

APPENDIX C

ECAT REPORTS



DRAFT NOVEMBER 2024
PRELIMINARY FEASIBILITY STUDY
U.S. 23 CORRIDOR STUDY, PID 112768

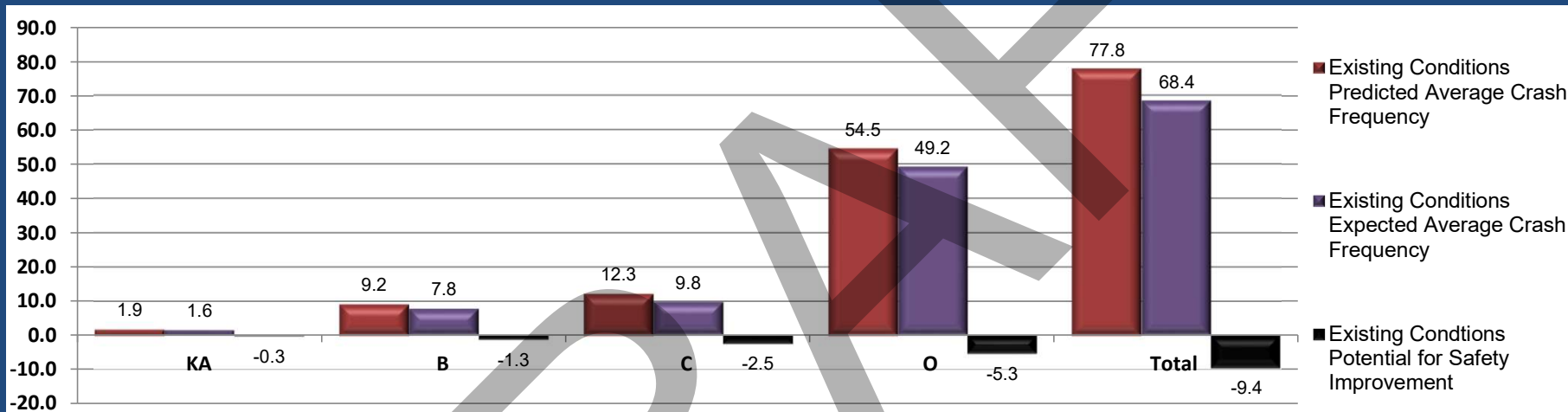


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}} - \text{Existing Conditions}$	1.9254	9.1571	12.2860	54.4550	77.8235
$N_{\text{expected}} - \text{Existing Conditions}$	1.6149	7.8445	9.7551	49.1890	68.4035
$N_{\text{potential for improvement}} - \text{Existing Conditions}$	-0.3105	-1.3126	-2.5309	-5.2660	-9.4200



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
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Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0438	0.2229	0.2217	1.2762	1.7646	
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0445	0.2259	0.2254	1.3003	1.7961	
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.0187	0.0941	0.0946	0.5482	0.7556	
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	0.0291	0.1469	0.1477	0.8558	1.1795	
US23; 0.624-0.7	N or Gold Meadows	0.0173	0.0884	0.0879	0.5049	0.6985	
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0444	0.2297	0.232	1.3532	1.8593	
US23N; 24.131-24.29	Northwoods - Highbluffs	0.0335	0.17	0.1693	0.975	1.3478	
US23N; 24.292-24.406	Highbluffs - Dillmont	0.0219	0.1109	0.1111	0.6425	0.8864	
US23N; 24.408-24.525	Dillmont - Lazelle	0.0242	0.1232	0.1227	0.7068	0.9769	
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.0172	0.0879	0.0872	0.5007	0.693	
US23; 0	Old Lazelle Rd Del	0.0933	0.3389	0.3796	2.3493	3.1611	
US23; 0.201	Carrington Ridge Dr	0.0949	0.35	0.3961	2.1639	3.0049	
US23; 0.402	Mirada Dr	0.0949	0.35	0.3961	2.1639	3.0049	
US23; 0.487	Olentangy Meadows Dr	0.1646	0.9403	1.2256	3.1665	5.497	
US23; 0.623	Gold Meadows Dr	0.0114	0.0663	0.0737	0.6698	0.8212	
US23N; 23.922	Northwoods S NB	0.0128	0.075	0.082	0.9022	1.072	
US23N; 23.923	Northwoods S NB	0.0128	0.075	0.082	0.9022	1.072	
US23N; 24.13	Northwoods N	0.3446	1.629	2.4312	9.7717	14.1765	
US23N; 24.291	Highbluffs Blvd	0.3293	1.5538	2.3157	9.2992	13.498	
US23N; 24.407	Dillmont Dr	0.0134	0.0781	0.0849	0.9821	1.1585	
US23N; 24.526	Lazelle Rd	0.4588	2.2008	3.3195	13.4206	19.3997	



Project Safety Performance Report

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Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0707	0.3734	0.3776	1.357	2.1787
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0368	0.1826	0.1807	1.2067	1.6068
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.017	0.085	0.0851	0.3865	0.5736
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	0.0254	0.1259	0.1258	0.5198	0.7969
US23; 0.624-0.7	N or Gold Meadows	0.0161	0.0812	0.0804	0.3735	0.5512
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0478	0.2494	0.2526	0.6745	1.2243
US23N; 24.131-24.29	Northwoods - Highbluffs	0.029	0.1448	0.1431	0.5822	0.8991
US23N; 24.292-24.406	Highbluffs - Dillmont	0.0197	0.0988	0.0985	0.4351	0.6521
US23N; 24.408-24.525	Dillmont - Lazelle	0.0218	0.1093	0.1083	0.4719	0.7113
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.016	0.0808	0.0798	0.3722	0.5488
US23; 0	Old Lazelle Rd Del	0.1111	0.4011	0.4448	1.6561	2.6131
US23; 0.201	Carrington Ridge Dr	0.0777	0.2833	0.3195	0.9884	1.6689
US23; 0.402	Mirada Dr	0.0777	0.2833	0.3195	1.6216	2.3021
US23; 0.487	Olentangy Meadows Dr	0.1594	0.916	1.2035	3.3857	5.6646
US23; 0.623	Gold Meadows Dr	0.0094	0.0549	0.0597	0.5302	0.6542
US23N; 23.922	Northwoods S NB	0.0106	0.062	0.066	0.625	0.7636
US23N; 23.923	Northwoods S NB	0.0106	0.062	0.066	0.4652	0.6038
US23N; 24.13	Northwoods N	0.1738	0.7842	1.1322	2.4095	4.4997
US23N; 24.291	Highbluffs Blvd	0.1701	0.7674	1.1076	2.3803	4.4254
US23N; 24.407	Dillmont Dr	0.3191	1.816	2.2252	26.1816	30.5419
US23N; 24.526	Lazelle Rd	0.1951	0.8831	1.2792	2.566	4.9234



Project Safety Performance Report

General Information

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Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0269	0.1505	0.1559	0.0808	0.4141
US23; 0.202-0.401	Carrington Ridge - Mirada	-0.0077	-0.0433	-0.0447	-0.0936	-0.1893
US23; 0.403-0.486	Mirada - Olentangy Meadows	-0.0017	-0.0091	-0.0095	-0.1617	-0.182
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	-0.0037	-0.021	-0.0219	-0.336	-0.3826
US23; 0.624-0.7	N or Gold Meadows	-0.0012	-0.0072	-0.0075	-0.1314	-0.1473
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0034	0.0197	0.0206	-0.6787	-0.635
US23N; 24.131-24.29	Northwoods - Highbluffs	-0.0045	-0.0252	-0.0262	-0.3928	-0.4487
US23N; 24.292-24.406	Highbluffs - Dillmont	-0.0022	-0.0121	-0.0126	-0.2074	-0.2343
US23N; 24.408-24.525	Dillmont - Lazelle	-0.0024	-0.0139	-0.0144	-0.2349	-0.2656
US23N; 24.527-24.606	Lazelle - Old Lazelle	-0.0012	-0.0071	-0.0074	-0.1285	-0.1442
US23; 0	Old Lazelle Rd Del	0.0178	0.0622	0.0652	-0.6932	-0.548
US23; 0.201	Carrington Ridge Dr	-0.0172	-0.0667	-0.0766	-1.1755	-1.336
US23; 0.402	Mirada Dr	-0.0172	-0.0667	-0.0766	-0.5423	-0.7028
US23; 0.487	Olentangy Meadows Dr	-0.0052	-0.0243	-0.0221	0.2192	0.1676
US23; 0.623	Gold Meadows Dr	-0.002	-0.0114	-0.014	-0.1396	-0.167
US23N; 23.922	Northwoods S NB	-0.0022	-0.013	-0.016	-0.2772	-0.3084
US23N; 23.923	Northwoods S NB	-0.0022	-0.013	-0.016	-0.437	-0.4682
US23N; 24.13	Northwoods N	-0.1708	-0.8448	-1.299	-7.3622	-9.6768
US23N; 24.291	Highbluffs Blvd	-0.1592	-0.7864	-1.2081	-6.9189	-9.0726
US23N; 24.407	Dillmont Dr	0.3057	1.7379	2.1403	25.1995	29.3834
US23N; 24.526	Lazelle Rd	-0.2637	-1.3177	-2.0403	-10.8546	-14.4763



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Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.0938	0.1043	0.0105	
Head On	1.2382	0.7145	-0.5237	
Rear End	36.3210	20.7966	-15.5244	
Backing	1.4918	1.2025	-0.2892	
Sideswipe - Meeting	0.3316	0.2520	-0.0796	
Sideswipe - Passing	8.9527	12.2120	3.2593	
Angle	12.7864	18.8581	6.0717	
Parked Vehicle	0.6041	1.2452	0.6412	
Pedestrian	0.2579	0.2579	0.0000	
Animal	1.0279	1.0617	0.0338	
Train	0.0185	0.0161	-0.0024	
Pedalcycles	0.1365	0.1365	0.0000	
Other Non-Vehicle	0.0003	0.0003	0.0000	
Fixed Object	4.8664	5.0180	0.1516	
Other Object	0.2192	0.2724	0.0533	
Overturning	0.2216	0.2536	0.0319	
Other Non-Collision	0.4211	0.3884	-0.0328	
Left Turn	6.8902	4.5996	-2.2906	
Right Turn	2.9722	2.0748	-0.8975	

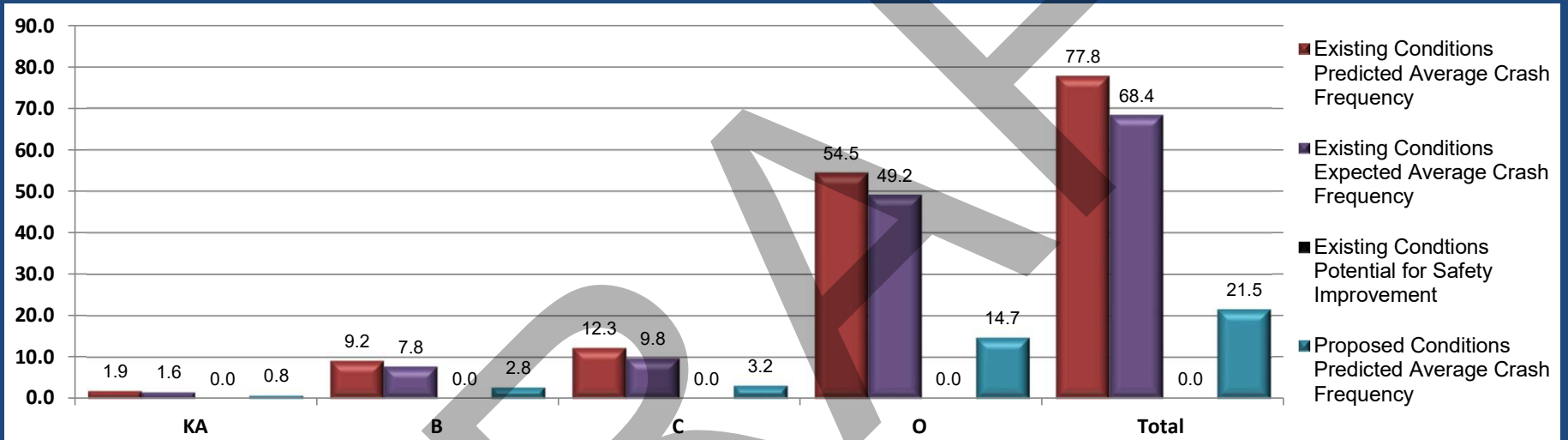


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Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.9254	9.1571	12.2860	54.4550	77.8235
N_{expected} - Existing Conditions	1.6149	7.8445	9.7551	49.1890	68.4035
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	0.8162	2.7893	3.2359	14.6873	21.5287



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Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0438	0.2229	0.2217	1.2762	1.7646
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0445	0.2259	0.2254	1.3003	1.7961
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.0187	0.0941	0.0946	0.5482	0.7556
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	0.0291	0.1469	0.1477	0.8558	1.1795
US23; 0.624-0.7	N or Gold Meadows	0.0173	0.0884	0.0879	0.5049	0.6985
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0444	0.2297	0.232	1.3532	1.8593
US23N; 24.131-24.29	Northwoods - Highbluffs	0.0335	0.17	0.1693	0.975	1.3478
US23N; 24.292-24.406	Highbluffs - Dillmont	0.0219	0.1109	0.1111	0.6425	0.8864
US23N; 24.408-24.525	Dillmont - Lazelle	0.0242	0.1232	0.1227	0.7068	0.9769
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.0172	0.0879	0.0872	0.5007	0.693
US23; 0	Old Lazelle Rd Del	0.0933	0.3389	0.3796	2.3493	3.1611
US23; 0.201	Carrington Ridge Dr	0.0949	0.35	0.3961	2.1639	3.0049
US23; 0.402	Mirada Dr	0.0949	0.35	0.3961	2.1639	3.0049
US23; 0.487	Olentangy Meadows Dr	0.1646	0.9403	1.2256	3.1665	5.497
US23; 0.623	Gold Meadows Dr	0.0114	0.0663	0.0737	0.6698	0.8212
US23N; 23.922	Northwoods S NB	0.0128	0.075	0.082	0.9022	1.072
US23N; 23.923	Northwoods S NB	0.0128	0.075	0.082	0.9022	1.072
US23N; 24.13	Northwoods N	0.3446	1.629	2.4312	9.7717	14.1765
US23N; 24.291	Highbluffs Blvd	0.3293	1.5538	2.3157	9.2992	13.498
US23N; 24.407	Dillmont Dr	0.0134	0.0781	0.0849	0.9821	1.1585
US23N; 24.526	Lazelle Rd	0.4588	2.2008	3.3195	13.4206	19.3997



