

**Appendix B. Stream crossings summary**

Crossing ID: Purcell  
 Crossing Type: Culvert  
 Location: Amelia Co.  
 Installation: Good  
 Approach: Fair

GPS Coordinates (Latitude, Longitude): 37.251°N, 77.992°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 139.9  
 Watershed: 80.7 acres  
 Rosgen Classification: E4

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	6/6/07	Purcell	Culvert	Permanent haul road	0.0011	0.0050	0.5000	1.2000
After Installation-Before harvest	6/20/07	Purcell	Culvert	Permanent haul road	102.8704	37.3959	34.5000	15.0000
During Harvest	8/10/07	Purcell	Culvert	Permanent haul road	126.1109	43.8312	51.8000	22.5000
After Harvest	10/4/07	Purcell	Culvert	Permanent haul road	71.2388	14.2140	48.8000	19.5000

Time During Harvest	Date Sampled	Crossing	Stream Position	TDS (ppm)	pH	Conductivity (µS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	6/6/07	Culvert	Above	252	7.4	365	67.1	110
Before install.	6/6/07	Culvert	Below	289	7.38	428	66.3	82
After install./Before harvest	6/20/07	Culvert	Above	1460	7.51	2090	74.3	100
After install./Before harvest	6/20/07	Culvert	Below	349	7.85	494	76.1	71
During harvest	8/10/07	Culvert	Above	209	7.47	299	82.7	142
During harvest	8/10/07	Culvert	Below	205	7.51	293	85.2	111
After harvest	10/4/07	Culvert	Above	626	7.21	893	67.4	190
After harvest	10/4/07	Culvert	Below	635	7.52	904	68.5	137



Figure A1. Purcell culvert crossing during harvest.



Figure A2. Culvert crossing with a variety of BMPs.

Crossing ID: Briery Creek  
 Crossing Type: Culvert  
 Location: Prince Edward Co.  
 Installation: Good  
 Approach: Good

GPS Coordinates (Latitude, Longitude): 37.228°N, 78.426°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 377.67  
 Watershed: 94.4 acres  
 Rosgen Classification: E6

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	6/28/06	Briery Creek	Culvert	Permanent haul road	4.7087	12.9399	39.0200	39.1200
After Installation-Before harvest	7/14/06	Briery Creek	Culvert	Permanent haul road	0.7633	41.5425	32.3800	22.7400
During Harvest	7/24/06	Briery Creek	Culvert	Permanent haul road	39.3788	45.4732	14.0800	15.8300
After Harvest	9/29/06	Briery Creek	Culvert	Permanent haul road	0.1283	1.5396	15.0000	8.0500

Time During Harvest	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	6/28/06	Culvert	Above	5.99	6.05	8.6	77.1	107
Before install.	6/28/06	Culvert	Below	6.12	6.66	8.81	75.9	168
After install./Before harvest	7/14/06	Culvert	Above	6.62	7.26	9.49	75.5	105
After install./Before harvest	7/14/06	Culvert	Below	5.04	6.58	7.23	76.1	461
During harvest	7/24/06	Culvert	Above	6.54	7.25	9.41	74.4	1658
During harvest	7/24/06	Culvert	Below	5.04	6.83	7.23	76.1	0
After harvest	9/29/06	Culvert	Above	78.4	6.49	112.8	67.8	648
After harvest	9/29/06	Culvert	Below	78.6	6.43	111.1	66.7	25390



Figure A3. Culvert crossing and left approach after harvest.



Figure A4. Curl-Ex material and rock used during harvest

Crossing ID: Reynolds B<sub>A</sub>  
 Crossing Type: Culvert  
 Location: Pittsylvania Co.  
 Installation: Good  
 Approach: Poor

GPS Coordinates (Latitude, Longitude): 36.98919°N, 79.314°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 24.066  
 Watershed: 206.4 acres  
 Rosgen Classification: E5b

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	4/18/07	Reynolds B <sub>A</sub>	Culvert	Permanent haul road	0.0130	0.0174	4.5600	6.0800
After Installation-Before harvest	5/1/07	Reynolds B <sub>A</sub>	Culvert	Permanent haul road	38.5860	41.3027	42.0900	34.3200
During Harvest	5/7/07	Reynolds B <sub>A</sub>	Culvert	Permanent haul road	33.0012	20.4544	42.0900	38.4900
After Harvest	8/10/07	Reynolds B <sub>A</sub>	Culvert	Permanent haul road	137.8768	96.6215	42.0900	38.4900

Time During Harvest	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	4/18/07	Culvert	Above	20.7	6.71	31.2	57.9	44
Before install.	4/18/07	Culvert	Below	33.7	7.25	48	60.8	37
After install./Before harvest	5/1/07	Culvert	Above	88.7	6.55	151	70.3	17
After install./Before harvest	5/1/07	Culvert	Below	64.4	6.71	87.7	72.3	0
During harvest	5/7/07	Culvert	Above	179	6.49	257	62.6	51
During harvest	5/7/07	Culvert	Below	1560	6.56	2.24	62.4	70
After harvest	8/10/07	Culvert	Above	197	6.63	279	68.1	7
After harvest	8/10/07	Culvert	Below	252	6.61	356	70.3	3



Figure A5. Double corrugated culvert pipes.



Figure A6. Partial gravel application on left approach.

