

# **COST OF TRAIL AT EXCURSION TRAIN PINCH POINTS**

## **White Paper**

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9/28/05

### **1.0 Summary**

To accommodate a Glenwood-Orrison excursion train, there are 3000 feet of pinch points forcing off road bed construction of the trail between 23rd Street and Orrison. Pinch points are defined as wetlands and places where the trail costs 30% more off than on the railroad bed.

The RFTA estimated cost of \$800,000 for building the trail off the roadbed at these pinch points is unfounded. In the trail sections where banking presents problems, there is no need to excavate and build retaining walls. An elevated boardwalk can be built on the surface with minimal environmental impact. It is faster and less expensive than an asphalt trail. Using boardwalks, the trail cost at pinch points can be reduced to \$52/ft which is considerably less than the RFTA cost, avoiding pinch points, of \$75/ft.

Boardwalks can also be used in wetlands. The conclusions reached for the Glenwood-Orrison route in this paper apply to the entire Glenwood-Carbondale route. There is no added cost for a parallel trail along the entire route.

## 2.0 Trail Cost

RFTA trail construction cost for the section from Glenwood Springs to Carbondale is \$74.55/ft. The cost is calculated from the RFTA Full Board Report 4/15/05 (see Appendix A). The cost assumes the trail is built on the rail bed at pinch points. It is obtained by taking the report's Glenwood Springs to Carbondale trail section cost of \$4,145,196 (a.) divided by its length of 55,600 linear feet (m.).

In the trail sections where banking presents problems, there is no need to excavate and build retaining walls and drainage. An elevated boardwalk can be built on the bank with minimal environmental impact. Costs for several board walk solutions are presented in Section 3 below. Three costs are in the \$52/ft range and well below the \$75/ft estimated by RFTA. The costs are conservatively calculated with a built in contingency factor.

For an excursion train to travel the 3.25 miles from 23rd street to Orrison four pinch points will be encountered. The trail is currently planned on the road bed at these points, but must be moved off road bed for an excursion train. RFTA plans call for an alternative off bed trail on the West side of the road bed at these points. A discussion of each of the pinch points and alternative solutions incurring no additional costs are given in Section 4.

### 3.0 Pier/Boardwalk Cost

In the trail sections where banking presents problems for the alternative off road bed trail, there is no need to excavate and build retaining walls and drainage. An elevated boardwalk can be built on the bank with minimal environmental impact. It is faster and less expensive than an asphalt trail. Costs for several boardwalk solutions were considered and summarized in the table below. Three costs come in at \$52/ft and are well below the \$75/ft estimated by RFTA.

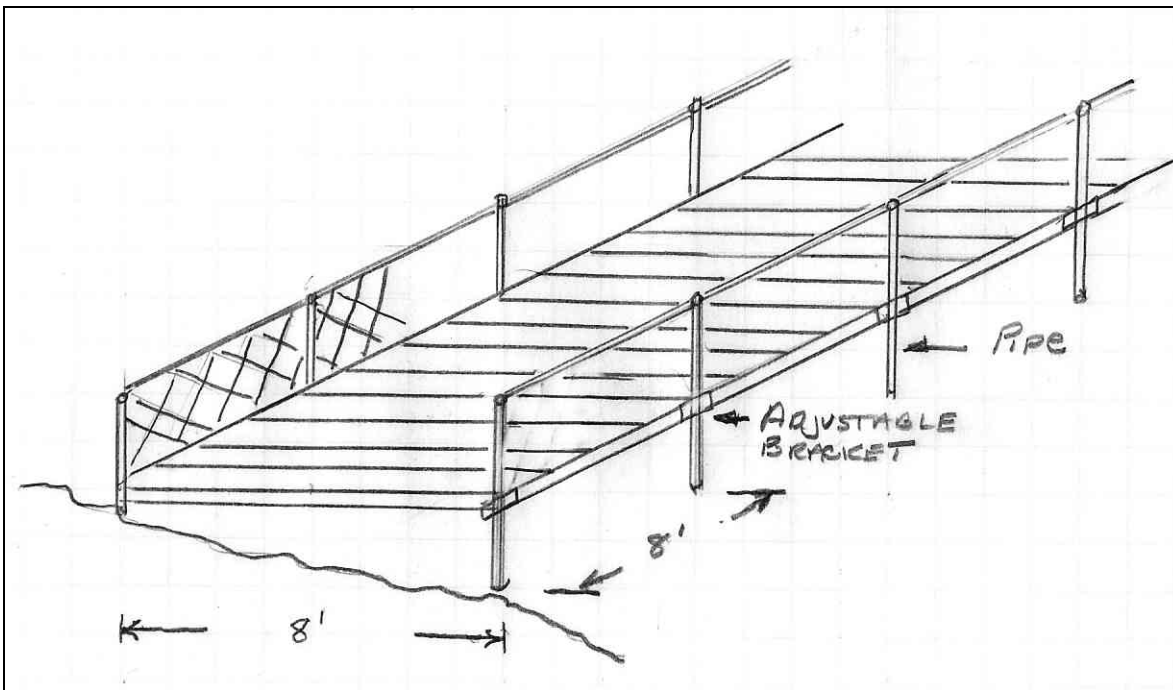
Materials considered have been chosen because they have a life expectancy of 15 to 25 years, require a minimum of maintenance, and provide a suitable trail surface. These costs include the decking, supports, fence, and labor required for an installed boardwalk. The work sheet used to calculate the costs is presented in Appendix B.