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Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0707	0.3734	0.3776	1.357	2.1787
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0368	0.1826	0.1807	1.2067	1.6068
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.017	0.085	0.0851	0.3865	0.5736
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	0.0254	0.1259	0.1258	0.5198	0.7969
US23; 0.624-0.7	N or Gold Meadows	0.0161	0.0812	0.0804	0.3735	0.5512
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0478	0.2494	0.2526	0.6745	1.2243
US23N; 24.131-24.29	Northwoods - Highbluffs	0.029	0.1448	0.1431	0.5822	0.8991
US23N; 24.292-24.406	Highbluffs - Dillmont	0.0197	0.0988	0.0985	0.4351	0.6521
US23N; 24.408-24.525	Dillmont - Lazelle	0.0218	0.1093	0.1083	0.4719	0.7113
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.016	0.0808	0.0798	0.3722	0.5488
US23; 0	Old Lazelle Rd Del	0.1111	0.4011	0.4448	1.6561	2.6131
US23; 0.201	Carrington Ridge Dr	0.0777	0.2833	0.3195	0.9884	1.6689
US23; 0.402	Mirada Dr	0.0777	0.2833	0.3195	1.6216	2.3021
US23; 0.487	Olentangy Meadows Dr	0.1594	0.916	1.2035	3.3857	5.6646
US23; 0.623	Gold Meadows Dr	0.0094	0.0549	0.0597	0.5302	0.6542
US23N; 23.922	Northwoods S NB	0.0106	0.062	0.066	0.625	0.7636
US23N; 23.923	Northwoods S NB	0.0106	0.062	0.066	0.4652	0.6038
US23N; 24.13	Northwoods N	0.1738	0.7842	1.1322	2.4095	4.4997
US23N; 24.291	Highbluffs Blvd	0.1701	0.7674	1.1076	2.3803	4.4254
US23N; 24.407	Dillmont Dr	0.3191	1.816	2.2252	26.1816	30.5419
US23N; 24.526	Lazelle Rd	0.1951	0.8831	1.2792	2.566	4.9234



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Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0269	0.1505	0.1559	0.0808	0.4141
US23; 0.202-0.401	Carrington Ridge - Mirada	-0.0077	-0.0433	-0.0447	-0.0936	-0.1893
US23; 0.403-0.486	Mirada - Olentangy Meadows	-0.0017	-0.0091	-0.0095	-0.1617	-0.182
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	-0.0037	-0.021	-0.0219	-0.336	-0.3826
US23; 0.624-0.7	N or Gold Meadows	-0.0012	-0.0072	-0.0075	-0.1314	-0.1473
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0034	0.0197	0.0206	-0.6787	-0.635
US23N; 24.131-24.29	Northwoods - Highbluffs	-0.0045	-0.0252	-0.0262	-0.3928	-0.4487
US23N; 24.292-24.406	Highbluffs - Dillmont	-0.0022	-0.0121	-0.0126	-0.2074	-0.2343
US23N; 24.408-24.525	Dillmont - Lazelle	-0.0024	-0.0139	-0.0144	-0.2349	-0.2656
US23N; 24.527-24.606	Lazelle - Old Lazelle	-0.0012	-0.0071	-0.0074	-0.1285	-0.1442
US23; 0	Old Lazelle Rd Del	0.0178	0.0622	0.0652	-0.6932	-0.548
US23; 0.201	Carrington Ridge Dr	-0.0172	-0.0667	-0.0766	-1.1755	-1.336
US23; 0.402	Mirada Dr	-0.0172	-0.0667	-0.0766	-0.5423	-0.7028
US23; 0.487	Olentangy Meadows Dr	-0.0052	-0.0243	-0.0221	0.2192	0.1676
US23; 0.623	Gold Meadows Dr	-0.002	-0.0114	-0.014	-0.1396	-0.167
US23N; 23.922	Northwoods S NB	-0.0022	-0.013	-0.016	-0.2772	-0.3084
US23N; 23.923	Northwoods S NB	-0.0022	-0.013	-0.016	-0.437	-0.4682
US23N; 24.13	Northwoods N	-0.1708	-0.8448	-1.299	-7.3622	-9.6768
US23N; 24.291	Highbluffs Blvd	-0.1592	-0.7864	-1.2081	-6.9189	-9.0726
US23N; 24.407	Dillmont Dr	0.3057	1.7379	2.1403	25.1995	29.3834
US23N; 24.526	Lazelle Rd	-0.2637	-1.3177	-2.0403	-10.8546	-14.4763



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
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Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0-0.64	Lazelle - N NB	0.0881	0.3915	0.5059	2.7755	3.761
US23; 0-0.63	Lazelle - N SB	0.0781	0.3409	0.4557	2.5584	3.4331
US23N; 23.925-24.326	Northwoods - Lazelle SB	0.0647	0.2954	0.3649	1.8975	2.6225
US23N; 23.926-24.327	Northwoods - Lazelle NB	0.0507	0.2239	0.2924	1.6889	2.2559
US23N; 24.326-24.726	Lazelle SB	0.0485	0.207	0.2879	1.5329	2.0763
US23N; 24.327-24.727	Lazelle NB	0.0485	0.207	0.2879	1.5329	2.0763
US23; 0.65	Northern Frontage Access	0.2188	0.5618	0.5206	1.3506	2.6518
US23N; 23.924	Northwoods S	0.2188	0.5618	0.5206	1.3506	2.6518



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Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.0938	0.1043		0.0537
Head On	1.2382	0.7145		0.0814
Rear End	36.3210	20.7966		1.1654
Backing	1.4918	1.2025		1.5164
Sideswipe - Meeting	0.3316	0.2520		0.0036
Sideswipe - Passing	8.9527	12.2120		0.3839
Angle	12.7864	18.8581		1.9428
Parked Vehicle	0.6041	1.2452		3.9345
Pedestrian	0.2579	0.2579		0.8493
Animal	1.0279	1.0617		0.0693
Train	0.0185	0.0161		0.5639
Pedalcycles	0.1365	0.1365		0.0155
Other Non-Vehicle	0.0003	0.0003		0.0000
Fixed Object	4.8664	5.0180		13.8714
Other Object	0.2192	0.2724		2.6965
Overturning	0.2216	0.2536		12.0151
Other Non-Collision	0.4211	0.3884		13.4355
Left Turn	6.8902	4.5996		0.0785
Right Turn	2.9722	2.0748		0.9776



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-38.009	\$2,236,451
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	0.000	\$0
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-18.285	\$22,445,670
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-56.294	\$24,682,121



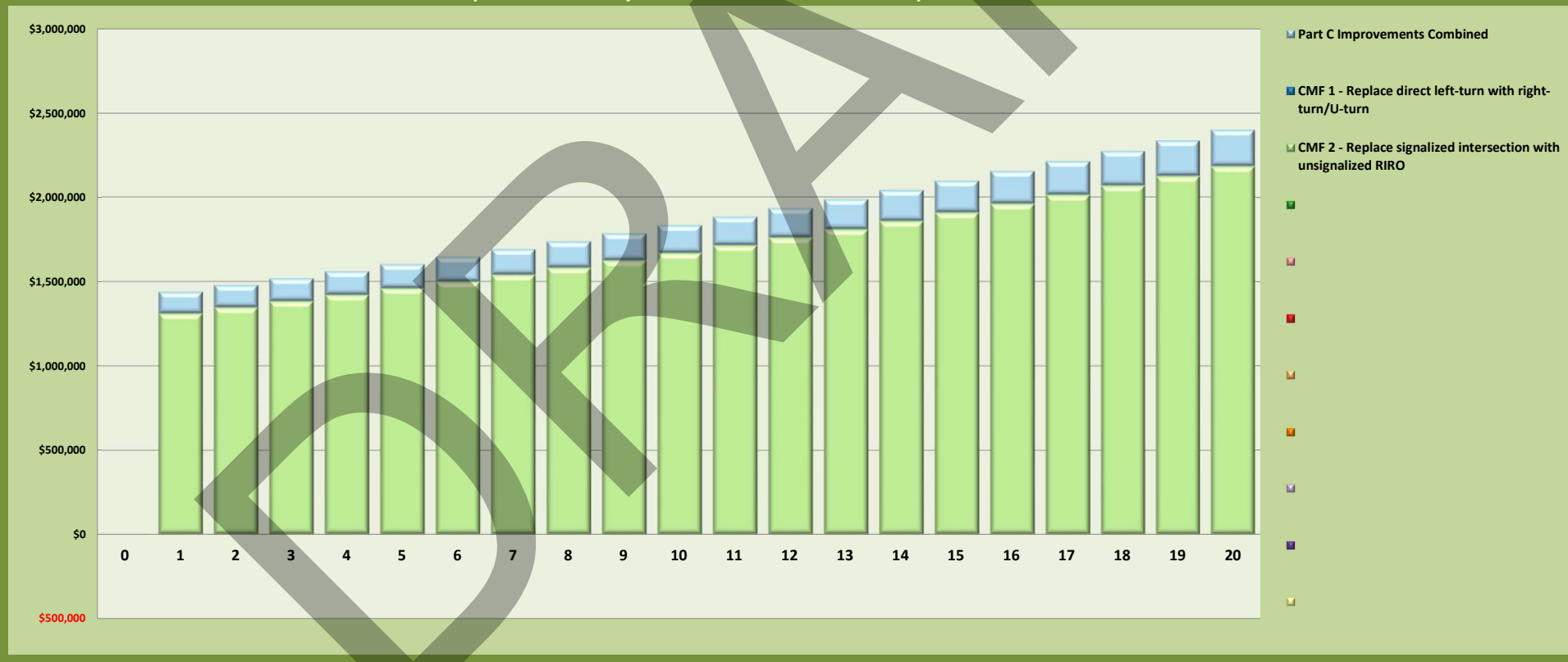
Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	Expected Annual Crash Adjustment	Comments:
<p>Net Present Value of Project: \$6.00</p> <p>Net Present Value of Safety Benefits: \$24,682,120.64</p> <p>Net Benefit: \$24,682,114.64</p> <p>Benefit / Cost Ratio: 4113686.77</p>	<p>Number of Fatal & Incapacitating Injury Crashes: -1.110</p> <p>Number of Injury Crashes: -16.527</p> <p>Number of Total Crashes: -56.294</p>	

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



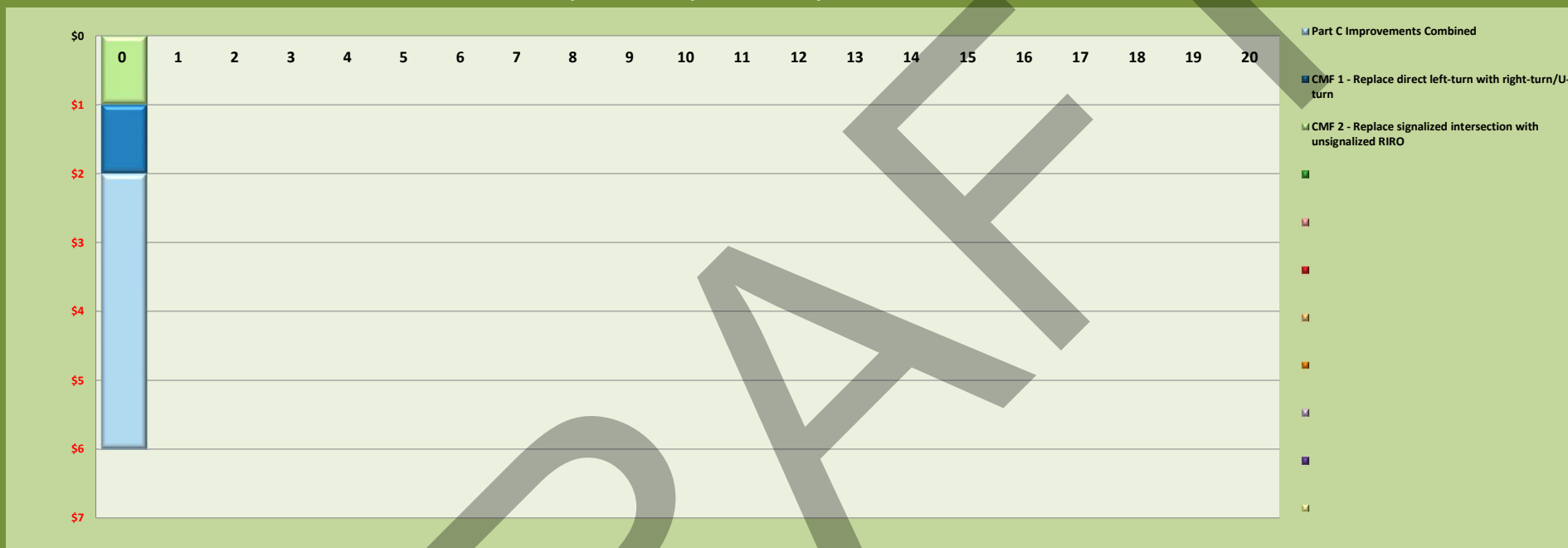


Safety Benefit - Cost Analysis

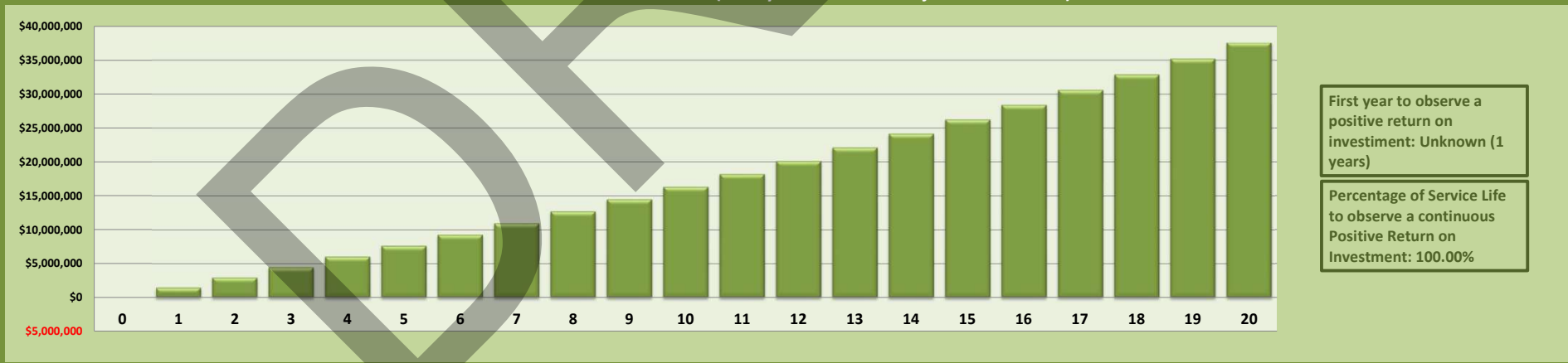
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