Crossing ID: Reynolds B<sub>B</sub>  
 Crossing Type: Culvert  
 Location: Pittsylvania Co.  
 Installation: Good  
 Approach: Poor

GPS Coordinates (Latitude, Longitude): 36.9876°N, 79.314°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 160.78  
 Watershed: 250.8 acres  
 Rosgen Classification: E4b

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	4/18/07	Reynolds B <sub>B</sub>	Culvert	Permanent haul road	0.0046	0.0026	5.1200	3.9200
After Installation-Before harvest	5/10/07	Reynolds B <sub>B</sub>	Culvert	Permanent haul road	58.0504	0.2856	64.7000	1.7400
During Harvest	5/29/07	Reynolds B <sub>B</sub>	Culvert	Permanent haul road	235.1029	48.3417	59.8600	27.2500
After Harvest	8/10/07	Reynolds B <sub>B</sub>	Culvert	Permanent haul road	198.1874	49.3202	59.8600	27.2500

Time During Harvest	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	4/18/07	Culvert	Above	33.2	6.76	46.9	63.1	14
Before install.	4/18/07	Culvert	Below	23.2	6.77	33.4	63.6	13
After install./Before harvest	5/10/07	Culvert	Above	167	6.92	239	66.5	48
After install./Before harvest	5/10/07	Culvert	Below	164	6.91	237	67.2	60
During harvest	5/29/07	Culvert	Above	196	7.24	280	67.2	26
During harvest	5/29/07	Culvert	Below	236	7.24	337	67.4	25
After harvest	8/10/07	Culvert	Above	148	6.72	212	74.3	29
After harvest	8/10/07	Culvert	Below	1325	7.06	1892	74.4	21



Figure A7. 48-inch culvert pipes installed in Pittsylvania Co.



Figure A8. Right approach of culvert crossing.

Crossing ID: Blue Rock-Curdsville  
 Crossing Type: Culvert  
 Location: Buckingham Co.  
 Installation: Fair  
 Approach: Fair

GPS Coordinates (Latitude, Longitude): 37.41053°N, 78.42528°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 26.66  
 Watershed: 82.5 acres  
 Rosgen Classification: E6

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	6/5/07	Blue Rock-Curdsville	Culvert	Permanent haul road	8.5321	19.9034	7.0000	7.7000
After Installation-Before harvest	7/17/07	Blue Rock-Curdsville	Culvert	Permanent haul road	2.0169	21.2680	6.5000	7.7000
During Harvest	8/10/07	Blue Rock-Curdsville	Culvert	Permanent haul road	7.6476	22.3625	6.9000	9.8000
After Harvest	1/10/08	Blue Rock-Curdsville	Culvert	Permanent haul road	6.5200	4.4985	6.4000	4.2000

Time During Harvest	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	6/5/07	Culvert	Above	284	6.51	406	73.7	122
Before install.	6/5/07	Culvert	Below	315	6.99	437	76.2	19388
After install./Before harvest	7/17/07	Culvert	Above	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	7/17/07	Culvert	Below	N/A	N/A	N/A	N/A	N/A
During harvest	8/10/07	Culvert	Above	N/A	N/A	N/A	N/A	N/A
During harvest	8/10/07	Culvert	Below	N/A	N/A	N/A	N/A	N/A
After harvest	1/10/08	Culvert	Above	69.8	6.75	96.4	48.9	31
After harvest	1/10/08	Culvert	Below	84.8	6.7	141.2	51	19



Figure A9. Culvert crossing with water control structures.



Figure A10. Right approach during harvest to crossing.

Crossing ID: Altavista (Perrow)  
 Crossing Type: Culvert  
 Location: Campbell Co.  
 Installation: Fair  
 Approach: Fair

GPS Coordinates (Latitude, Longitude): 37.11680°N, 79.17235°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 137.68  
 Watershed: 19.0 acres  
 Rosgen Classification: F6b

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	8/11/07	Altavista (Perrow)	Culvert	Permanent haul road	0.0117	0.0319	5.2000	8.9000
After Installation-Before harvest	N/A	Altavista (Perrow)	Culvert	Permanent haul road	N/A	N/A	N/A	N/A
During Harvest	8/23/07	Altavista (Perrow)	Culvert	Permanent haul road	244.7200	163.0048	136.6000	128.6000
After Harvest	1/10/08	Altavista (Perrow)	Culvert	Permanent haul road	16.1271	9.5256	12.5000	10.5000

Time During Harvest	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	8/11/07	Culvert	Above	N/A	N/A	N/A	N/A	N/A
Before install.	8/11/07	Culvert	Below	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	N/A	Culvert	Above	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	N/A	Culvert	Below	N/A	N/A	N/A	N/A	N/A
During harvest	8/23/07	Culvert	Above	N/A	N/A	N/A	N/A	N/A
During harvest	8/23/07	Culvert	Below	N/A	N/A	N/A	N/A	N/A
After harvest	1/10/08	Culvert	Above	N/A	N/A	N/A	N/A	N/A
After harvest	1/10/08	Culvert	Below	N/A	N/A	N/A	N/A	N/A



Figure A11. Culvert crossing during harvest.



Figure A12. BMPs after harvest; gravel, seed, and silt fence.