The costs are conservatively calculated and contain a built in contingency factor. The material costs have not been put out for bid and will come down considerably. The labor cost has been intentionally estimated on the high side.

Other cost saving solutions exist I am sure. The boardwalk approach demonstrates that there is at least one alternative which doesn't lead to increased cost.

#### Total Pier/Boardwalk Costs (Deck + support + fence + labor)

	deck	supports	railing	labor	cost	price/ft
Composite Bearboard	314.08	98.56	48.72	120.00	581.36	72.67
Composite Yakima	151.52	98.56	48.72	120.00	418.80	52.35
Cedar	156.32	98.56	48.72	120.00	423.60	52.95
Pressure Treated	146.08	98.56	48.72	120.00	413.36	51.67
Aluminum	448.00	98.56	48.72	120.00	715.28	89.41



## 4.0 Pinch Points

### 4.1 Discussion

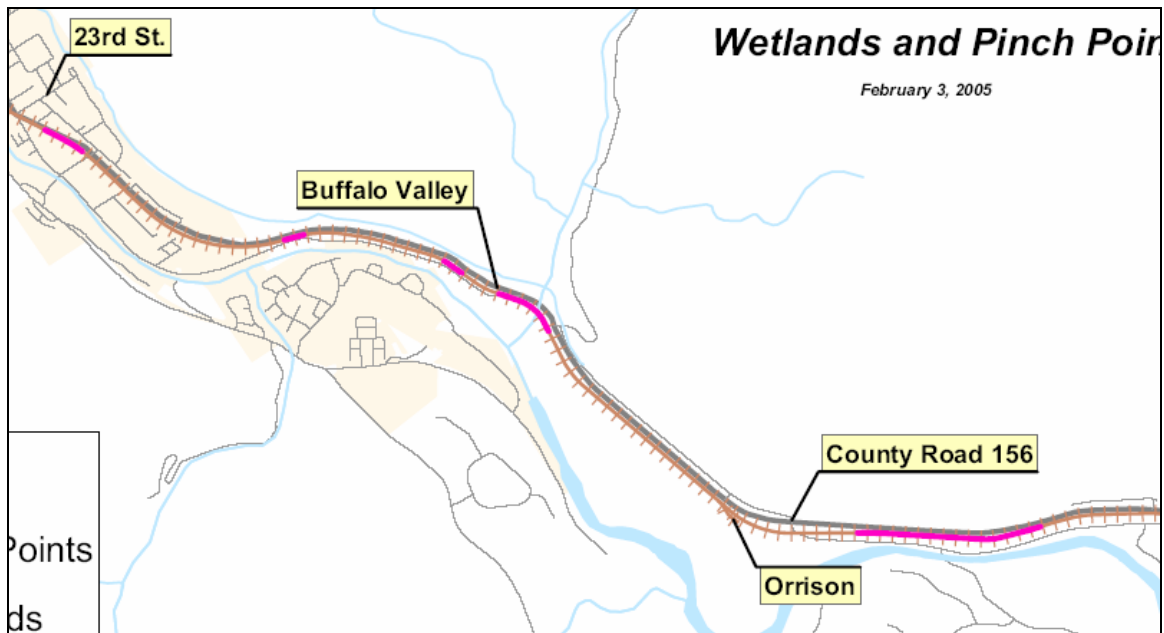
It is believed RFTA presented an absolute cost for relocation off the rail bed. The figure did not subtract out the cost of building the trail on the road bed to give the incremental cost for preserving the rails.