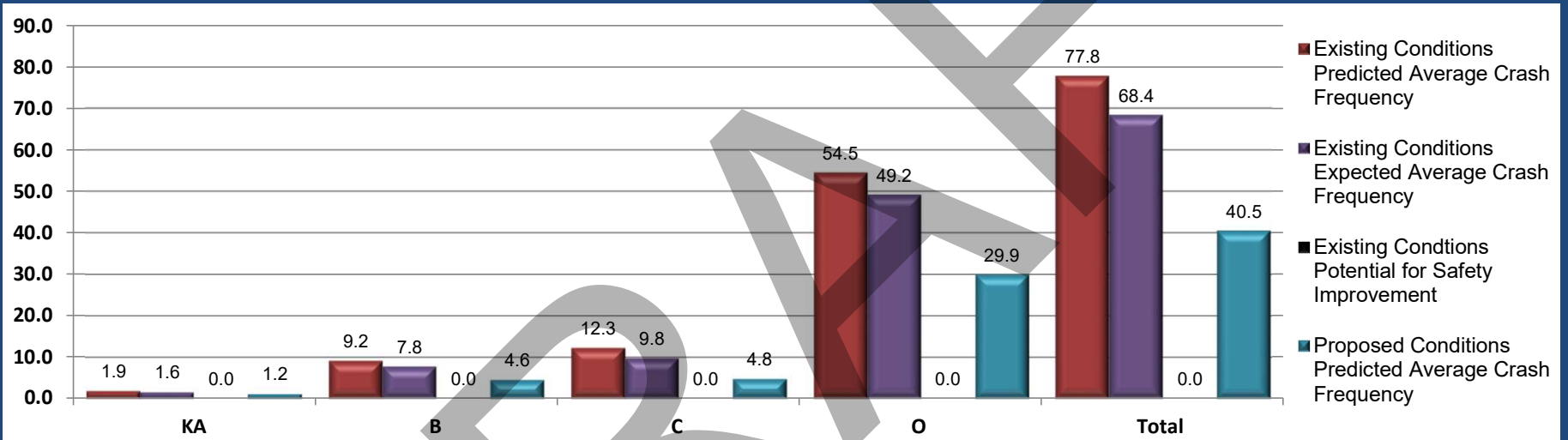


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
N_{predicted} - Existing Conditions	1.9254	9.1571	12.2860	54.4550	77.8235
N_{expected} - Existing Conditions	1.6149	7.8445	9.7551	49.1890	68.4035
N_{potential for improvement} - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	1.1694	4.6230	4.7951	29.8796	40.4671



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0438	0.2229	0.2217	1.2762	1.7646	
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0445	0.2259	0.2254	1.3003	1.7961	
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.0187	0.0941	0.0946	0.5482	0.7556	
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	0.0291	0.1469	0.1477	0.8558	1.1795	
US23; 0.624-0.7	N or Gold Meadows	0.0173	0.0884	0.0879	0.5049	0.6985	
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0444	0.2297	0.232	1.3532	1.8593	
US23N; 24.131-24.29	Northwoods - Highbluffs	0.0335	0.17	0.1693	0.975	1.3478	
US23N; 24.292-24.406	Highbluffs - Dillmont	0.0219	0.1109	0.1111	0.6425	0.8864	
US23N; 24.408-24.525	Dillmont - Lazelle	0.0242	0.1232	0.1227	0.7068	0.9769	
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.0172	0.0879	0.0872	0.5007	0.693	
US23; 0	Old Lazelle Rd Del	0.0933	0.3389	0.3796	2.3493	3.1611	
US23; 0.201	Carrington Ridge Dr	0.0949	0.35	0.3961	2.1639	3.0049	
US23; 0.402	Mirada Dr	0.0949	0.35	0.3961	2.1639	3.0049	
US23; 0.487	Olentangy Meadows Dr	0.1646	0.9403	1.2256	3.1665	5.497	
US23; 0.623	Gold Meadows Dr	0.0114	0.0663	0.0737	0.6698	0.8212	
US23N; 23.922	Northwoods S NB	0.0128	0.075	0.082	0.9022	1.072	
US23N; 23.923	Northwoods S NB	0.0128	0.075	0.082	0.9022	1.072	
US23N; 24.13	Northwoods N	0.3446	1.629	2.4312	9.7717	14.1765	
US23N; 24.291	Highbluffs Blvd	0.3293	1.5538	2.3157	9.2992	13.498	
US23N; 24.407	Dillmont Dr	0.0134	0.0781	0.0849	0.9821	1.1585	
US23N; 24.526	Lazelle Rd	0.4588	2.2008	3.3195	13.4206	19.3997	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0707	0.3734	0.3776	1.357	2.1787
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0368	0.1826	0.1807	1.2067	1.6068
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.017	0.085	0.0851	0.3865	0.5736
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	0.0254	0.1259	0.1258	0.5198	0.7969
US23; 0.624-0.7	N or Gold Meadows	0.0161	0.0812	0.0804	0.3735	0.5512
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0478	0.2494	0.2526	0.6745	1.2243
US23N; 24.131-24.29	Northwoods - Highbluffs	0.029	0.1448	0.1431	0.5822	0.8991
US23N; 24.292-24.406	Highbluffs - Dillmont	0.0197	0.0988	0.0985	0.4351	0.6521
US23N; 24.408-24.525	Dillmont - Lazelle	0.0218	0.1093	0.1083	0.4719	0.7113
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.016	0.0808	0.0798	0.3722	0.5488
US23; 0	Old Lazelle Rd Del	0.1111	0.4011	0.4448	1.6561	2.6131
US23; 0.201	Carrington Ridge Dr	0.0777	0.2833	0.3195	0.9884	1.6689
US23; 0.402	Mirada Dr	0.0777	0.2833	0.3195	1.6216	2.3021
US23; 0.487	Olentangy Meadows Dr	0.1594	0.916	1.2035	3.3857	5.6646
US23; 0.623	Gold Meadows Dr	0.0094	0.0549	0.0597	0.5302	0.6542
US23N; 23.922	Northwoods S NB	0.0106	0.062	0.066	0.625	0.7636
US23N; 23.923	Northwoods S NB	0.0106	0.062	0.066	0.4652	0.6038
US23N; 24.13	Northwoods N	0.1738	0.7842	1.1322	2.4095	4.4997
US23N; 24.291	Highbluffs Blvd	0.1701	0.7674	1.1076	2.3803	4.4254
US23N; 24.407	Dillmont Dr	0.3191	1.816	2.2252	26.1816	30.5419
US23N; 24.526	Lazelle Rd	0.1951	0.8831	1.2792	2.566	4.9234



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0269	0.1505	0.1559	0.0808	0.4141
US23; 0.202-0.401	Carrington Ridge - Mirada	-0.0077	-0.0433	-0.0447	-0.0936	-0.1893
US23; 0.403-0.486	Mirada - Olentangy Meadows	-0.0017	-0.0091	-0.0095	-0.1617	-0.182
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	-0.0037	-0.021	-0.0219	-0.336	-0.3826
US23; 0.624-0.7	N or Gold Meadows	-0.0012	-0.0072	-0.0075	-0.1314	-0.1473
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0034	0.0197	0.0206	-0.6787	-0.635
US23N; 24.131-24.29	Northwoods - Highbluffs	-0.0045	-0.0252	-0.0262	-0.3928	-0.4487
US23N; 24.292-24.406	Highbluffs - Dillmont	-0.0022	-0.0121	-0.0126	-0.2074	-0.2343
US23N; 24.408-24.525	Dillmont - Lazelle	-0.0024	-0.0139	-0.0144	-0.2349	-0.2656
US23N; 24.527-24.606	Lazelle - Old Lazelle	-0.0012	-0.0071	-0.0074	-0.1285	-0.1442
US23; 0	Old Lazelle Rd Del	0.0178	0.0622	0.0652	-0.6932	-0.548
US23; 0.201	Carrington Ridge Dr	-0.0172	-0.0667	-0.0766	-1.1755	-1.336
US23; 0.402	Mirada Dr	-0.0172	-0.0667	-0.0766	-0.5423	-0.7028
US23; 0.487	Olentangy Meadows Dr	-0.0052	-0.0243	-0.0221	0.2192	0.1676
US23; 0.623	Gold Meadows Dr	-0.002	-0.0114	-0.014	-0.1396	-0.167
US23N; 23.922	Northwoods S NB	-0.0022	-0.013	-0.016	-0.2772	-0.3084
US23N; 23.923	Northwoods S NB	-0.0022	-0.013	-0.016	-0.437	-0.4682
US23N; 24.13	Northwoods N	-0.1708	-0.8448	-1.299	-7.3622	-9.6768
US23N; 24.291	Highbluffs Blvd	-0.1592	-0.7864	-1.2081	-6.9189	-9.0726
US23N; 24.407	Dillmont Dr	0.3057	1.7379	2.1403	25.1995	29.3834
US23N; 24.526	Lazelle Rd	-0.2637	-1.3177	-2.0403	-10.8546	-14.4763



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 0.001-0.2	Old Lazelle - Carrington Ridge	0.0286	0.1996	0.1917	1.1801	1.6	
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0307	0.2152	0.2055	1.2739	1.7253	
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.0136	0.0957	0.0904	0.5683	0.768	
US23; 0.489-0.622	Olentangy Meadows - Gold Meadows	0.0202	0.1425	0.1345	0.8459	1.1431	
US23; 0.624-0.7	N or Gold Meadows	0.0119	0.0827	0.0795	0.4886	0.6627	
US23N; 23.922-24.129	South of Northwoods N	0.0297	0.2349	0.2156	1.4304	1.9106	
US23N; 24.131-24.29	Northwoods - Highbluffs	0.0236	0.165	0.1582	0.9757	1.3225	
US23N; 24.293-24.406	Highbluffs - Dillmont	0.0143	0.1007	0.0956	0.5972	0.8078	
US23N; 24.408-24.526	Dillmont - Lazelle	0.0169	0.1177	0.1128	0.6963	0.9437	
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.0124	0.0861	0.083	0.5082	0.6897	
US23; 0	Old Lazelle Rd Del	0.0951	0.3602	0.4197	2.9267	3.8017	
US23; 0.201	Carrington Ridge Dr	0.065	0.25	0.2941	1.8135	2.4226	
US23; 0.402	Mirada Dr	0.065	0.25	0.2941	1.8135	2.4226	
US23; 0.487	Olentangy Meadows CRs	0.1595	0.4092	0.3792	1.0983	2.0462	
US23; 0.622	Gold Meadows Dr	0.0114	0.0663	0.0737	0.6698	0.8212	
US23N; 24.129	Northwoods N	0.1486	0.3811	0.3531	1.0228	1.9056	
US23N; 24.291	Highbluffs/Windsong	0.1158	0.297	0.2752	0.8553	1.5433	
US23N; 24.408	Dillmont	0.0134	0.0781	0.0849	0.9821	1.1585	
US23N; 24.526	Lazelle CR	0.1986	0.7308	0.8346	7.2063	8.9703	
US23N; 24.607	Old Lazelle Rd Fra	0.0951	0.3602	0.4197	2.9267	3.8017	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.0938	0.1043		0.0612
Head On	1.2382	0.7145		0.5162
Rear End	36.3210	20.7966		17.0902
Backing	1.4918	1.2025		0.8385
Sideswipe - Meeting	0.3316	0.2520		0.1582
Sideswipe - Passing	8.9527	12.2120		4.8272
Angle	12.7864	18.8581		6.4330
Parked Vehicle	0.6041	1.2452		0.3721
Pedestrian	0.2579	0.2579		0.1866
Animal	1.0279	1.0617		1.7551
Train	0.0185	0.0161		0.0035
Pedalcycles	0.1365	0.1365		0.0982
Other Non-Vehicle	0.0003	0.0003		0.0007
Fixed Object	4.8664	5.0180		5.1410
Other Object	0.2192	0.2724		0.2217
Overturning	0.2216	0.2536		0.2134
Other Non-Collision	0.4211	0.3884		0.4082
Left Turn	6.8902	4.5996		1.9264
Right Turn	2.9722	2.0748		1.9708



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-13.369	(\$7,275,208)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-5.166	\$3,682,346
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-18.821	\$21,741,345
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-37.356	\$18,148,483