Crossing ID: Purcell  
 Crossing Type: Ford  
 Location: Amelia Co.  
 Installation: Poor  
 Approach: Fair

GPS Coordinates (Latitude, Longitude): 37.254°N, 77.992°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 58.54  
 Watershed: 39.5 acres  
 Rosgen Classification: E5b

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	6/6/07	Purcell	Ford	Permanent haul road	1.5589	1.0029	10.8000	3.3000
After Installation-Before harvest	6/20/07	Purcell	Ford	Permanent haul road	0.5250	20.2955	2.7000	15.5000
During Harvest	8/10/07	Purcell	Ford	Permanent haul road	109.4601	26.9550	53.8000	18.7000
After Harvest	10/4/07	Purcell	Ford	Permanent haul road	77.3646	23.4508	47.4000	14.9000

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	6/6/07	Ford	Above	257	7.43	373	70.1	86
Before install.	6/6/07	Ford	Below	261	7.47	419	70.3	100
After install./Before harvest	6/20/07	Ford	Above	286	7.62	459	74.1	126
After install./Before harvest	6/20/07	Ford	Below	1470	7.58	2110	74.3	115
During harvest	8/10/07	Ford	Above	1339	7.51	1893	81.3	110
During harvest	8/10/07	Ford	Below	224	7.55	323	81.5	105
After harvest	10/4/07	Ford	Above	679	7.41	968	66.7	168
After harvest	10/4/07	Ford	Below	711	7.42	1010	66.5	115



Figure A13. Re-enforced ford stream crossing in Amelia Co.



Figure A14. Ford crossing from left approach after harvest.

Crossing ID: Kyanite  
 Crossing Type: Ford  
 Location: Charlotte Co.  
 Installation: Good  
 Approach: Good

GPS Coordinates (Latitude, Longitude): 37.0995°N, 78.8197°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 352.77  
 Watershed: 815.9 acres  
 Rosgen Classification: E4b

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	6/27/06	Kyanite	Ford	Temporary haul road	0.0748	0.0929	22.5700	27.6700
After Installation-Before harvest	7/24/06	Kyanite	Ford	Temporary haul road	11.1573	7.1113	25.3200	19.8500
During Harvest	8/17/06	Kyanite	Ford	Temporary haul road	0.0920	1.2998	24.6400	17.8400
After Harvest	9/29/06	Kyanite	Ford	Temporary haul road	0.2565	0.0635	19.2600	16.0500

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	6/27/06	Ford	Above	5.95	7.4	8.56	71.4	327
Before install.	6/27/06	Ford	Below	6.55	7.44	9.48	74	373
After install./Before harvest	7/24/06	Ford	Above	6.23	7.43	8.93	69.2	2096
After install./Before harvest	7/24/06	Ford	Below	6.88	7.74	10.1	70.8	279
During harvest	8/17/06	Ford	Above	6.29	7.52	8.97	65	126
During harvest	8/17/06	Ford	Below	6.37	7.52	9.07	70.1	85
After harvest	9/29/06	Ford	Above	5.45	7.23	7.95	62.9	60
After harvest	9/29/06	Ford	Below	5.92	7.24	8.51	65.3	67



Figure A15. Re-enforced ford with logging mat during use.