Regardless of what happens with an excursion train, the rails will not be salvaged between 23rd and 27th and the trail will be built off the rail bed. It is believed that RFTA incorrectly credited this cost to the excursion train.

However, the RFTA estimate did not take into account a boardwalk alternative. At each of the pinch points the additional costs for trail construction can be eliminated by applying combinations of boardwalks and asphalt construction.

The four pinch points are discussed in the subsections below.

### 4.2 Map



### 4.3 23rd to 27th - 1000 feet

The south 1000 feet of this section approaching the 27th street intersection is a pinch point. The west side is banked at least 5' and the right of way is only 25' wide on the West side. The alternative off road bed trail is proposed on the West side and requires banking and filling. A board walk trail can be built on the bank without disturbing it. Here the fencing on the boardwalk separates and isolates the trail user from the buildings on the West.



27 St intersection looking North



Looking South to 27th St

### 4.4 Flour Mill Siding (Rader) - 400 feet

This pinch point is located to the South of the Cemetery on CR 154 where the road curves and the railroad is embanked with 8 foot retaining walls along the West side of the road which comes within 25 feet of the railroad. RFTA has no alternative off road bed trail planned at this point on its map. There is room a boardwalk on the West side of the road bed. At several critical points it will have to be placed close to the rails. Here the fence provided with the boardwalk protects the trail users. Note separation of rails and trails with fencing has been used in Glenwood Springs just south of the wye.



Rader looking south



Rader looking south

**4.5 Piffer - 400 feet**

This pinch point is at the next curve of CR 154 past the Flour Mill Siding, on the West side across from the Piffer property. Here the railroad comes within 50 feet of the road. It is not clear why the trail has been moved on the road bed; however there is room for the trail. Although it appears on the map to present no significantly different construction problems the terrain is rougher. A boardwalk can be easily constructed over the rough terrain.



Piffer looking south



Piffer looking south

**4.6 Holy Cross - 1200 ft**

This pinch point centers about the entrance to Holy Cross's facilities. The railroad is on a high bank, about 15 feet on the West side where the right of way is only 25 feet wide. The off rail bed proposed trail will go along the West side at the very bottom of the steep bank where retaining wall will have to be built. A board walk trail can be build on the bank without disturbing it.



Holy Cross looking north



Holy Cross looking south

**Appendix A:**

**RFTA Full Board Report  
4/14/05**

**Chart 1: Est'd Net Salv of Tracks, etc. by Section**

	Glenwood to Carbondale	Carbondale to Catherine Store	Catherine Store to Hooks Lane	Hooks Lane to Woody Creek
Miles	10.5	2.8	4.6	5.1
Linr Ft exposed	55,600	15,000	24,200	26,976
Est' Net Salv	\$780,000	\$95,201	\$153,590	\$171,209
Avg\$ per Linr Ft	14.03	6.35	6.35	6.35

**Chart 2: Est'd Net Salv of Tracks, etc. at Pinch Points and Wetlands Only**

	Glenwood to Carbondale Pinch Points & Wetlands	Carbondale to Catherine Store Pinch Points & Wetlands	Catherine Store to Hooks Lane Pinch Points & Wetlands	Glenwood to Hooks Lane Pinch Points & Wetlands
Linr Ft over rails	13,850	6,900	22,300	43,050
Val per Linr Ft	\$14.16	\$6.35	\$6.35	\$8.86
Est'd Net Salv	\$196,062	\$43,792	\$141,532	\$381,386
RFTA Salv Cost	\$138,500	\$115,000	\$310,500	\$564,000
Total Salvage and RFTA cost	\$334,562	\$158,792	\$452,032	\$945,386

**Chart 3: Estimate of Trail Construction Costs in 2005 \$'s**

	Glenwood to Carbondale	Carbondale to Catherine Store	Catherine Store to Hooks Lane	Glenwood to Hooks Total
a.Trail off Rail Bed	\$7,367,462	\$1,767,190	\$4,240,000	\$13,374,651
b.Trail on @ pp&w	\$4,145,196	\$1,014,828	\$1,804,662	\$6,964,687
Trail on Rail Bed	\$2,660,558	\$810,836	\$1,269,132	\$4,740,526