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator

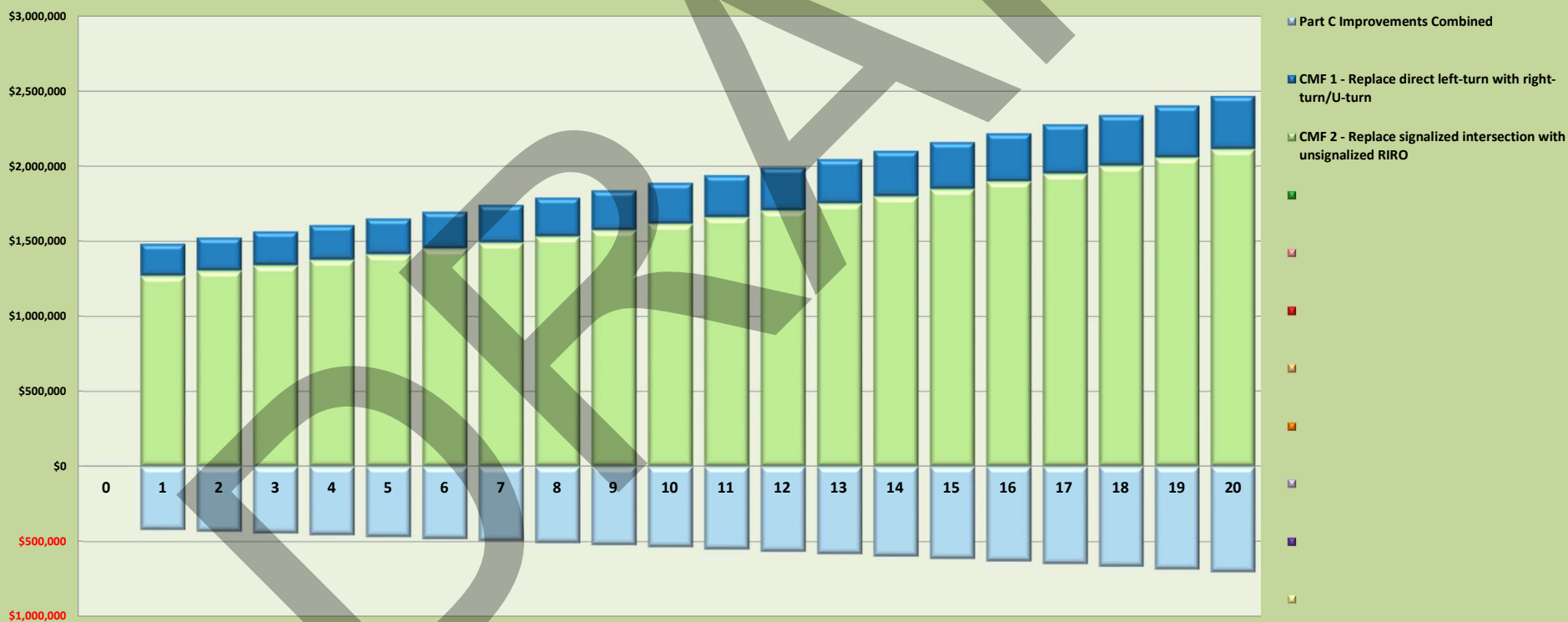
Net Present Value of Project	\$6.00
Net Present Value of Safety Benefits	\$18,148,482.80
Net Benefit	\$18,148,476.80
Benefit / Cost Ratio	3024747.13

Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes	-0.756
Number of Injury Crashes	-12.781
Number of Total Crashes	-37.356

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



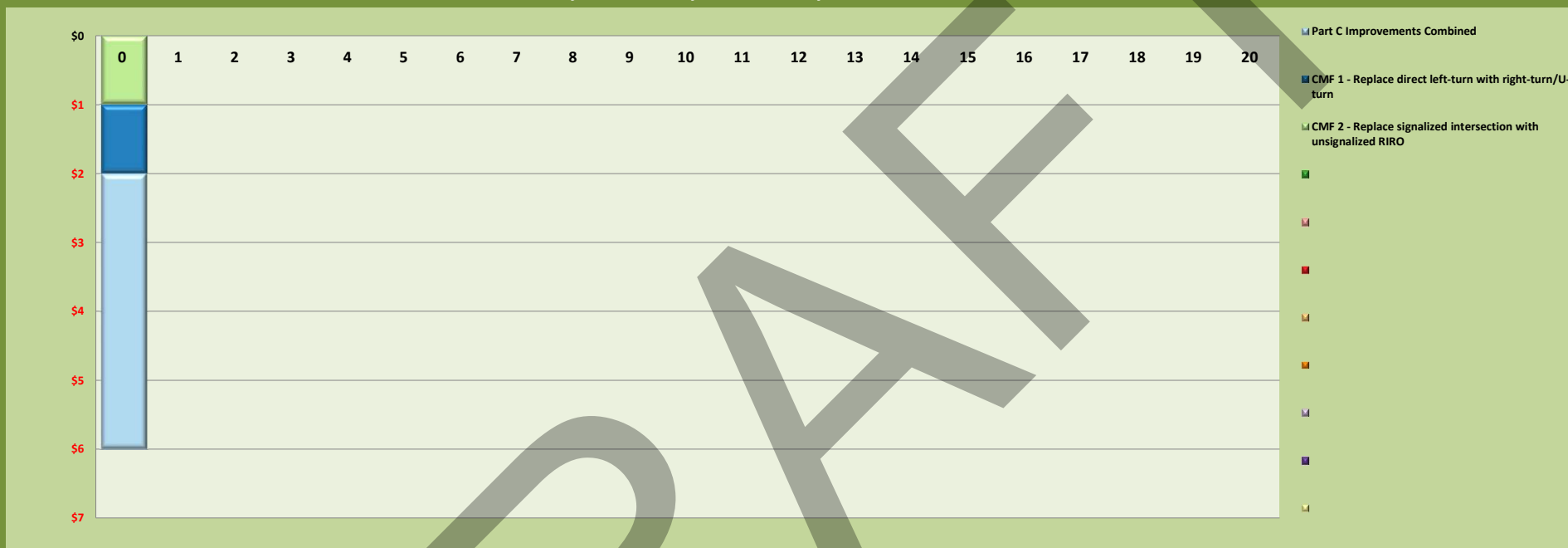


Safety Benefit - Cost Analysis

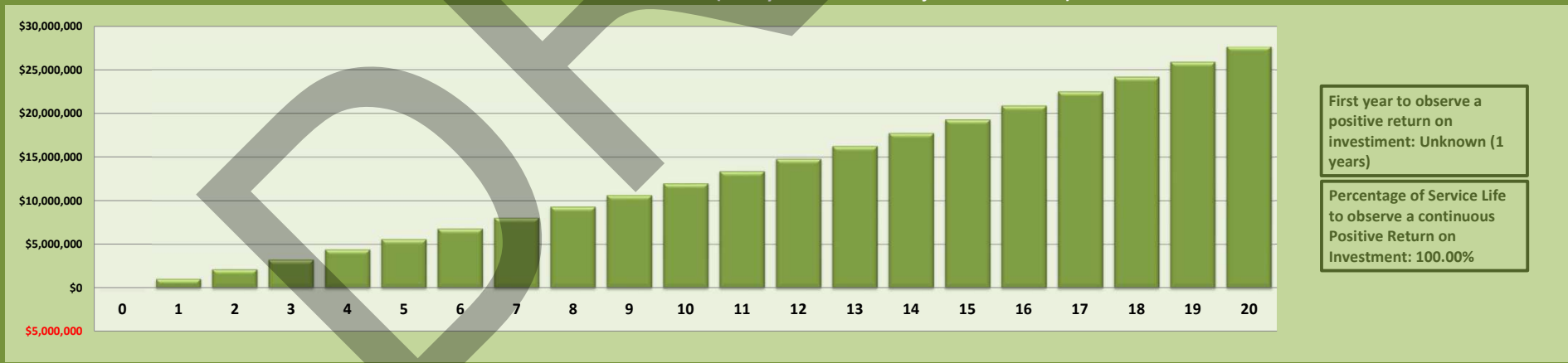
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



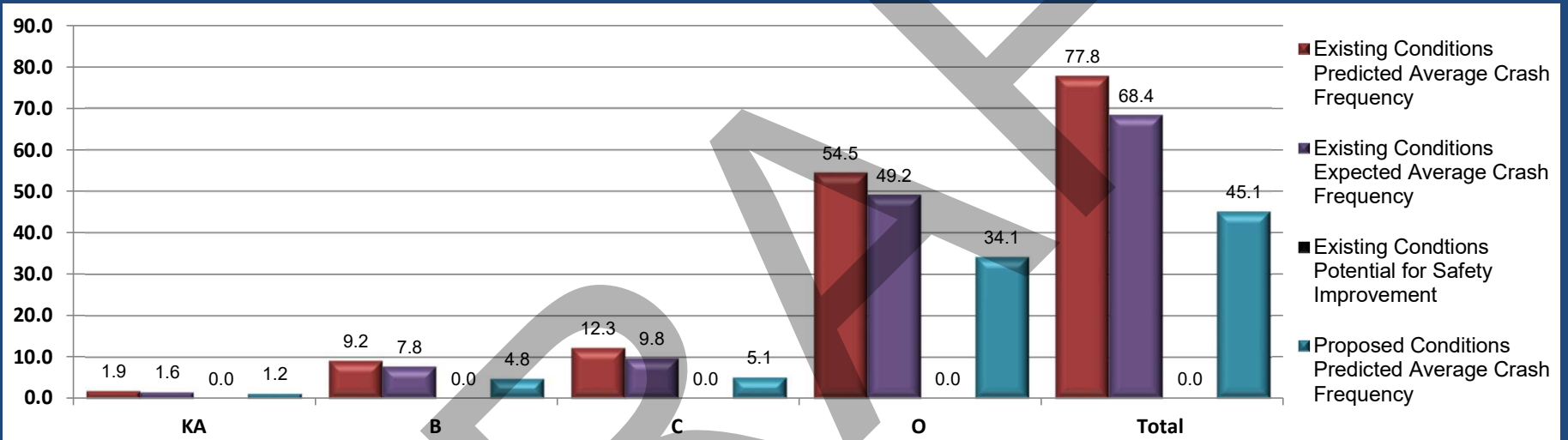


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.9254	9.1571	12.2860	54.4550	77.8235
N_{expected} - Existing Conditions	1.6149	7.8445	9.7551	49.1890	68.4035
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	1.1664	4.7980	5.0892	34.0691	45.1227



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0438	0.2229	0.2217	1.2762	1.7646	
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0445	0.2259	0.2254	1.3003	1.7961	
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.0187	0.0941	0.0946	0.5482	0.7556	
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	0.0291	0.1469	0.1477	0.8558	1.1795	
US23; 0.624-0.7	N or Gold Meadows	0.0173	0.0884	0.0879	0.5049	0.6985	
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0444	0.2297	0.232	1.3532	1.8593	
US23N; 24.131-24.29	Northwoods - Highbluffs	0.0335	0.17	0.1693	0.975	1.3478	
US23N; 24.292-24.406	Highbluffs - Dillmont	0.0219	0.1109	0.1111	0.6425	0.8864	
US23N; 24.408-24.525	Dillmont - Lazelle	0.0242	0.1232	0.1227	0.7068	0.9769	
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.0172	0.0879	0.0872	0.5007	0.693	
US23; 0	Old Lazelle Rd Del	0.0933	0.3389	0.3796	2.3493	3.1611	
US23; 0.201	Carrington Ridge Dr	0.0949	0.35	0.3961	2.1639	3.0049	
US23; 0.402	Mirada Dr	0.0949	0.35	0.3961	2.1639	3.0049	
US23; 0.487	Olentangy Meadows Dr	0.1646	0.9403	1.2256	3.1665	5.497	
US23; 0.623	Gold Meadows Dr	0.0114	0.0663	0.0737	0.6698	0.8212	
US23N; 23.922	Northwoods S NB	0.0128	0.075	0.082	0.9022	1.072	
US23N; 23.923	Northwoods S NB	0.0128	0.075	0.082	0.9022	1.072	
US23N; 24.13	Northwoods N	0.3446	1.629	2.4312	9.7717	14.1765	
US23N; 24.291	Highbluffs Blvd	0.3293	1.5538	2.3157	9.2992	13.498	
US23N; 24.407	Dillmont Dr	0.0134	0.0781	0.0849	0.9821	1.1585	
US23N; 24.526	Lazelle Rd	0.4588	2.2008	3.3195	13.4206	19.3997	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0707	0.3734	0.3776	1.357	2.1787
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0368	0.1826	0.1807	1.2067	1.6068
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.017	0.085	0.0851	0.3865	0.5736
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	0.0254	0.1259	0.1258	0.5198	0.7969
US23; 0.624-0.7	N or Gold Meadows	0.0161	0.0812	0.0804	0.3735	0.5512
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0478	0.2494	0.2526	0.6745	1.2243
US23N; 24.131-24.29	Northwoods - Highbluffs	0.029	0.1448	0.1431	0.5822	0.8991
US23N; 24.292-24.406	Highbluffs - Dillmont	0.0197	0.0988	0.0985	0.4351	0.6521
US23N; 24.408-24.525	Dillmont - Lazelle	0.0218	0.1093	0.1083	0.4719	0.7113
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.016	0.0808	0.0798	0.3722	0.5488
US23; 0	Old Lazelle Rd Del	0.1111	0.4011	0.4448	1.6561	2.6131
US23; 0.201	Carrington Ridge Dr	0.0777	0.2833	0.3195	0.9884	1.6689
US23; 0.402	Mirada Dr	0.0777	0.2833	0.3195	1.6216	2.3021
US23; 0.487	Olentangy Meadows Dr	0.1594	0.916	1.2035	3.3857	5.6646
US23; 0.623	Gold Meadows Dr	0.0094	0.0549	0.0597	0.5302	0.6542
US23N; 23.922	Northwoods S NB	0.0106	0.062	0.066	0.625	0.7636
US23N; 23.923	Northwoods S NB	0.0106	0.062	0.066	0.4652	0.6038
US23N; 24.13	Northwoods N	0.1738	0.7842	1.1322	2.4095	4.4997
US23N; 24.291	Highbluffs Blvd	0.1701	0.7674	1.1076	2.3803	4.4254
US23N; 24.407	Dillmont Dr	0.3191	1.816	2.2252	26.1816	30.5419
US23N; 24.526	Lazelle Rd	0.1951	0.8831	1.2792	2.566	4.9234