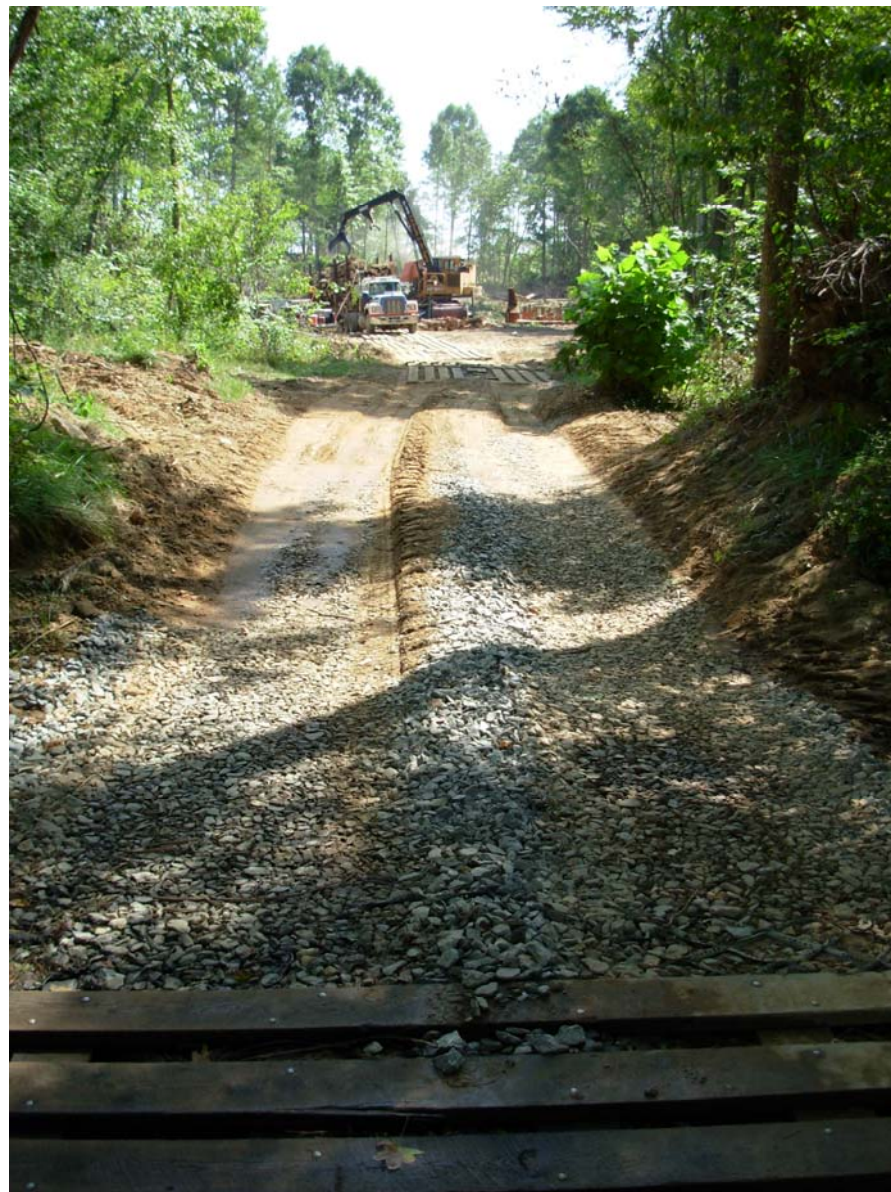


Figure A16. Right approach of ford crossing.

Crossing ID: Nicholson  
 Crossing Type: Ford  
 Location: Fluvanna Co.  
 Installation: Good  
 Approach: Poor

GPS Coordinates (Latitude, Longitude): 37.7360°N, 78.3499°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 787.76  
 Watershed: 3,216+ acres  
 Rosgen Classification: E4

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	8/31/07	Nicholson	Ford	Permanent haul road	7.7343	6.1262	63.1000	44.5000
After Installation-Before harvest	N/A	Nicholson	Ford	Permanent haul road	N/A	N/A	N/A	N/A
During Harvest	11/2/07	Nicholson	Ford	Permanent haul road	33.2507	8.2399	13.1000	8.7000
After Harvest	2/29/08	Nicholson	Ford	Permanent haul road	14.9465	7.7249	13.1000	8.7000

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (µS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	8/31/07	Ford	Above	566	7.43	794	74.1	54
Before install.	8/31/07	Ford	Below	560	7.33	801	72.6	39
After install./Before harvest	N/A	Ford	Above	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	N/A	Ford	Below	N/A	N/A	N/A	N/A	N/A
During harvest	11/2/07	Ford	Above	740	6.87	1059	49.8	43
During harvest	11/2/07	Ford	Below	741	6.96	1059	49.8	39
After harvest	2/29/08	Ford	Above	54.5	7.62	78	43.3	35
After harvest	2/29/08	Ford	Below	62.7	7.58	91.1	45.6	31



Figure A17. Ford stream crossing on Bremono Creek (Fluvanna Co).



Figure A18. Left approach with a 20% grade.

Crossing ID: Crummett  
 Crossing Type: Ford  
 Location: Fauquier Co.  
 Installation: Fair  
 Approach: Good

GPS Coordinates (Latitude, Longitude): 38.74720°N, 77.98936°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 577.59  
 Watershed: 6,388+ acres  
 Rosgen Classification: C3

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	8/6/07	Crummett	Ford	Permanent haul road	1.2785	3.8957	2.6000	3.3000
After Installation-Before harvest	N/A	Crummett	Ford	Permanent haul road	N/A	N/A	N/A	N/A
During Harvest	1/11/08	Crummett	Ford	Permanent haul road	4.7969	3.0434	4.9000	6.8000
After Harvest	N/A	Crummett	Ford	Permanent haul road				

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	8/6/07	Ford	Above	217	6.99	311	75.9	73
Before install.	8/6/07	Ford	Below	225	6.95	326	76.1	69
After install./Before harvest	N/A	Ford	Above	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	N/A	Ford	Below	N/A	N/A	N/A	N/A	N/A
During harvest	1/11/08	Ford	Above	102.5	7.69	146.5	49.2	58
During harvest	1/11/08	Ford	Below	109.4	7.65	156	49.4	62
After harvest	N/A	Ford	Above					
After harvest	N/A	Ford	Below					

\*Note: This crossing was still active at the end of the study. This data was not used in analysis due to being incomplete.



Figure A19. Ford crossing on Thumb Run (Fauquier Co.)



Figure A20. Photo of Thumb Run upstream from ford.

Crossing ID: Pearson  
 Crossing Type: Pole Bridge  
 Location: Buckingham Co.  
 Installation: Poor  
 Approach: Good

GPS Coordinates (Latitude, Longitude): 37.468°N, 78.613°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 131.57  
 Watershed: 3.0 acres  
 Rosgen Classification: E4

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	2/10/07	Pearson	Pole Bridge	Skid trail	0.0074	0.0045	4.7500	3.0300
After Installation-Before harvest	2/20/07	Pearson	Pole Bridge	Skid trail	0.0043	0.0602	0.0000	1.8800
During Harvest	2/27/07	Pearson	Pole Bridge	Skid trail	5.2790	5.0119	32.1600	30.2100
After Harvest	3/6/07	Pearson	Pole Bridge	Skid trail	0.0941	0.8260	17.3900	23.9500

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	2/10/07	Pole Bridge	Above	34.3	6.96	49.5	41.5	75
Before install.	2/10/07	Pole Bridge	Below	33.5	7.01	48	42	55
After install./Before harvest	2/20/07	Pole Bridge	Above	34.8	6.82	50.1	51	12
After install./Before harvest	2/20/07	Pole Bridge	Below	48.3	6.4	68.9	53.7	309
During harvest	2/27/07	Pole Bridge	Above	35.7	6.5	51.3	50.5	14
During harvest	2/27/07	Pole Bridge	Below	42.2	6.75	58.9	50	54
After harvest	3/6/07	Pole Bridge	Above	46.9	6.78	92.4	46.9	39
After harvest	3/6/07	Pole Bridge	Below	49.7	6.76	72.1	45.3	24



Figure A21. Pole bridge crossing after installation.



