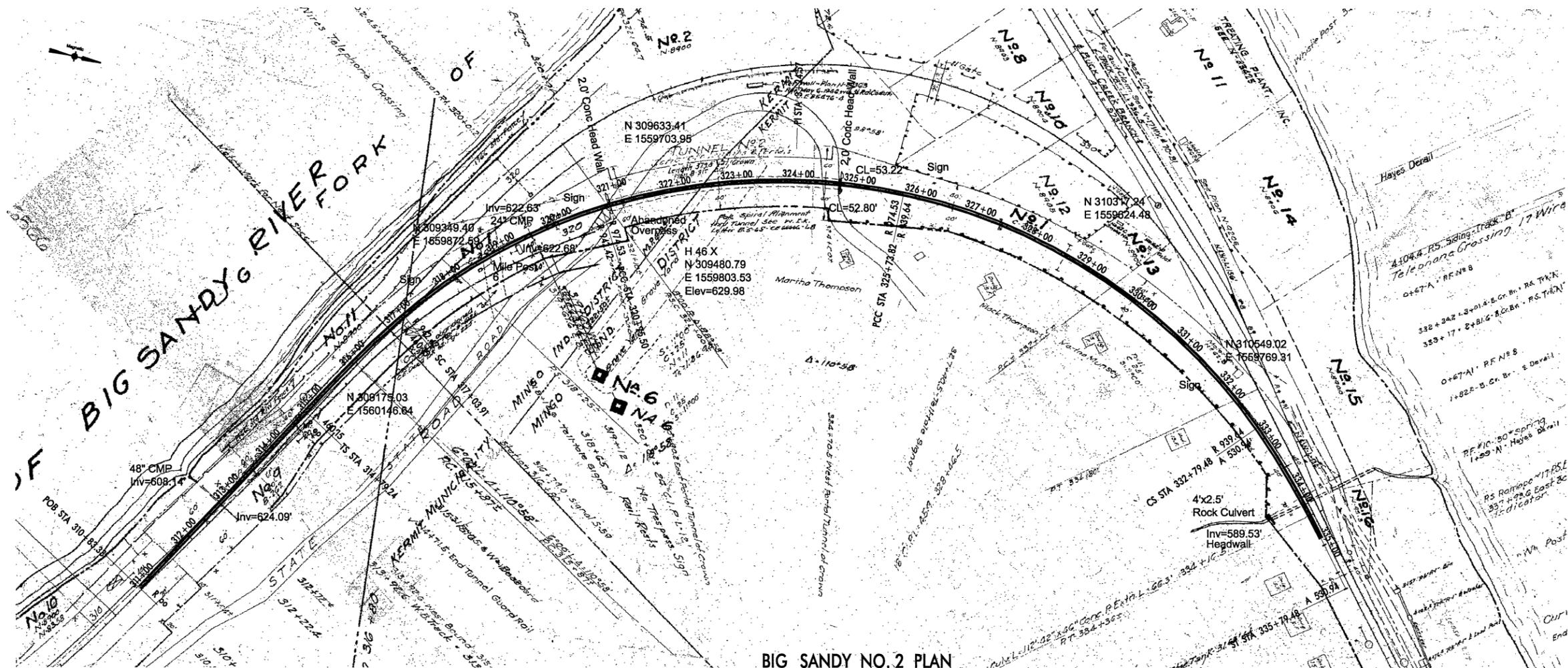
1. HORIZONTAL DATUM IS PARALLEL TO TRACK. WHERE TRACK IS SUPERELEVATED, DATUM IS NOT PARALLEL WITH GROUND.
2. CROSS SECTION GIVEN FOR STA. 0+00 IS A COMPOSITE FOR THE TUNNEL FROM STA. 0+00 THROUGH 0+50. ALL OF THE SECTIONS FOLLOW THIS CONVENTION.

NOT FOR CONSTRUCTION

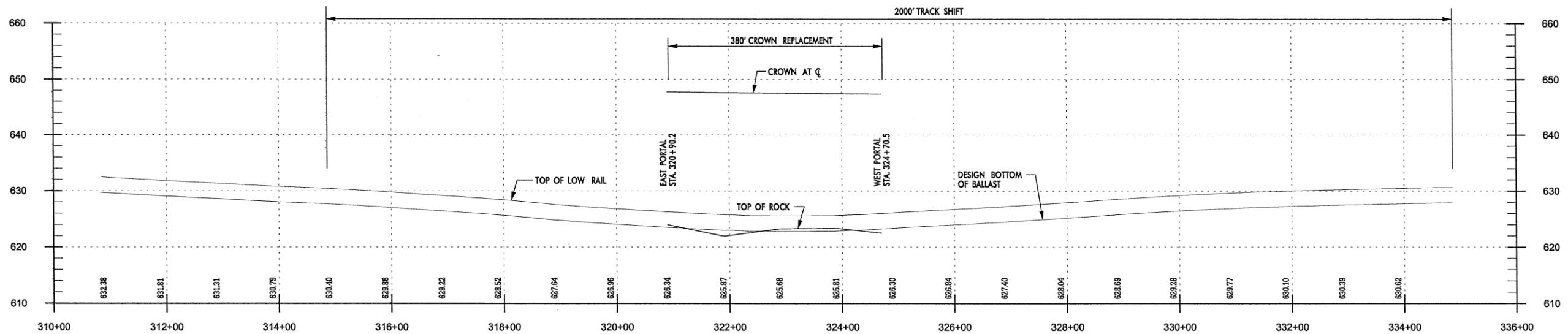
SCALE: 1" = 100'