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0269	0.1505	0.1559	0.0808	0.4141
US23; 0.202-0.401	Carrington Ridge - Mirada	-0.0077	-0.0433	-0.0447	-0.0936	-0.1893
US23; 0.403-0.486	Mirada - Olentangy Meadows	-0.0017	-0.0091	-0.0095	-0.1617	-0.182
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	-0.0037	-0.021	-0.0219	-0.336	-0.3826
US23; 0.624-0.7	N or Gold Meadows	-0.0012	-0.0072	-0.0075	-0.1314	-0.1473
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0034	0.0197	0.0206	-0.6787	-0.635
US23N; 24.131-24.29	Northwoods - Highbluffs	-0.0045	-0.0252	-0.0262	-0.3928	-0.4487
US23N; 24.292-24.406	Highbluffs - Dillmont	-0.0022	-0.0121	-0.0126	-0.2074	-0.2343
US23N; 24.408-24.525	Dillmont - Lazelle	-0.0024	-0.0139	-0.0144	-0.2349	-0.2656
US23N; 24.527-24.606	Lazelle - Old Lazelle	-0.0012	-0.0071	-0.0074	-0.1285	-0.1442
US23; 0	Old Lazelle Rd Del	0.0178	0.0622	0.0652	-0.6932	-0.548
US23; 0.201	Carrington Ridge Dr	-0.0172	-0.0667	-0.0766	-1.1755	-1.336
US23; 0.402	Mirada Dr	-0.0172	-0.0667	-0.0766	-0.5423	-0.7028
US23; 0.487	Olentangy Meadows Dr	-0.0052	-0.0243	-0.0221	0.2192	0.1676
US23; 0.623	Gold Meadows Dr	-0.002	-0.0114	-0.014	-0.1396	-0.167
US23N; 23.922	Northwoods S NB	-0.0022	-0.013	-0.016	-0.2772	-0.3084
US23N; 23.923	Northwoods S NB	-0.0022	-0.013	-0.016	-0.437	-0.4682
US23N; 24.13	Northwoods N	-0.1708	-0.8448	-1.299	-7.3622	-9.6768
US23N; 24.291	Highbluffs Blvd	-0.1592	-0.7864	-1.2081	-6.9189	-9.0726
US23N; 24.407	Dillmont Dr	0.3057	1.7379	2.1403	25.1995	29.3834
US23N; 24.526	Lazelle Rd	-0.2637	-1.3177	-2.0403	-10.8546	-14.4763



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 0.001-0.2	Old Lazelle - Carrington Ridge	0.0286	0.1996	0.1917	1.1801	1.6	
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0307	0.2152	0.2055	1.2739	1.7253	
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.0136	0.0957	0.0904	0.5683	0.768	
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	0.0203	0.1435	0.1356	0.8521	1.1515	
US23; 0.624-0.7	N or Gold Meadows	0.0119	0.0827	0.0795	0.4886	0.6627	
US23N; 23.922-24.129	South of Northwoods N	0.0297	0.2349	0.2156	1.4304	1.9106	
US23N; 24.131-24.29	Northwoods - Highbluffs	0.0236	0.165	0.1582	0.9757	1.3225	
US23N; 24.293-24.406	Highbluffs - Dillmont	0.0143	0.1007	0.0956	0.5972	0.8078	
US23N; 24.408-24.526	Dillmont - Lazelle	0.0169	0.1177	0.1128	0.6963	0.9437	
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.0124	0.0861	0.083	0.5082	0.6897	
US23; 0	Old Lazelle Rd Del	0.0951	0.3602	0.4197	2.9267	3.8017	
US23; 0.201	Carrington Ridge Dr	0.065	0.25	0.2941	1.8135	2.4226	
US23; 0.402	Mirada Dr	0.065	0.25	0.2941	1.8135	2.4226	
US23; 0.487	Olentangy Meadows Dr	0.1564	0.5832	0.6722	5.2816	6.6934	
US23; 0.622	Gold Meadows Dr	0.0114	0.0663	0.0737	0.6698	0.8212	
US23N; 24.129	Northwoods N	0.1486	0.3811	0.3531	1.0228	1.9056	
US23N; 24.291	Highbluffs/Windsong	0.1158	0.297	0.2752	0.8553	1.5433	
US23N; 24.408	Dillmont	0.0134	0.0781	0.0849	0.9821	1.1585	
US23N; 24.526	Lazelle CR	0.1986	0.7308	0.8346	7.2063	8.9703	
US23N; 24.607	Old Lazelle Rd Fra	0.0951	0.3602	0.4197	2.9267	3.8017	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
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Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.0938	0.1043		0.0699
Head On	1.2382	0.7145		0.6227
Rear End	36.3210	20.7966		19.4296
Backing	1.4918	1.2025		0.9745
Sideswipe - Meeting	0.3316	0.2520		0.1712
Sideswipe - Passing	8.9527	12.2120		5.3166
Angle	12.7864	18.8581		6.5900
Parked Vehicle	0.6041	1.2452		0.4295
Pedestrian	0.2579	0.2579		0.2015
Animal	1.0279	1.0617		1.7564
Train	0.0185	0.0161		0.0045
Pedalcycles	0.1365	0.1365		0.0983
Other Non-Vehicle	0.0003	0.0003		0.0009
Fixed Object	4.8664	5.0180		6.0368
Other Object	0.2192	0.2724		0.2517
Overturning	0.2216	0.2536		0.2351
Other Non-Collision	0.4211	0.3884		0.4771
Left Turn	6.8902	4.5996		2.3496
Right Turn	2.9722	2.0748		1.8636



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-14.113	(\$634,556)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-6.782	\$4,793,144
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-11.806	\$13,559,838
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-32.701	\$17,718,426



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator

Expected Annual Crash Adjustment

Comments:

Net Present Value of Project **\$6.00**

Net Present Value of Safety Benefits **\$17,718,425.94**

Net Benefit **\$17,718,419.94**

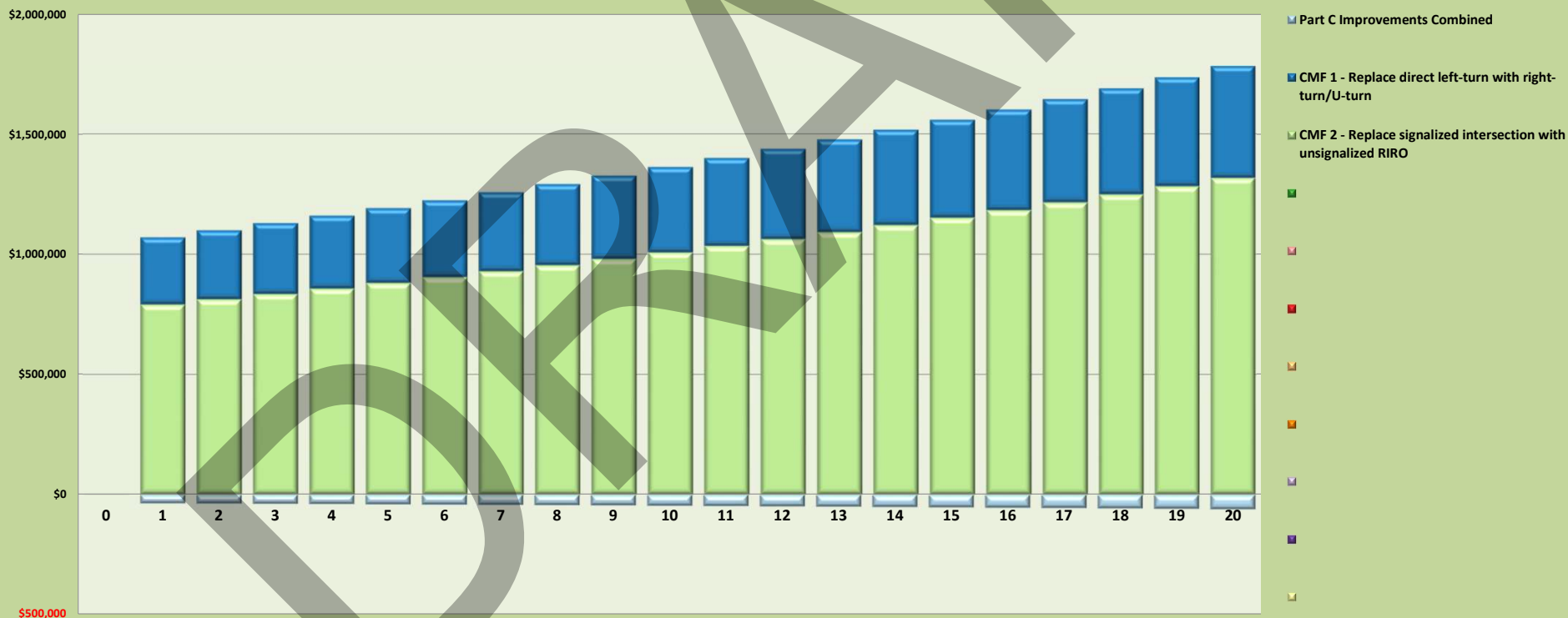
Benefit / Cost Ratio **2953070.99**

Number of Fatal & Incapacitating Injury Crashes **-0.759**

Number of Injury Crashes **-12.315**

Number of Total Crashes **-32.701**

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



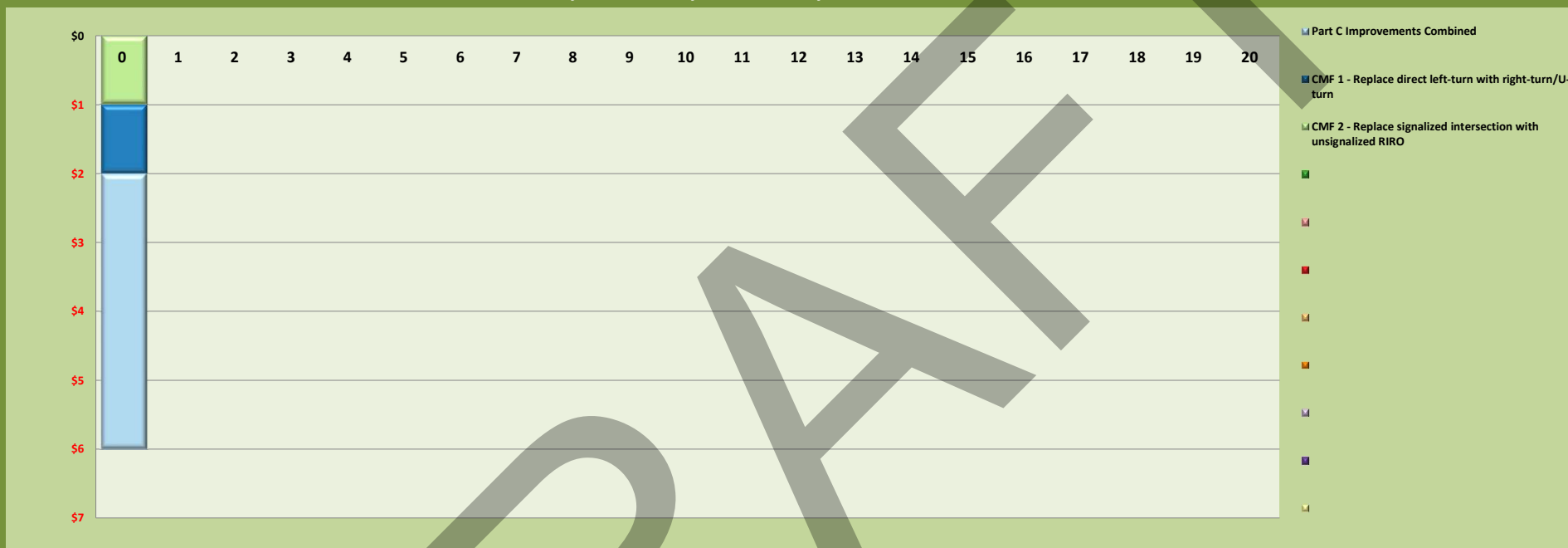


Safety Benefit - Cost Analysis

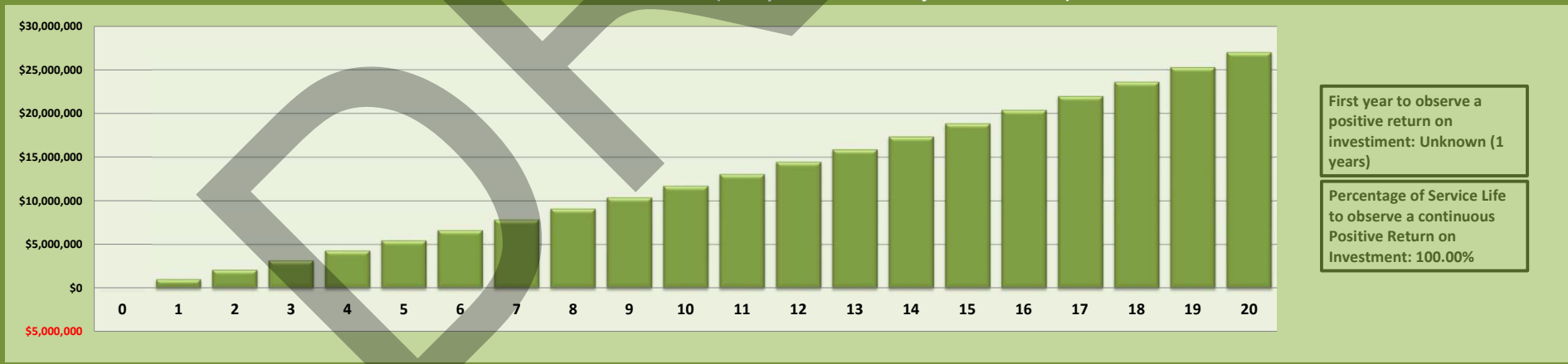
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