Figure A22. Pole bridge approaches after road closure.

Crossing ID: Winterstein  
 Crossing Type: Pole Bridge  
 Location: Buckingham Co.  
 Installation: Poor  
 Approach: Good

GPS Coordinates (Latitude, Longitude): 37.697°N, 78.359°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 463.77  
 Watershed: 24.1 acres  
 Rosgen Classification: E5

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	2/10/07	Winterstein	Pole Bridge	Skid trail	0.2970	0.0652	5.5500	4.5600
After Installation-Before harvest	N/A	Winterstein	Pole Bridge	Skid trail	N/A	N/A	N/A	N/A
During Harvest	2/20/07	Winterstein	Pole Bridge	Skid trail	0.2732	1.5953	9.5200	5.6300
After Harvest	3/6/07	Winterstein	Pole Bridge	Skid trail	2.5977	7.5479	3.3300	4.7200

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	2/10/07	Pole Bridge	Above	24.6	7	37.3	38.8	162
Before install.	2/10/07	Pole Bridge	Below	20.6	6.9	29.2	35.6	75
After install./Before harvest	N/A	Pole Bridge	Above	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	N/A	Pole Bridge	Below	N/A	N/A	N/A	N/A	N/A
During harvest	2/20/07	Pole Bridge	Above	29.5	7.09	44.4	47.3	4
During harvest	2/20/07	Pole Bridge	Below	33.6	7.18	48.5	47.6	54
After harvest	3/6/07	Pole Bridge	Above	21.7	6.44	31.7	48.7	20
After harvest	3/6/07	Pole Bridge	Below	22.7	6.18	42.5	49.2	34



Figure A23. Pole bridge crossing in an intermittent stream.



Figure A24. Pole bridge crossing after road closure.

Crossing ID: Trent  
 Crossing Type: Pole Bridge  
 Location: Campbell Co.  
 Installation: Poor  
 Approach: Fair

GPS Coordinates (Latitude, Longitude): 37.21600°N, 78.99584°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 2.1  
 Watershed: 19.7 acres  
 Rosgen Classification: E4b

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	4/7/07	Trent	Pole Bridge	Skid trail	0.0017	0.0098	1.2000	0.6000
After Installation-Before harvest	N/A	Trent	Pole Bridge	Skid trail	N/A	N/A	N/A	N/A
During Harvest	5/10/07	Trent	Pole Bridge	Skid trail	2.5153	0.0704	9.8000	0.1000
After Harvest	6/25/07	Trent	Pole Bridge	Skid trail	75.0685	11.0145	7.3000	1.0000

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (µS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	4/7/07	Pole Bridge	Above	N/A	N/A	N/A	N/A	N/A
Before install.	4/7/07	Pole Bridge	Below	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	N/A	Pole Bridge	Above	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	N/A	Pole Bridge	Below	N/A	N/A	N/A	N/A	N/A
During harvest	5/10/07	Pole Bridge	Above	N/A	N/A	N/A	N/A	N/A
During harvest	5/10/07	Pole Bridge	Below	N/A	N/A	N/A	N/A	N/A
After harvest	6/25/07	Pole Bridge	Above	N/A	N/A	N/A	N/A	N/A
After harvest	6/25/07	Pole Bridge	Below	N/A	N/A	N/A	N/A	N/A



Figure A25. Left approach of pole bridge before installation.



Figure A26. Left approach of pole bridge during harvest.

Crossing ID: Haley  
 Crossing Type: Pole Bridge  
 Location: Charlotte Co.  
 Installation: Good  
 Approach: Good

GPS Coordinates (Latitude, Longitude): 37.03575°N, 78.71352°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 9.1865  
 Watershed: 87 acres  
 Rosgen Classification: E5

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	5/1/07	Haley	Pole Bridge	Skid trail	0.4772	0.0018	9.2000	6.3000
After Installation-Before harvest	5/3/07	Haley	Pole Bridge	Skid trail	8.8468	0.0984	39.7000	38.1000
During Harvest	5/7/07	Haley	Pole Bridge	Skid trail	8.9468	1.6932	47.5000	34.1000
After Harvest	7/17/07	Haley	Pole Bridge	Skid trail	8.7609	8.8613	2.8000	2.2000

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	5/1/07	Pole Bridge	Above	33.5	6.75	111.4	67.8	46
Before install.	5/1/07	Pole Bridge	Below	98.2	6.92	144.4	66	54
After install./Before harvest	5/3/07	Pole Bridge	Above	210	6.33	311	62.2	110
After install./Before harvest	5/3/07	Pole Bridge	Below	265	6.52	386	63.5	120
During harvest	5/7/07	Pole Bridge	Above	1580	6.36	2280	61.1	71
During harvest	5/7/07	Pole Bridge	Below	226	6.54	325	60.2	108
After harvest	7/17/07	Pole Bridge	Above	1325	6.81	1902	78.6	111
After harvest	7/17/07	Pole Bridge	Below	315	6.99	463	78.2	313



Figure A27. Unique pole bridge in Charlotte Co.