PI	DJL	8/5/05	PRELIMINARY ENGINEERING PHASE REPORT
REV	BY	DATE	DESCRIPTION
LOCATION			BIG SANDY NO. 2, GREY EAGLE, WV
TITLE			TUNNEL CLEARANCE CROSS SECTIONS - 1 OF 1
DESIGN	FILE NO.	16565 & 16566	MILE POST NA-6.02
OPERATING DIVISION	DRAWING NUMBER		
OFFICE OF THE CHIEF ENGINEER - DESIGN AND CONSTRUCTION - ATLANTA, GA.	DATE	APRIL 29, 2005	



**BIG SANDY NO. 2 PLAN**  
SCALE: 1"=100'



**BIG SANDY NO. 2 PROFILE**  
SCALE: 1"=100' HORIZ.  
1"=10' VERT.

**NOT FOR CONSTRUCTION**

FILE NAME = P:\NORFOLK\_SOUTHERN\Survey\Info\005\03 Big Sandy No. 2.dgn  
DATE/TIME = 10/12/2005 03:44:23 PM

SCALE: 1"=100'



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

PROJECT NO.	P2 D/L/101405	REPORT TITLE	PRELIMINARY ENGINEERING PHASE REPORT
DATE	8/19/05	REPORT TITLE	PRELIMINARY ENGINEERING PHASE REPORT
LOCATION	BIG SANDY NO. 2 TUNNEL, GREY EAGLE, WV		
TITLE	PLAN AND PROFILE		
DWG NO.	16565 & 16566	WILE POST	NA-6.02
DATE	APRIL 29, 2005	DRAWING NUMBER	

BIG SANDY NO. 2 CURVE DATA

Description:  
Style:  
Input Factor: 1.0000

STATION      NORTHING      EASTING

Element: Linear  
POB ( 1 )      310+83.33      308927.42      1560551.07  
TS ( 2 )      314+79.24      309122.13      1560206.35  
Tangent Direction: 299°27'36"  
Tangent Length: 395.91

Element: Clothoid  
TS ( 2 )      314+79.24      309122.13      1560206.35  
SPI ( 4 )      316+29.13      309195.85      1560075.84  
SC ( 5 )      317+03.91      309240.23      1560015.39  
Entrance Radius: 0.00  
Exit Radius: 942.42  
Length: 224.67  
Angle: 6°49'46" Right  
Constant: 460.15  
Long Tangent: 149.89  
Short Tangent: 74.99  
Long Chord: 224.53  
Xs: 224.35  
Ys: 8.92  
P: 2.23  
K: 112.28  
Tangent Direction: 299°27'36"  
Radial Direction: 29°27'36"  
Chord Direction: 301°44'10"  
Radial Direction: 36°17'22"  
Tangent Direction: 306°17'22"

Element: Circular  
SC ( 5 )      317+03.91      309240.23      1560015.39  
PI ( 6 )      318+92.24      309351.70      1559863.59  
CC ( 6 )      309999.86      1560573.18  
PCC ( )      320+75.50      309512.94      1559766.29  
Radius: 942.42  
Delta: 22°36'06" Right  
Degree of Curvature(Chord): 6°04'57"  
Length: 371.76  
Length(Chorded): 371.59  
Tangent: 188.33  
Chord: 369.35  
Middle Ordinate: 18.27  
External: 18.63  
Tangent Direction: 306°17'22"  
Radial Direction: 36°17'22"  
Chord Direction: 317°35'25"  
Radial Direction: 58°53'28"  
Tangent Direction: 328°53'28"

Element: Circular  
PCC ( )      320+75.50      309512.94      1559766.29  
PI ( )      323+30.35      309731.14      1559634.62  
CC ( )      310016.45      1560600.67  
PCC ( )      325+73.82      309985.87      1559626.62  
Radius: 974.53  
Delta: 29°18'39" Right  
Degree of Curvature(Chord): 5°52'55"  
Length: 498.54  
Length(Chorded): 498.32  
Tangent: 254.85  
Chord: 493.12  
Middle Ordinate: 31.71  
External: 32.77  
Tangent Direction: 328°53'28"  
Radial Direction: 58°53'28"  
Chord Direction: 343°32'47"  
Radial Direction: 88°12'07"  
Tangent Direction: 358°12'07"

BIG SANDY NO. 2 CURVE DATA CONT.