First year to observe a positive return on investment: Unknown (1 years)

Percentage of Service Life to observe a continuous Positive Return on Investment: 100.00%

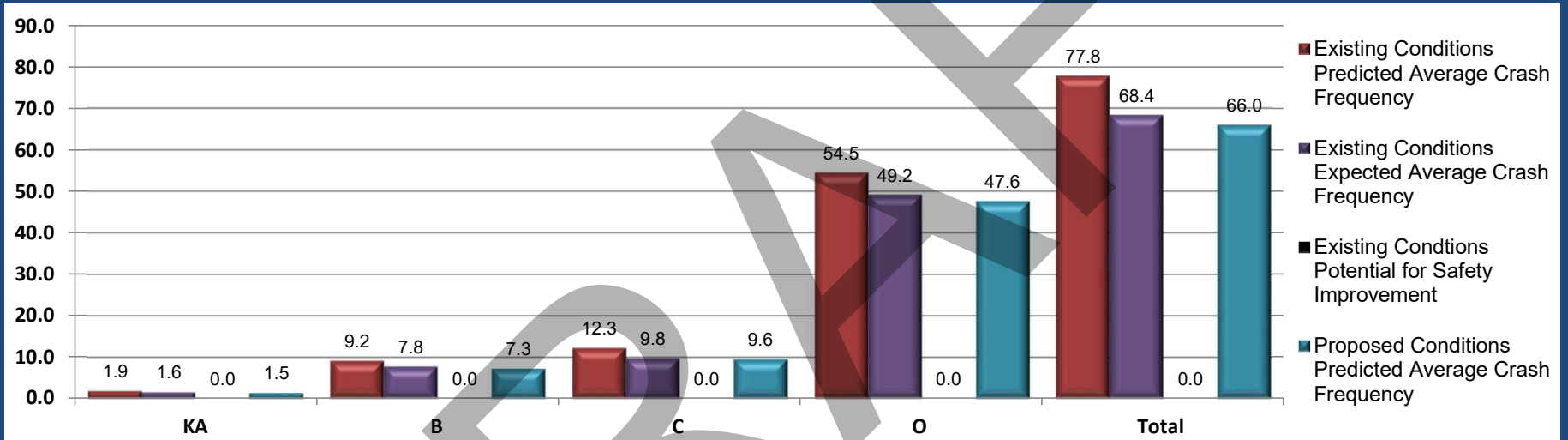


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N Alt D	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.9254	9.1571	12.2860	54.4550	77.8235
N_{expected} - Existing Conditions	1.6149	7.8445	9.7551	49.1890	68.4035
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	1.5057	7.3408	9.5575	47.5721	65.9761



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N Alt D	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0438	0.2229	0.2217	1.2762	1.7646	
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0445	0.2259	0.2254	1.3003	1.7961	
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.0187	0.0941	0.0946	0.5482	0.7556	
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	0.0291	0.1469	0.1477	0.8558	1.1795	
US23; 0.624-0.7	N or Gold Meadows	0.0173	0.0884	0.0879	0.5049	0.6985	
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0444	0.2297	0.232	1.3532	1.8593	
US23N; 24.131-24.29	Northwoods - Highbluffs	0.0335	0.17	0.1693	0.975	1.3478	
US23N; 24.292-24.406	Highbluffs - Dillmont	0.0219	0.1109	0.1111	0.6425	0.8864	
US23N; 24.408-24.525	Dillmont - Lazelle	0.0242	0.1232	0.1227	0.7068	0.9769	
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.0172	0.0879	0.0872	0.5007	0.693	
US23; 0	Old Lazelle Rd Del	0.0933	0.3389	0.3796	2.3493	3.1611	
US23; 0.201	Carrington Ridge Dr	0.0949	0.35	0.3961	2.1639	3.0049	
US23; 0.402	Mirada Dr	0.0949	0.35	0.3961	2.1639	3.0049	
US23; 0.487	Olentangy Meadows Dr	0.1646	0.9403	1.2256	3.1665	5.497	
US23; 0.623	Gold Meadows Dr	0.0114	0.0663	0.0737	0.6698	0.8212	
US23N; 23.922	Northwoods S NB	0.0128	0.075	0.082	0.9022	1.072	
US23N; 23.923	Northwoods S NB	0.0128	0.075	0.082	0.9022	1.072	
US23N; 24.13	Northwoods N	0.3446	1.629	2.4312	9.7717	14.1765	
US23N; 24.291	Highbluffs Blvd	0.3293	1.5538	2.3157	9.2992	13.498	
US23N; 24.407	Dillmont Dr	0.0134	0.0781	0.0849	0.9821	1.1585	
US23N; 24.526	Lazelle Rd	0.4588	2.2008	3.3195	13.4206	19.3997	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N Alt D	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0707	0.3734	0.3776	1.357	2.1787
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0368	0.1826	0.1807	1.2067	1.6068
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.017	0.085	0.0851	0.3865	0.5736
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	0.0254	0.1259	0.1258	0.5198	0.7969
US23; 0.624-0.7	N or Gold Meadows	0.0161	0.0812	0.0804	0.3735	0.5512
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0478	0.2494	0.2526	0.6745	1.2243
US23N; 24.131-24.29	Northwoods - Highbluffs	0.029	0.1448	0.1431	0.5822	0.8991
US23N; 24.292-24.406	Highbluffs - Dillmont	0.0197	0.0988	0.0985	0.4351	0.6521
US23N; 24.408-24.525	Dillmont - Lazelle	0.0218	0.1093	0.1083	0.4719	0.7113
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.016	0.0808	0.0798	0.3722	0.5488
US23; 0	Old Lazelle Rd Del	0.1111	0.4011	0.4448	1.6561	2.6131
US23; 0.201	Carrington Ridge Dr	0.0777	0.2833	0.3195	0.9884	1.6689
US23; 0.402	Mirada Dr	0.0777	0.2833	0.3195	1.6216	2.3021
US23; 0.487	Olentangy Meadows Dr	0.1594	0.916	1.2035	3.3857	5.6646
US23; 0.623	Gold Meadows Dr	0.0094	0.0549	0.0597	0.5302	0.6542
US23N; 23.922	Northwoods S NB	0.0106	0.062	0.066	0.625	0.7636
US23N; 23.923	Northwoods S NB	0.0106	0.062	0.066	0.4652	0.6038
US23N; 24.13	Northwoods N	0.1738	0.7842	1.1322	2.4095	4.4997
US23N; 24.291	Highbluffs Blvd	0.1701	0.7674	1.1076	2.3803	4.4254
US23N; 24.407	Dillmont Dr	0.3191	1.816	2.2252	26.1816	30.5419
US23N; 24.526	Lazelle Rd	0.1951	0.8831	1.2792	2.566	4.9234



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N Alt D	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0269	0.1505	0.1559	0.0808	0.4141
US23; 0.202-0.401	Carrington Ridge - Mirada	-0.0077	-0.0433	-0.0447	-0.0936	-0.1893
US23; 0.403-0.486	Mirada - Olentangy Meadows	-0.0017	-0.0091	-0.0095	-0.1617	-0.182
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	-0.0037	-0.021	-0.0219	-0.336	-0.3826
US23; 0.624-0.7	N or Gold Meadows	-0.0012	-0.0072	-0.0075	-0.1314	-0.1473
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0034	0.0197	0.0206	-0.6787	-0.635
US23N; 24.131-24.29	Northwoods - Highbluffs	-0.0045	-0.0252	-0.0262	-0.3928	-0.4487
US23N; 24.292-24.406	Highbluffs - Dillmont	-0.0022	-0.0121	-0.0126	-0.2074	-0.2343
US23N; 24.408-24.525	Dillmont - Lazelle	-0.0024	-0.0139	-0.0144	-0.2349	-0.2656
US23N; 24.527-24.606	Lazelle - Old Lazelle	-0.0012	-0.0071	-0.0074	-0.1285	-0.1442
US23; 0	Old Lazelle Rd Del	0.0178	0.0622	0.0652	-0.6932	-0.548
US23; 0.201	Carrington Ridge Dr	-0.0172	-0.0667	-0.0766	-1.1755	-1.336
US23; 0.402	Mirada Dr	-0.0172	-0.0667	-0.0766	-0.5423	-0.7028
US23; 0.487	Olentangy Meadows Dr	-0.0052	-0.0243	-0.0221	0.2192	0.1676
US23; 0.623	Gold Meadows Dr	-0.002	-0.0114	-0.014	-0.1396	-0.167
US23N; 23.922	Northwoods S NB	-0.0022	-0.013	-0.016	-0.2772	-0.3084
US23N; 23.923	Northwoods S NB	-0.0022	-0.013	-0.016	-0.437	-0.4682
US23N; 24.13	Northwoods N	-0.1708	-0.8448	-1.299	-7.3622	-9.6768
US23N; 24.291	Highbluffs Blvd	-0.1592	-0.7864	-1.2081	-6.9189	-9.0726
US23N; 24.407	Dillmont Dr	0.3057	1.7379	2.1403	25.1995	29.3834
US23N; 24.526	Lazelle Rd	-0.2637	-1.3177	-2.0403	-10.8546	-14.4763



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N Alt D	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 0-0.2	Old Lazelle - Carrington Ridge	0.0288	0.2006	0.1927	1.186	1.6081	
US23; 0.202-0.401	Carrington Ridge - Mirada	0.0307	0.2152	0.2055	1.2739	1.7253	
US23; 0.403-0.486	Mirada - Olentangy Meadows	0.0136	0.0957	0.0904	0.5683	0.768	
US23; 0.488-0.622	Olentangy Meadows - Gold Meadows	0.0203	0.1435	0.1356	0.8521	1.1515	
US23; 0.624-0.7	N of Gold Meadows	0.0119	0.0827	0.0795	0.4886	0.6627	
US23N; 23.925-24.129	Northwoods S - Northwoods N	0.0293	0.2316	0.2124	1.4097	1.883	
US23N; 24.131-24.29	Northwoods - Highbluffs	0.0236	0.165	0.1582	0.9757	1.3225	
US23N; 24.292-24.406	Highbluffs - Dillmont	0.0145	0.1016	0.0964	0.6024	0.8149	
US23N; 24.408-24.525	Dillmont - Lazelle	0.0169	0.1177	0.1128	0.6963	0.9437	
US23N; 24.527-24.606	Lazelle - Old Lazelle	0.0124	0.0861	0.083	0.5082	0.6897	
US23; 0	Old Lazelle Rd Del	0.0951	0.3602	0.4197	2.9267	3.8017	
US23; 0.201	Carrington Ridge Dr	0.065	0.25	0.2941	1.8135	2.4226	
US23; 0.402	Mirada Dr	0.065	0.25	0.2941	1.8135	2.4226	
US23; 0.487	Olentangy Meadows Dr	0.1287	0.7259	0.9731	2.8895	4.7172	
US23; 0.622	Gold Meadows Dr	0.0114	0.0663	0.0737	0.6698	0.8212	
US23N; 23.923	Northwoods S SB	0.0128	0.075	0.082	0.9022	1.072	
US23N; 23.924	Northwoods S NB	0.0128	0.075	0.082	0.9022	1.072	
US23N; 24.13	Northwoods N	0.3051	1.4424	2.1527	8.652	12.5522	
US23N; 24.29	Highbluffs/Windsong	0.1158	0.297	0.2752	0.8553	1.5433	
US23N; 24.408	Dillmont Dr NB	0.0134	0.0781	0.0849	0.9821	1.1585	
US23N; 24.526	Lazelle Rd	0.3835	1.921	3.0398	13.6774	19.0217	
US23N; 24.607	Old Lazelle Rd Fra	0.0951	0.3602	0.4197	2.9267	3.8017	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N Alt D	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.0938	0.1043		0.0848
Head On	1.2382	0.7145		0.8944
Rear End	36.3210	20.7966		30.6987
Backing	1.4918	1.2025		1.3451
Sideswipe - Meeting	0.3316	0.2520		0.1646
Sideswipe - Passing	8.9527	12.2120		8.0513
Angle	12.7864	18.8581		9.7177
Parked Vehicle	0.6041	1.2452		0.5054
Pedestrian	0.2579	0.2579		0.2616
Animal	1.0279	1.0617		1.7610
Train	0.0185	0.0161		0.0154
Pedalcycles	0.1365	0.1365		0.1603
Other Non-Vehicle	0.0003	0.0003		0.0004
Fixed Object	4.8664	5.0180		5.3472
Other Object	0.2192	0.2724		0.2512
Overturning	0.2216	0.2536		0.2404
Other Non-Collision	0.4211	0.3884		0.4636
Left Turn	6.8902	4.5996		5.0810
Right Turn	2.9722	2.0748		2.6928



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N Alt D	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	2.437	(\$4,568,773)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-9.012	\$6,670,363
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-5.272	\$5,940,731
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-11.847	\$8,042,321