Figure A28. Left approach to pole bridge crossing.

Crossing ID: Tharpe  
 Crossing Type: Pole Bridge  
 Location: Prince Edward Co.  
 Installation: Good  
 Approach: Good

GPS Coordinates (Latitude, Longitude): 37.32854°N, 78.46716°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 6.59  
 Watershed: 6.2 acres  
 Rosgen Classification: E6b

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	4/24/07	Tharpe	Pole Bridge	Skid trail	0.0021	0.0023	3.6100	4.8800
After Installation-Before harvest	5/1/07	Tharpe	Pole Bridge	Skid trail	3.8577	0.0031	2.9800	0.0000
During Harvest	5/7/07	Tharpe	Pole Bridge	Skid trail	8.8347	8.8347	35.3300	37.0900
After Harvest	7/17/07	Tharpe	Pole Bridge	Skid trail	20.5209	6.5293	42.7000	34.4000

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	4/24/07	Pole Bridge	Above	N/A	N/A	N/A	N/A	N/A
Before install.	4/24/07	Pole Bridge	Below	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	5/1/07	Pole Bridge	Above	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	5/1/07	Pole Bridge	Below	N/A	N/A	N/A	N/A	N/A
During harvest	5/7/07	Pole Bridge	Above	N/A	N/A	N/A	N/A	N/A
During harvest	5/7/07	Pole Bridge	Below	N/A	N/A	N/A	N/A	N/A
After harvest	7/17/07	Pole Bridge	Above	N/A	N/A	N/A	N/A	N/A
After harvest	7/17/07	Pole Bridge	Below	N/A	N/A	N/A	N/A	N/A



Figure A29. Pole bridge crossing during use.



Figure A30. Application of slash to approaches during use.

Crossing ID: Kyanite  
 Crossing Type: Pole Bridge  
 Location: Charlotte Co.  
 Installation: Fair  
 Approach: Good

GPS Coordinates (Latitude, Longitude): 37.0999°N, 78.8193°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 141.62  
 Watershed: 3.4 acres  
 Rosgen Classification: E6

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	6/28/06	Kyanite	Pole Bridge	Temporary haul road	0.0066	0.1790	0.0100	27.0500
After Installation-Before harvest	N/A	Kyanite	Pole Bridge	Temporary haul road	N/A	N/A	N/A	N/A
During Harvest	8/17/06	Kyanite	Pole Bridge	Temporary haul road	0.8958	0.8118	0.0700	0.0500
After Harvest	9/29/06	Kyanite	Pole Bridge	Temporary haul road	0.4366	0.0933	0.0700	20.4400

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	6/28/06	Pole Bridge	Above	5.46	4.53	7.84	72.3	1448
Before install.	6/28/06	Pole Bridge	Below	5.55	4.34	7.96	71	121
After install./Before harvest	N/A	Pole Bridge	Above	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	N/A	Pole Bridge	Below	N/A	N/A	N/A	N/A	N/A
During harvest	8/17/06	Pole Bridge	Above	N/A	N/A	N/A	N/A	N/A
During harvest	8/17/06	Pole Bridge	Below	N/A	N/A	N/A	N/A	N/A
After harvest	9/29/06	Pole Bridge	Above	N/A	N/A	N/A	N/A	N/A
After harvest	9/29/06	Pole Bridge	Below	N/A	N/A	N/A	N/A	N/A



Figure A31. Right approach to pole bridge during use.



Figure A32. Ephemeral stream after pole bridge removal.

Crossing ID: Townley  
 Crossing Type: Pole Bridge  
 Location: Amherst Co.  
 Installation: Good  
 Approach: Good

GPS Coordinates (Latitude, Longitude): 37.52882°N, 78.94608°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 73.92  
 Watershed: 15.2 acres  
 Rosgen Classification: E6b

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	6/5/07	Townley	Pole Bridge	Skid trail	0.0150	0.0054	10.5000	5.6000
After Installation-Before harvest	6/20/07	Townley	Pole Bridge	Skid trail	0.2195	0.8877	85.9000	15.3000
During Harvest	6/25/07	Townley	Pole Bridge	Skid trail	16.9019	1.0260	44.1000	17.4000
After Harvest	1/10/08	Townley	Pole Bridge	Skid trail	1.8938	0.1856	4.2000	0.6000

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (µS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	6/5/07	Pole Bridge	Above	189	6.56	291	64.5	38
Before install.	6/5/07	Pole Bridge	Below	260	6.57	393	66.3	1372
After install./Before harvest	6/20/07	Pole Bridge	Above	177	6.43	253	70.5	634
After install./Before harvest	6/20/07	Pole Bridge	Below	194	6.61	278	71.6	1683
During harvest	6/25/07	Pole Bridge	Above	1520	6.22	2160	67.2	33
During harvest	6/25/07	Pole Bridge	Below	1500	6.35	2150	67.4	1834
After harvest	1/10/08	Pole Bridge	Above	25.2	6.56	36	52.1	47
After harvest	1/10/08	Pole Bridge	Below	34	6.4	64	50.3	1384



Figure A33. Pipe installation of pole bridge crossing.



Figure A34. Right approach to pole bridge during use.