Element: Circular  
PCC ( )      325+73.82      309985.87      1559626.62  
PI ( )      329+44.42      310356.29      1559614.99  
CC ( )      310015.35      1560565.80  
CS ( )      332+79.48      310634.92      1559859.35

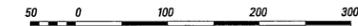
Radius: 939.64  
Delta: 43°02'57" Right  
Degree of Curvature(Chord): 6°06'02"  
Length: 706.00  
Length(Chorded): 705.67  
Tangent: 370.60  
Chord: 689.51  
Middle Ordinate: 65.53  
External: 70.44  
Tangent Direction: 358°12'07"  
Radial Direction: 88°12'07"  
Chord Direction: 19°43'35"  
Radial Direction: 131°15'04"  
Tangent Direction: 41°15'04"

Element: Clothoid  
CS ( )      332+79.48      310634.92      1559859.35  
SPI ( )      333+79.73      310710.28      1559925.45  
ST ( )      335+79.48      310837.94      1560079.75  
Entrance Radius: 939.64  
Exit Radius: 0.00  
Length: 300.00  
Angle: 9°08'47" Right  
Constant: 530.94  
Long Tangent: 200.27  
Short Tangent: 100.24  
Long Chord: 299.66  
Xs: 299.24  
Ys: 15.93  
P: 3.99  
K: 149.87  
Tangent Direction: 41°15'04"  
Radial Direction: 131°15'04"  
Chord Direction: 47°20'58"  
Radial Direction: 140°23'51"  
Tangent Direction: 50°23'51"

FILE NAME = F:\NSR\210398\CAD\survey info\006.02 Big Sandy No. 2\6.02 Big Sandy No. 2 curve data.dgn  
DATE/TIME = 02/22/2005 01:22:05 PM

NOT FOR CONSTRUCTION

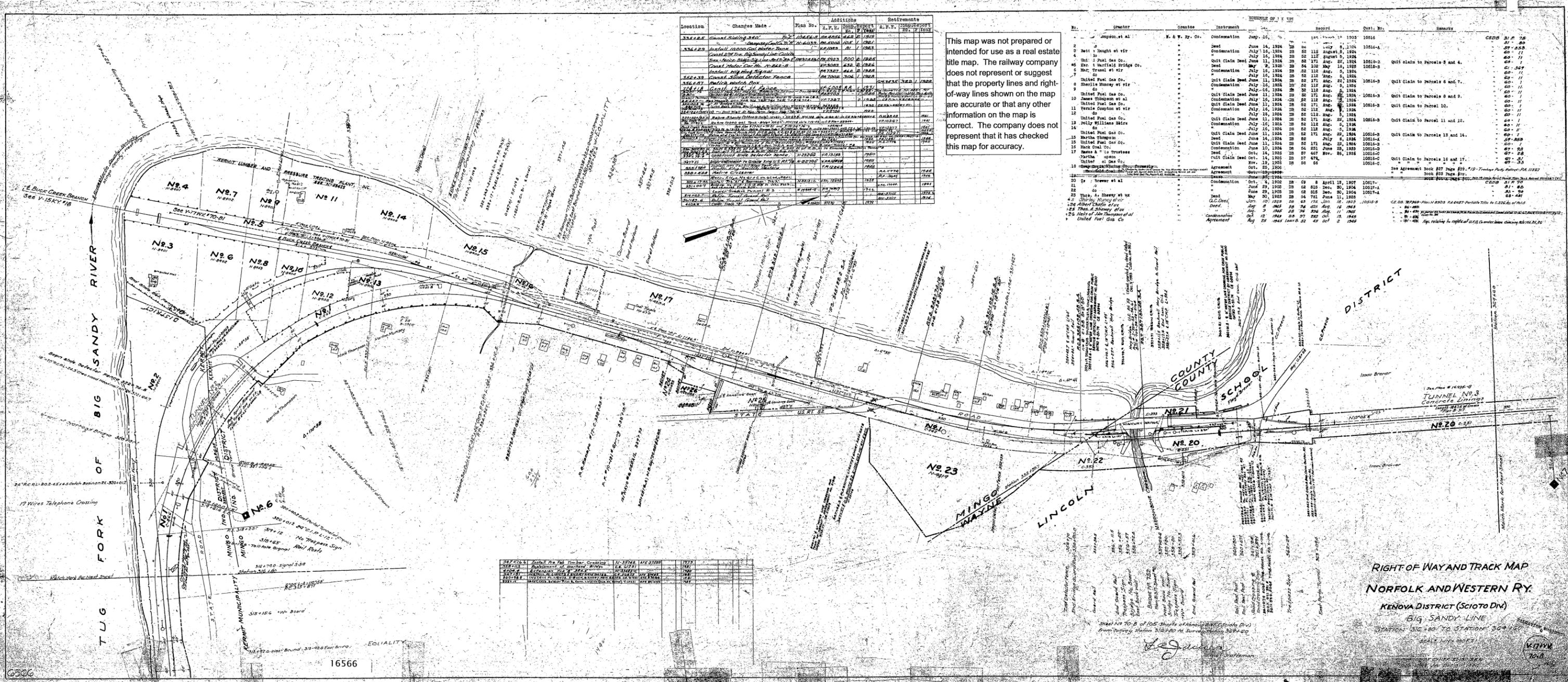
SCALE: 1" = 100'