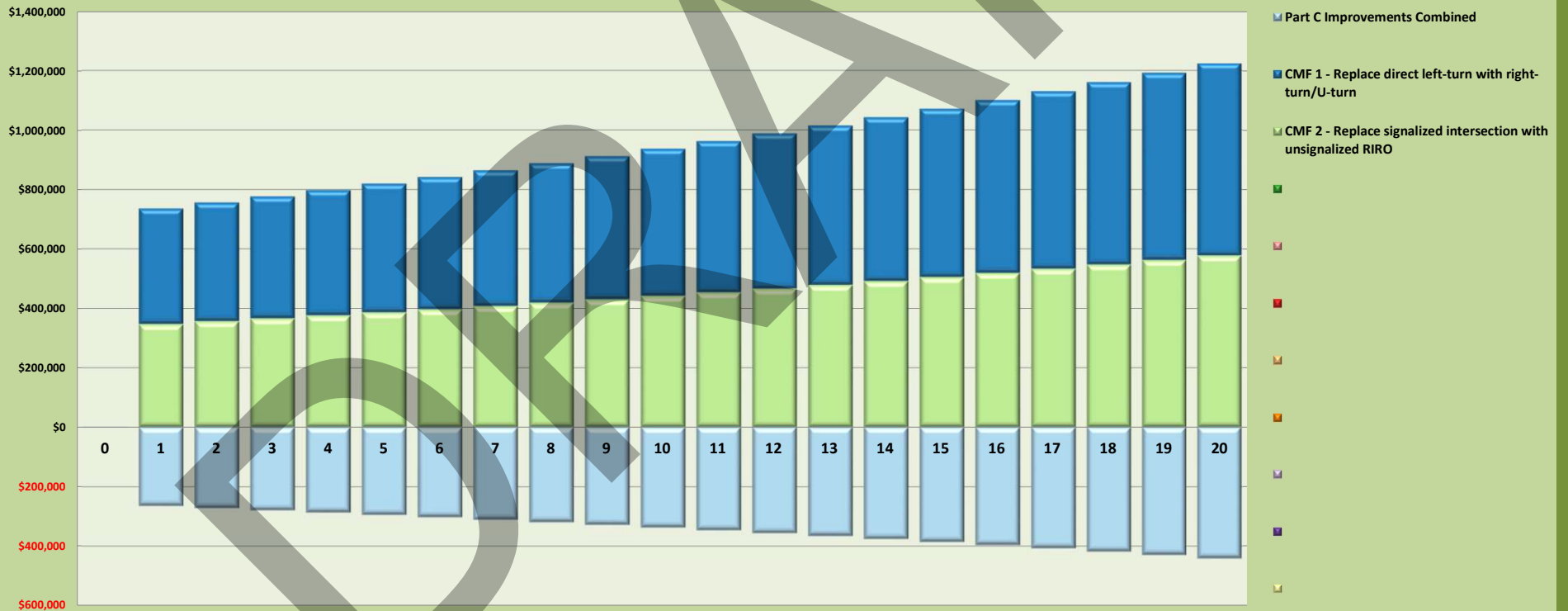
Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N Alt D	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator		Expected Annual Crash Adjustment		Comments:
Net Present Value of Project	\$6.00	Number of Fatal & Incapacitating Injury Crashes	-0.420	
Net Present Value of Safety Benefits	\$8,042,320.66	Number of Injury Crashes	-4.965	
Net Benefit	\$8,042,314.66	Number of Total Crashes	-11.847	
Benefit / Cost Ratio	1340386.78			

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



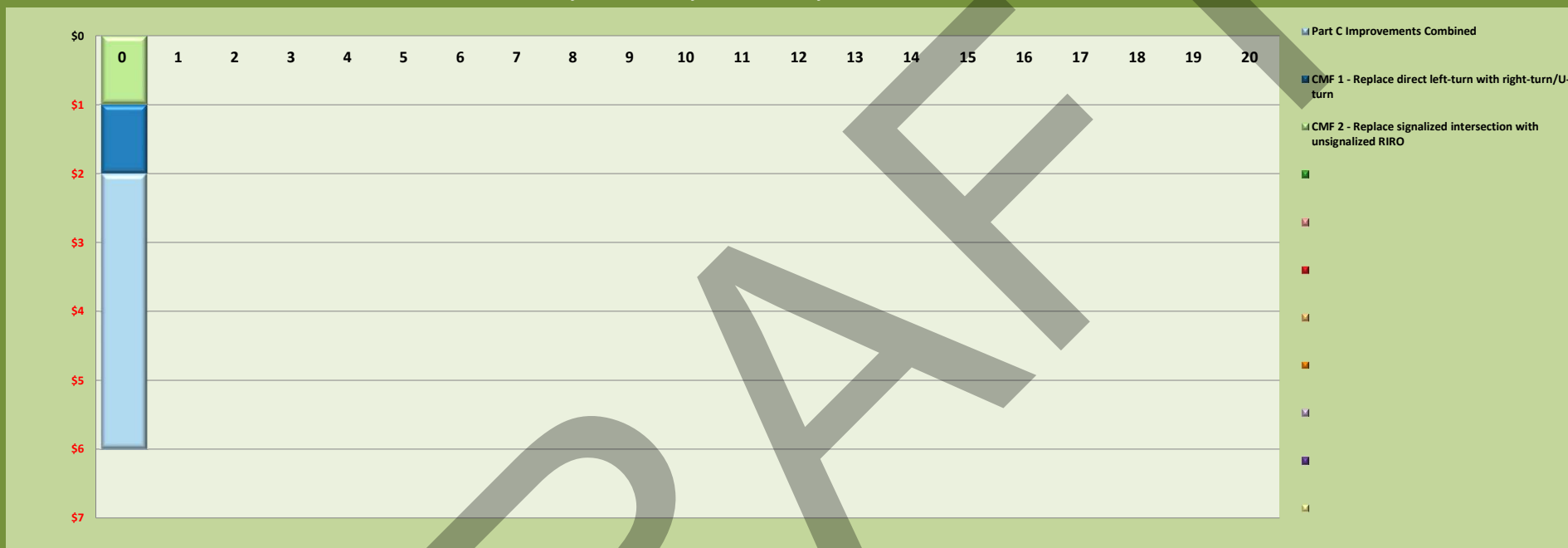


Safety Benefit - Cost Analysis

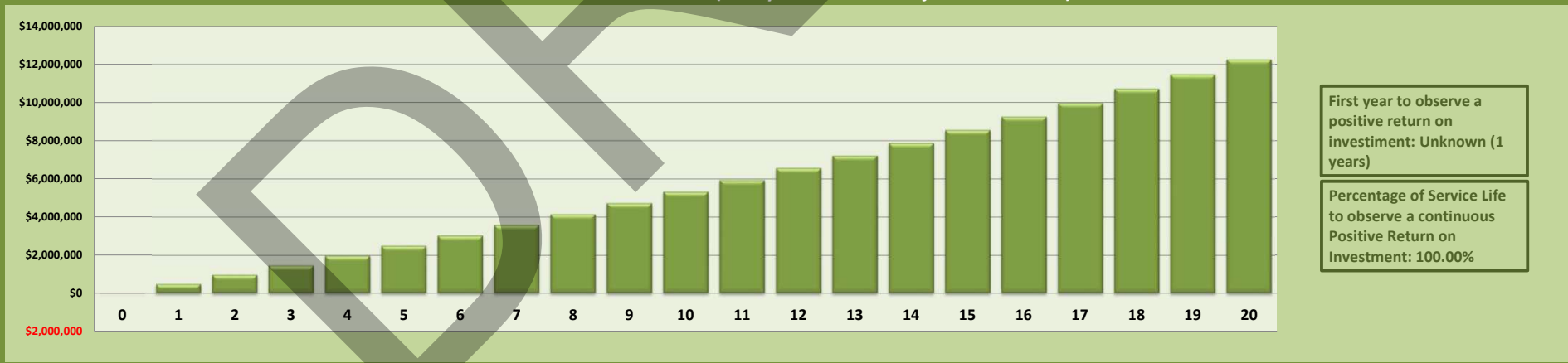
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 1N Alt D	Contact Phone	
Reference Number		Date Performed	
Analyst	IMA	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



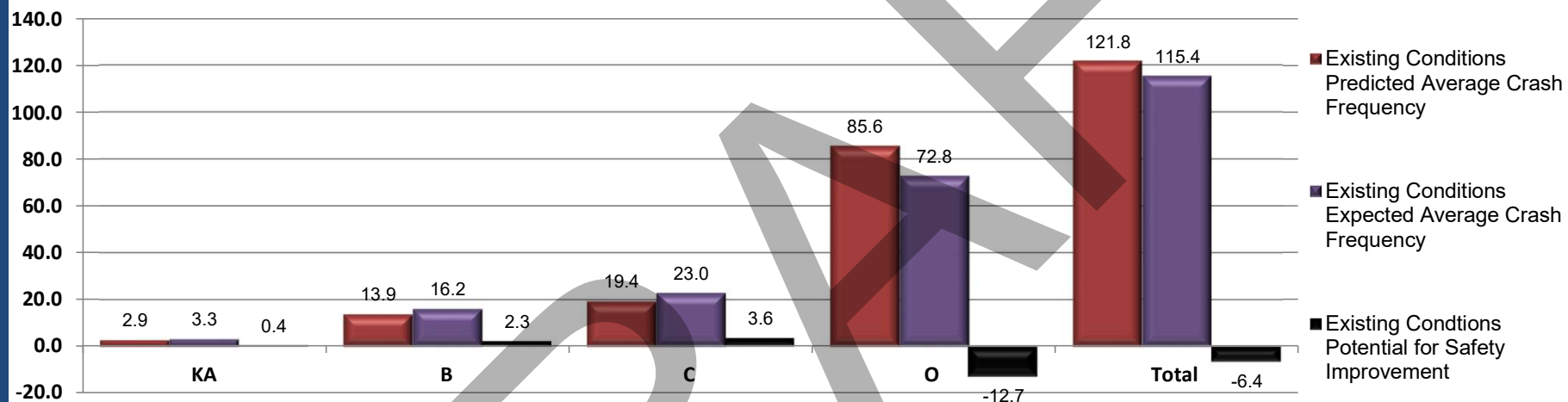


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.8871	13.9119	19.4415	85.5511	121.7916
N_{expected} - Existing Conditions	3.3228	16.2436	22.9968	72.8036	115.3668
$N_{\text{potential for improvement}}$ - Existing Conditions	0.4357	2.3317	3.5553	-12.7475	-6.4248



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0.7-1.114	S of Green Meadows	0.0883	0.4475	0.4486	2.5973	3.5817
US23; 1.114-1.397	Green Meadows - SR 750	0.06	0.3044	0.3048	1.7636	2.4328
US23; 1.397-1.506	SR 750 - Neverland	0.0237	0.121	0.1192	0.6793	0.9432
US23; 1.506-1.855	Meadow Park - Stone Bend	0.0702	0.3528	0.3538	2.0408	2.8176
US23; 1.855-2.069	Stone Bend - Windbrush	0.044	0.221	0.2217	1.2786	1.7653
US23; 2.069-2.206	Walmart Backdrive - Evergreen	0.028	0.1405	0.141	0.813	1.1225
US23; 2.206-2.346	Evergreen - Hidden Ravines	0.0261	0.131	0.1314	0.7579	1.0464
US23; 2.346-2.662	Hidden Ravines - Orange	0.0589	0.2964	0.2968	1.7106	2.3627
US23; 2.662-2.868	Orange - Parkway	0.0396	0.2004	0.1993	1.1429	1.5822
US23; 2.868-2.98	N of Parkway	0.021	0.1053	0.1057	0.6097	0.8417
US23; 1.114	Green Meadows	0.3839	1.8231	2.7299	11.0272	15.9641
US23; 1.397	SR 750	0.5129	2.4703	3.7367	15.0517	21.7716
US23; 1.506	Neverland	0.0124	0.0723	0.0792	0.8566	1.0205
US23; 1.57	Hornbeam	0.0128	0.0748	0.0819	0.8859	1.0554
US23; 1.637	Meijer Drive	0.0117	0.068	0.0752	0.7214	0.8763
US23; 1.727	Meadow Park	0.3789	1.8097	2.721	10.8391	15.7487
US23; 1.855	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.009	Windbrush	0.33	1.5683	2.3495	9.3429	13.5907
US23; 2.069	Walmart Backdrive	0.0124	0.0726	0.0797	0.8297	0.9944
US23; 2.206	Evergreen	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.346	Hidden Ravines	0.28	1.3201	1.9659	7.7916	11.3576
US23; 2.662	Orange	0.3864	1.8466	2.7778	11.0677	16.0785
US23; 2.868	Parkway	0.0708	0.2618	0.2968	1.5794	2.2088
US23; 1.856	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0.7-1.114	S of Green Meadows	0.1201	0.6248	0.6334	2.4493	3.8276
US23; 1.114-1.397	Green Meadows - SR 750	0.0767	0.3961	0.3994	1.3916	2.2638
US23; 1.397-1.506	SR 750 - Neverland	0.0215	0.1088	0.1066	0.5865	0.8234
US23; 1.506-1.855	Meadow Park - Stone Bend	0.077	0.3919	0.3948	1.6996	2.5633
US23; 1.855-2.069	Stone Bend - Windbrush	0.0362	0.1772	0.1763	0.9985	1.3882
US23; 2.069-2.206	Walmart Backdrive - Evergreen	0.0246	0.1213	0.121	0.5048	0.7717
US23; 2.206-2.346	Evergreen - Hidden Ravines	0.0231	0.1142	0.1139	0.8664	1.1176
US23; 2.346-2.662	Hidden Ravines - Orange	0.0675	0.3454	0.3479	0.7673	1.5281
US23; 2.662-2.868	Orange - Parkway	0.0351	0.17	0.1664	0.9591	1.3306
US23; 2.868-2.98	N of Parkway	0.019	0.0942	0.0941	0.5286	0.7359
US23; 1.114	Green Meadows	0.4027	1.9193	2.881	6.5175	11.7205
US23; 1.397	SR 750	0.8958	4.4364	6.8349	21.6785	33.8456
US23; 1.506	Neverland	0.0102	0.06	0.064	0.9196	1.0538
US23; 1.57	Hornbeam	0.0204	0.1181	0.1352	0.7774	1.0511
US23; 1.637	Meijer Drive	0.0096	0.0563	0.0609	0.6952	0.822
US23; 1.727	Meadow Park	0.3846	1.8364	2.7606	7.2395	12.2211
US23; 1.855	Stone Bend	0.0285	0.1634	0.1927	1.2613	1.6459
US23; 2.009	Windbrush	0.4026	1.9543	2.9713	5.9073	11.2355
US23; 2.069	Walmart Backdrive	0.0151	0.0877	0.0983	1.057	1.2581
US23; 2.206	Evergreen	0.0237	0.1366	0.1597	0.6952	1.0152
US23; 2.346	Hidden Ravines	0.1792	0.8252	1.2089	4.0138	6.2271
US23; 2.662	Orange	0.3772	1.8187	2.753	9.5077	14.4566
US23; 2.868	Parkway	0.0628	0.231	0.2616	1.3699	1.9253
US23; 1.856	Stone Bend	0.0096	0.0563	0.0609	0.412	0.5388