Crossing ID: Pearson  
 Crossing Type: Steel Bridge  
 Location: Buckingham Co.  
 Installation: Poor  
 Approach: Fair

GPS Coordinates (Latitude, Longitude): 37.468°N, 78.614°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 45.88  
 Watershed: 130.7 acres  
 Rosgen Classification: E4

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	2/10/07	Pearson	Steel Bridge	Skid trail	0.0042	0.0287	0.0000	0.0000
After Installation-Before harvest	2/20/07	Pearson	Steel Bridge	Skid trail	0.4358	0.2964	30.8700	11.1700
During Harvest	2/27/07	Pearson	Steel Bridge	Skid trail	8.6829	11.6474	17.0800	35.8500
After Harvest	3/6/07	Pearson	Steel Bridge	Skid trail	0.4325	24.0687	12.0700	32.1600

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (µS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	2/10/07	Steel Bridge	Above	34.4	6.88	51.7	45.3	76
Before install.	2/10/07	Steel Bridge	Below	49	7.04	77.4	44.9	46
After install./Before harvest	2/20/07	Steel Bridge	Above	47.2	6.42	72	50.9	21
After install./Before harvest	2/20/07	Steel Bridge	Below	130.6	6.9	197.4	53.4	7
During harvest	2/27/07	Steel Bridge	Above	27.3	6.49	39.3	48.7	51
During harvest	2/27/07	Steel Bridge	Below	84.9	6.91	112.1	47.8	46
After harvest	3/6/07	Steel Bridge	Above	41.7	6.59	56.8	47.4	75
After harvest	3/6/07	Steel Bridge	Below	52.7	6.53	76.7	49.1	14



Figure A35. Steel bridge crossing installed before harvest.



Figure A36. Right approach to steel bridge crossing.

Crossing ID: Jordan  
 Crossing Type: Steel Bridge  
 Location: Prince Edward Co.  
 Installation: Good  
 Approach: Poor

GPS Coordinates (Latitude, Longitude): 37.271°N, 78.233°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 132.85  
 Watershed: 46.5 acres  
 Rosgen Classification: E5

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	6/28/06	Jordan	Steel Bridge	Temporary haul road	1.5925	0.1112	6.3100	0.1900
After Installation-Before harvest	7/14/06	Jordan	Steel Bridge	Temporary haul road	87.5772	20.0264	2.6200	1.1800
During Harvest	7/24/06	Jordan	Steel Bridge	Temporary haul road	87.5772	16.1188	38.7800	13.8500
After Harvest	9/29/06	Jordan	Steel Bridge	Temporary haul road	37.4280	10.2894	44.7400	16.2900

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (µS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	6/28/06	Steel Bridge	Above	5.62	5.63	8.04	70.5	69
Before install.	6/28/06	Steel Bridge	Below	6.26	5.66	8.97	71.7	59
After install./Before harvest	7/14/06	Steel Bridge	Above	6.23	6.75	8.94	75.2	112
After install./Before harvest	7/14/06	Steel Bridge	Below	6.15	6.6	8.82	71.9	94
During harvest	7/24/06	Steel Bridge	Above	6.08	6.54	8.69	73.2	539
During harvest	7/24/06	Steel Bridge	Below	6.69	6.74	9.5	74.3	933
After harvest	9/29/06	Steel Bridge	Above	75.5	6.29	107.2	65.8	28843
After harvest	9/29/06	Steel Bridge	Below	109.3	6.28	160	66	139



Figure A37. Steel bridge crossing during log truck use.



Figure A38. Left approach to steel bridge crossing.

Crossing ID: Kyanite  
 Crossing Type: Steel Bridge  
 Location: Charlotte Co.  
 Installation: Good  
 Approach: Poor

GPS Coordinates (Latitude, Longitude): 37.0991°N, 78.8227°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 297.01  
 Watershed: 437.7 acres  
 Rosgen Classification: E3b

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	6/27/06	Kyanite	Steel Bridge	Temporary haul road	12.4000	10.5900	67.1500	50.6600
After Installation-Before harvest	7/24/06	Kyanite	Steel Bridge	Temporary haul road	110.9800	48.7600	61.1300	37.2100
During Harvest	8/17/06	Kyanite	Steel Bridge	Temporary haul road	28.6900	12.8500	66.2500	37.2100
After Harvest	9/29/06	Kyanite	Steel Bridge	Temporary haul road	52.1500	18.7200	62.7300	40.6400

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	6/27/06	Steel Bridge	Above	5.67	7.5	8.18	71.6	82
Before install.	6/27/06	Steel Bridge	Below	6.27	7.31	8.99	69.2	92
After install./Before harvest	7/24/06	Steel Bridge	Above	6.14	7.5	8.8	70.1	1735
After install./Before harvest	7/24/06	Steel Bridge	Below	6.27	7.5	8.98	72.3	0
During harvest	8/17/06	Steel Bridge	Above	4.72	7.04	9.45	67.1	170
During harvest	8/17/06	Steel Bridge	Below	6.37	7.5	9.12	68.7	83
After harvest	9/29/06	Steel Bridge	Above	6.72	7.09	9.57	63.5	64
After harvest	9/29/06	Steel Bridge	Below	5.87	7.14	8.76	63.8	75



Figure A39. Steel bridge crossing and approach.



Figure A40. Left approach to steel bridge crossing.