## Appendix B:

### Boardwalk Worksheet

#### Total Pier/Boardwalk Costs (Deck + support + fence + labor)

	deck	supports	railing	labor	cost	price/ft
Composite Bearboard	314.08	98.56	48.72	120.00	581.36	72.67
Composite Yakima	151.52	98.56	48.72	120.00	418.80	52.35
Cedar	156.32	98.56	48.72	120.00	423.60	52.95
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Aluminum	448.00	98.56	48.72	120.00	715.28	89.41

	pieces	length	bd ft	price/ft	cost	wt/ft	weight
<b>Deck Section using Bearboard</b>							
deck composite 5/4x6	16	8	128	1.89	241.92	1.7	218
2x6 pt on 12"c	11	8	88	0.82	72.16	1.26	111
Total				39.26	314.08		329

<b>Deck Section using Yakima</b>							
decking Yakima 1 x 5.5	16	8	128	0.62	79.36	1.83	234
2x6 pt on 12"c	11	8	88	0.82	72.16	1.26	111
Total				18.94	151.52		345

<b>Deck Section using cedar</b>							
Durable, few splinter, little warp/twist, doesn't need treating, 15-25 years, light at 22#/cuft							
deck cedar 5/4x6	16	8	128	0.76	97.28	0.84	108
2x6pt on 16"c	9	8	72	0.82	59.04	2.20	158
Total				19.54	156.32		266

<b>Deck Section using pressure treated</b>							
deck pt 5/4x6	16	8	128	0.68	87.04	1.7	218
2x6 pt on 16"c	9	8	72	0.82	59.04	2.2	158
Total				18.26	146.08		376

<b>Deck Section Aluminum</b>							
waiting for response to RFP							
LockDry \$5000 for 500ft2 70% material			8	56.00	448.00		
<a href="http://www.lockdry.com/">http://www.lockdry.com/</a>							

	pieces	length	bd ft	price/ft	cost	wt/ft	weight
<b>Support - posts</b>							
4x4pt post	2	8	16	0.90	14.40		
2x6pt cross	1	8	8	0.82	6.56		
Adl Bracket			2	20.00	40.00		
Total				7.62	60.96		

<b>Support - pipe</b>							
2" galv pipe	2	8	16	3.25	52.00		
2x6pt cross	1	8	8	0.82	6.56		
adj bracket			2	20.00	40.00		
Total				12.32	98.56		

#### Fence/Railing

Fence 4'	1	8	8	1.24	9.92
top rail	2	8	16	1.80	28.80
rail brackets			4	2.50	10.00
Total				6.09	48.72

**Labor**

Deck			1	20.00	20.00
Transport			1	20.00	20.00
dig holes			3	20.00	60.00
mount deck			1	20.00	20.00
Total				15	120

	pieces	length	bd ft	price/ft	cost	wt/ft	weight
<b>Deck Platform Alternatives</b>							
2x6pt on 12" centers	11	8	88	0.82	72.16	2.2	194
Total				9.02	72.16		

Recommended for composite materials

2x6 pt on 16" centers	9	8	72	0.82	59.04	2.2	158
Total				7.38	59.04		158

Most cost efficient solution

2x6 cedar on 12" centers	11	8	88	1.12	98.56	1.47	129
Total				12.32	98.56		129

Environmentally friendly solution, light weight, for composite

2x6 cedar on 16" centers	9	8	72	1.12	80.64	1.47	106
Total				10.08	80.64		106

Environmentally friendly solution, light weight

2x8 pt box	5	8	40	1.12	44.80	2.9	116
w/ 2x6 pt on 16" centers	4	8	32	0.82	26.24	2.2	70
Total				8.88	71.04		186

Heavy duty solution if needed, but not included in costing exercise

<b>Material (\$/ft)</b>	Lowes	BMC	BigJ	EPS	BldDir	wt/ft
5/4pt	0.68	1.17	1.43		0.62	1.7
2x6pt	0.82	0.9	1.1			2.2
2x8pt	1.12					2.9
4x4 pt		0.9				4
5/4 bearboard				1.89		1.7
2x6				2.39		2.2
4x4				3.99		4
5/4 cedar					0.76	0.84
2x6					1.12	1.47
4x4					1.76	1.87
Fence - chain link			1.24			
top rail - chain link			1.8			
2" galv pipe		3.25				