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

PI	DJI	8/19/05	PRELIMINARY ENGINEERING PHASE REPORT
REV	BY	DATE	DESCRIPTION
LOCATION			
BIG SANDY NO. 2 TUNNEL, GREY EAGLE, WV			
TITLE			
CURVE DATA			
DSN	PTD NO.	WYN	16565 & 16566 MILE POST NA-6.02
DWN	FILE NO.	DRAWING NUMBER	
CHK	DATE	APRIL 29, 2005	





Location	Changes Made	PLAN No.	Additions		Retirements	
			DATE	BY	DATE	BY
334.4.2.1	General Survey 344.2.1	344.2.1	1902	1902		
334.4.2.2	Install 1000 Gal. Water Tank	344.2.2	1902	1902		
334.4.2.3	Install 1000 Gal. Water Tank	344.2.3	1902	1902		
334.4.2.4	Install 1000 Gal. Water Tank	344.2.4	1902	1902		
334.4.2.5	Install 1000 Gal. Water Tank	344.2.5	1902	1902		
334.4.2.6	Install 1000 Gal. Water Tank	344.2.6	1902	1902		
334.4.2.7	Install 1000 Gal. Water Tank	344.2.7	1902	1902		
334.4.2.8	Install 1000 Gal. Water Tank	344.2.8	1902	1902		
334.4.2.9	Install 1000 Gal. Water Tank	344.2.9	1902	1902		
334.4.2.10	Install 1000 Gal. Water Tank	344.2.10	1902	1902		
334.4.2.11	Install 1000 Gal. Water Tank	344.2.11	1902	1902		
334.4.2.12	Install 1000 Gal. Water Tank	344.2.12	1902	1902		
334.4.2.13	Install 1000 Gal. Water Tank	344.2.13	1902	1902		
334.4.2.14	Install 1000 Gal. Water Tank	344.2.14	1902	1902		
334.4.2.15	Install 1000 Gal. Water Tank	344.2.15	1902	1902		
334.4.2.16	Install 1000 Gal. Water Tank	344.2.16	1902	1902		
334.4.2.17	Install 1000 Gal. Water Tank	344.2.17	1902	1902		
334.4.2.18	Install 1000 Gal. Water Tank	344.2.18	1902	1902		
334.4.2.19	Install 1000 Gal. Water Tank	344.2.19	1902	1902		
334.4.2.20	Install 1000 Gal. Water Tank	344.2.20	1902	1902		
334.4.2.21	Install 1000 Gal. Water Tank	344.2.21	1902	1902		
334.4.2.22	Install 1000 Gal. Water Tank	344.2.22	1902	1902		
334.4.2.23	Install 1000 Gal. Water Tank	344.2.23	1902	1902		

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.

No.	Grantor	Grantee	Instrument	Record	Date	Dist. No.	Remarks
1	Union et al.	H. & W. Ry. Co.	Condemnation	July 16, 1902	1902	10516	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
2	West & Hought et vir		Deed	June 14, 1904	1904	10516-1	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
3	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-2	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
4	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-3	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
5	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-4	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
6	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-5	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
7	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-6	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
8	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-7	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
9	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-8	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
10	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-9	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
11	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-10	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
12	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-11	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
13	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-12	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
14	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-13	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
15	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-14	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
16	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-15	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
17	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-16	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
18	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-17	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
19	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-18	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
20	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-19	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
21	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-20	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
22	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-21	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322
23	United Fuel Gas Co.		Condemnation	July 16, 1904	1904	10516-22	See Agreement Book 227 Page 459. P.O. Transfer Public Authority No. 11322

**RIGHT OF WAY AND TRACK MAP**  
**NORFOLK AND WESTERN RY.**  
**KENOVA DISTRICT (SCIOTO DIV.)**  
**BIG SANDY LINE**  
 STATION 312+80 TO STATION 304+100