Crossing ID: Burke  
 Crossing Type: Steel Bridge  
 Location: Appomattox Co.  
 Installation: Good  
 Approach: Good

GPS Coordinates (Latitude, Longitude): 37.2596°N, 78.8644°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 4.51  
 Watershed: 30.9 acres  
 Rosgen Classification: E4

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	3/9/07	Burke	Steel Bridge	Skid trail	0.0032	0.0016	5.1000	1.9000
After Installation-Before harvest	N/A	Burke	Steel Bridge	Skid trail	N/A	N/A	N/A	N/A
During Harvest	3/13/07	Burke	Steel Bridge	Skid trail	8.8653	3.1227	28.6000	17.4000
After Harvest	3/24/07	Burke	Steel Bridge	Skid trail	6.4000	0.7279	21.6000	19.1000

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (µS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	3/9/07	Steel Bridge	Above	28	6.22	48.4	44.4	0
Before install.	3/9/07	Steel Bridge	Below	23.6	6.34	33.8	43.7	56
After install./Before harvest	N/A	Steel Bridge	Above	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	N/A	Steel Bridge	Below	N/A	N/A	N/A	N/A	N/A
During harvest	3/13/07	Steel Bridge	Above	25.9	6.24	38.4	55.7	0
During harvest	3/13/07	Steel Bridge	Below	60.2	6.31	85.5	57.3	7
After harvest	3/24/07	Steel Bridge	Above	32.3	6.24	45.7	61.3	3
After harvest	3/24/07	Steel Bridge	Below	81.7	6.28	120.8	63.3	5



Figure A41. Steel bridge stream crossing during use.



Figure A42. Left approach to stream crossing.

Crossing ID: Trent  
 Crossing Type: Steel Bridge  
 Location: Campbell Co.  
 Installation: Fair  
 Approach: Fair

GPS Coordinates (Latitude, Longitude): 37.21600°N, 78.99584°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 126.87  
 Watershed: 3,340 acres  
 Rosgen Classification: C3c-

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Stream Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	4/7/07	Trent	Steel Bridge	Skid trail	1.7847	0.3347	1.8000	1.6000
After Installation-Before harvest	N/A	Trent	Steel Bridge	Skid trail	N/A	N/A	N/A	N/A
During Harvest	5/10/07	Trent	Steel Bridge	Skid trail	35.2179	0.9222	28.7000	9.7000
After Harvest	6/25/07	Trent	Steel Bridge	Skid trail	34.2312	2.6942	35.4000	14.1000

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (μS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	4/7/07	Steel Bridge	Above	48.5	8.08	61.7	52.5	66
Before install.	4/7/07	Steel Bridge	Below	41.9	8.42	85.5	56.3	17
After install./Before harvest	N/A	Steel Bridge	Above	N/A	N/A	N/A	N/A	N/A
After install./Before harvest	N/A	Steel Bridge	Below	N/A	N/A	N/A	N/A	N/A
During harvest	5/10/07	Steel Bridge	Above	195	7.31	280	64.4	66
During harvest	5/10/07	Steel Bridge	Below	203	7.27	294	64.9	41
After harvest	6/25/07	Steel Bridge	Above	189	7.4	271	73.7	50
After harvest	6/25/07	Steel Bridge	Below	208	7.36	297	74.1	42



Figure A43. Largest steel bridge crossing used for study.



Figure A44. Steel bridge during skidder use.

Crossing ID: Townley  
 Crossing Type: Steel Bridge  
 Location: Amherst Co.  
 Installation: Good  
 Approach: Good

GPS Coordinates (Latitude, Longitude): 37.52776°N, 78.94658°W  
 Manning-Chezy Equation (ft<sup>3</sup>/sec): 61.77  
 Watershed: 198.7 acres  
 Rosgen Classification: E4b

Time During Harvest	Date Sampled	Tract	Crossing	Reason for Crossing	USLE (tons/acre/year)		WEPP (tons/acre/year)	
					Left	Right	Left	Right
Before Installation	6/5/07	Townley	Steel Bridge	Skid trail	0.0017	0.0016	3.4000	4.5000
After Installation-Before harvest	6/8/07	Townley	Steel Bridge	Skid trail	3.9197	1.7442	28.2000	4.5000
During Harvest	6/20/07	Townley	Steel Bridge	Skid trail	6.5797	4.5148	28.0000	35.0000
After Harvest	1/10/08	Townley	Steel Bridge	Skid trail	0.0368	0.1039	3.1000	3.7000

Time Condition	Date Sampled	Treatment	Stream Position	TDS (ppm)	pH	Conductivity (µS/cm)	Temp. (Fahrenheit)	Sediment (ppm)
Before install.	6/5/07	Steel Bridge	Above	193	7.42	279	67.6	94
Before install.	6/5/07	Steel Bridge	Below	207	7.11	297	66.7	57
After install./Before harvest	6/8/07	Steel Bridge	Above	233	7.44	349	71.4	39
After install./Before harvest	6/8/07	Steel Bridge	Below	325	7.23	467	74.1	63
During harvest	6/20/07	Steel Bridge	Above	203	7.37	292	69.4	31
During harvest	6/20/07	Steel Bridge	Below	204	7.27	293	69.8	34
After harvest	1/10/08	Steel Bridge	Above	54	7.47	78.2	49.1	56
After harvest	1/10/08	Steel Bridge	Below	100.3	7.23	147	49.8	112



Figure A45. Steel bridge during skidding operations.



Figure A46. Steel bridge approaches after road closure.