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 0.7-1.114	S of Green Meadows	0.0318	0.1773	0.1848	-0.148	0.2459
US23: 1.114-1.397	Green Meadows - SR 750	0.0167	0.0917	0.0946	-0.372	-0.169
US23: 1.397-1.506	SR 750 - Neverland	-0.0022	-0.0122	-0.0126	-0.0928	-0.1198
US23: 1.506-1.855	Meadow Park - Stone Bend	0.0068	0.0391	0.041	-0.3412	-0.2543
US23: 1.855-2.069	Stone Bend - Windbrush	-0.0078	-0.0438	-0.0454	-0.2801	-0.3771
US23: 2.069-2.206	Walmart Backdrive - Evergreen	-0.0034	-0.0192	-0.02	-0.3082	-0.3508
US23: 2.206-2.346	Evergreen - Hidden Ravines	-0.003	-0.0168	-0.0175	0.1085	0.0712
US23: 2.346-2.662	Hidden Ravines - Orange	0.0086	0.049	0.0511	-0.9433	-0.8346
US23: 2.662-2.868	Orange - Parkway	-0.0045	-0.0304	-0.0329	-0.1838	-0.2516
US23: 2.868-2.98	N of Parkway	-0.002	-0.0111	-0.0116	-0.0811	-0.1058
US23: 1.114	Green Meadows	0.0188	0.0962	0.1511	-4.5097	-4.2436
US23: 1.397	SR 750	0.3829	1.9661	3.0982	6.6268	12.074
US23: 1.506	Neverland	-0.0022	-0.0123	-0.0152	0.063	0.0333
US23: 1.57	Hornbeam	0.0076	0.0433	0.0533	-0.1085	-0.0043
US23: 1.637	Meijer Drive	-0.0021	-0.0117	-0.0143	-0.0262	-0.0543
US23: 1.727	Meadow Park	0.0057	0.0267	0.0396	-3.5996	-3.5276
US23: 1.855	Stone Bend	0.0168	0.0954	0.1175	0.5399	0.7696
US23: 2.009	Windbrush	0.0726	0.386	0.6218	-3.4356	-2.3552
US23: 2.069	Walmart Backdrive	0.0027	0.0151	0.0186	0.2273	0.2637
US23: 2.206	Evergreen	0.012	0.0686	0.0845	-0.0262	0.1389
US23: 2.346	Hidden Ravines	-0.1008	-0.4949	-0.757	-3.7778	-5.1305
US23: 2.662	Orange	-0.0092	-0.0279	-0.0248	-1.56	-1.6219
US23: 2.868	Parkway	-0.008	-0.0308	-0.0352	-0.2095	-0.2835
US23: 1.856	Stone Bend	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

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Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.1333	0.1440	0.0107	
Head On	1.9380	2.0326	0.0946	
Rear End	58.7408	54.2913	-4.4495	
Backing	2.3188	1.9836	-0.3352	
Sideswipe - Meeting	0.4965	0.4447	-0.0518	
Sideswipe - Passing	14.1337	12.6204	-1.5133	
Angle	20.2418	20.2792	0.0375	
Parked Vehicle	0.8500	0.9101	0.0601	
Pedestrian	0.3949	0.3949	0.0000	
Animal	1.6548	1.8515	0.1967	
Train	0.0088	0.0088	0.0000	
Pedalcycles	0.2256	0.2256	0.0000	
Other Non-Vehicle	0.0001	0.0001	0.0000	
Fixed Object	5.1757	5.3869	0.2112	
Other Object	0.2454	0.2692	0.0238	
Overturning	0.3165	0.3003	-0.0161	
Other Non-Collision	0.4287	0.4568	0.0281	
Left Turn	11.2314	11.1930	-0.0385	
Right Turn	4.9132	4.4255	-0.4876	

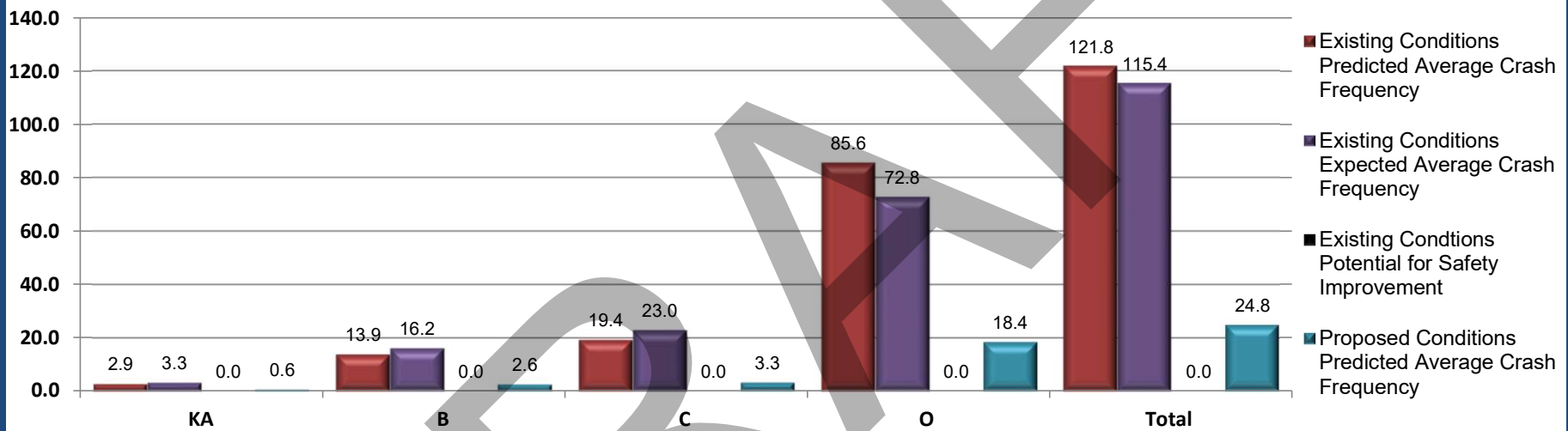


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.8871	13.9119	19.4415	85.5511	121.7916
N_{expected} - Existing Conditions	3.3228	16.2436	22.9968	72.8036	115.3668
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	0.5764	2.5559	3.3244	18.3918	24.8485



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0.7-1.114	S of Green Meadows	0.0883	0.4475	0.4486	2.5973	3.5817
US23; 1.114-1.397	Green Meadows - SR 750	0.06	0.3044	0.3048	1.7636	2.4328
US23; 1.397-1.506	SR 750 - Neverland	0.0237	0.121	0.1192	0.6793	0.9432
US23; 1.506-1.855	Meadow Park - Stone Bend	0.0702	0.3528	0.3538	2.0408	2.8176
US23; 1.855-2.069	Stone Bend - Windbrush	0.044	0.221	0.2217	1.2786	1.7653
US23; 2.069-2.206	Walmart Backdrive - Evergreen	0.028	0.1405	0.141	0.813	1.1225
US23; 2.206-2.346	Evergreen - Hidden Ravines	0.0261	0.131	0.1314	0.7579	1.0464
US23; 2.346-2.662	Hidden Ravines - Orange	0.0589	0.2964	0.2968	1.7106	2.3627
US23; 2.662-2.868	Orange - Parkway	0.0396	0.2004	0.1993	1.1429	1.5822
US23; 2.868-2.98	N of Parkway	0.021	0.1053	0.1057	0.6097	0.8417
US23; 1.114	Green Meadows	0.3839	1.8231	2.7299	11.0272	15.9641
US23; 1.397	SR 750	0.5129	2.4703	3.7367	15.0517	21.7716
US23; 1.506	Neverland	0.0124	0.0723	0.0792	0.8566	1.0205
US23; 1.57	Hornbeam	0.0128	0.0748	0.0819	0.8859	1.0554
US23; 1.637	Meijer Drive	0.0117	0.068	0.0752	0.7214	0.8763
US23; 1.727	Meadow Park	0.3789	1.8097	2.721	10.8391	15.7487
US23; 1.855	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.009	Windbrush	0.33	1.5683	2.3495	9.3429	13.5907
US23; 2.069	Walmart Backdrive	0.0124	0.0726	0.0797	0.8297	0.9944
US23; 2.206	Evergreen	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.346	Hidden Ravines	0.28	1.3201	1.9659	7.7916	11.3576
US23; 2.662	Orange	0.3864	1.8466	2.7778	11.0677	16.0785
US23; 2.868	Parkway	0.0708	0.2618	0.2968	1.5794	2.2088
US23; 1.856	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0.7-1.114	S of Green Meadows	0.1201	0.6248	0.6334	2.4493	3.8276
US23; 1.114-1.397	Green Meadows - SR 750	0.0767	0.3961	0.3994	1.3916	2.2638
US23; 1.397-1.506	SR 750 - Neverland	0.0215	0.1088	0.1066	0.5865	0.8234
US23; 1.506-1.855	Meadow Park - Stone Bend	0.077	0.3919	0.3948	1.6996	2.5633
US23; 1.855-2.069	Stone Bend - Windbrush	0.0362	0.1772	0.1763	0.9985	1.3882
US23; 2.069-2.206	Walmart Backdrive - Evergreen	0.0246	0.1213	0.121	0.5048	0.7717
US23; 2.206-2.346	Evergreen - Hidden Ravines	0.0231	0.1142	0.1139	0.8664	1.1176
US23; 2.346-2.662	Hidden Ravines - Orange	0.0675	0.3454	0.3479	0.7673	1.5281
US23; 2.662-2.868	Orange - Parkway	0.0351	0.17	0.1664	0.9591	1.3306
US23; 2.868-2.98	N of Parkway	0.019	0.0942	0.0941	0.5286	0.7359
US23; 1.114	Green Meadows	0.4027	1.9193	2.881	6.5175	11.7205
US23; 1.397	SR 750	0.8958	4.4364	6.8349	21.6785	33.8456
US23; 1.506	Neverland	0.0102	0.06	0.064	0.9196	1.0538
US23; 1.57	Hornbeam	0.0204	0.1181	0.1352	0.7774	1.0511
US23; 1.637	Meijer Drive	0.0096	0.0563	0.0609	0.6952	0.822
US23; 1.727	Meadow Park	0.3846	1.8364	2.7606	7.2395	12.2211
US23; 1.855	Stone Bend	0.0285	0.1634	0.1927	1.2613	1.6459
US23; 2.009	Windbrush	0.4026	1.9543	2.9713	5.9073	11.2355
US23; 2.069	Walmart Backdrive	0.0151	0.0877	0.0983	1.057	1.2581
US23; 2.206	Evergreen	0.0237	0.1366	0.1597	0.6952	1.0152
US23; 2.346	Hidden Ravines	0.1792	0.8252	1.2089	4.0138	6.2271
US23; 2.662	Orange	0.3772	1.8187	2.753	9.5077	14.4566
US23; 2.868	Parkway	0.0628	0.231	0.2616	1.3699	1.9253
US23; 1.856	Stone Bend	0.0096	0.0563	0.0609	0.412	0.5388



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0.7-1.114	S of Green Meadows	0.0318	0.1773	0.1848	-0.148	0.2459
US23; 1.114-1.397	Green Meadows - SR 750	0.0167	0.0917	0.0946	-0.372	-0.169
US23; 1.397-1.506	SR 750 - Neverland	-0.0022	-0.0122	-0.0126	-0.0928	-0.1198
US23; 1.506-1.855	Meadow Park - Stone Bend	0.0068	0.0391	0.041	-0.3412	-0.2543
US23; 1.855-2.069	Stone Bend - Windbrush	-0.0078	-0.0438	-0.0454	-0.2801	-0.3771
US23; 2.069-2.206	Walmart Backdrive - Evergreen	-0.0034	-0.0192	-0.02	-0.3082	-0.3508
US23; 2.206-2.346	Evergreen - Hidden Ravines	-0.003	-0.0168	-0.0175	0.1085	0.0712
US23; 2.346-2.662	Hidden Ravines - Orange	0.0086	0.049	0.0511	-0.9433	-0.8346
US23; 2.662-2.868	Orange - Parkway	-0.0045	-0.0304	-0.0329	-0.1838	-0.2516
US23; 2.868-2.98	N of Parkway	-0.002	-0.0111	-0.0116	-0.0811	-0.1058
US23; 1.114	Green Meadows	0.0188	0.0962	0.1511	-4.5097	-4.2436
US23; 1.397	SR 750	0.3829	1.9661	3.0982	6.6268	12.074
US23; 1.506	Neverland	-0.0022	-0.0123	-0.0152	0.063	0.0333
US23; 1.57	Hornbeam	0.0076	0.0433	0.0533	-0.1085	-0.0043
US23; 1.637	Meijer Drive	-0.0021	-0.0117	-0.0143	-0.0262	-0.0543
US23; 1.727	Meadow Park	0.0057	0.0267	0.0396	-3.5996	-3.5276
US23; 1.855	Stone Bend	0.0168	0.0954	0.1175	0.5399	0.7696
US23; 2.009	Windbrush	0.0726	0.386	0.6218	-3.4356	-2.3552
US23; 2.069	Walmart Backdrive	0.0027	0.0151	0.0186	0.2273	0.2637
US23; 2.206	Evergreen	0.012	0.0686	0.0845	-0.0262	0.1389
US23; 2.346	Hidden Ravines	-0.1008	-0.4949	-0.757	-3.7778	-5.1305
US23; 2.662	Orange	-0.0092	-0.0279	-0.0248	-1.56	-1.6219
US23; 2.868	Parkway	-0.008	-0.0308	-0.0352	-0.2095	-0.2835
US23; 1.856	Stone Bend	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
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Reference Number		Date Performed	
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Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0.7-1.197	S - 750 NB	0.0633	0.2778	0.3673	2.0856	2.794
US23; 0.699-1.196	S - 750 SB	0.0792	0.3588	0.45	2.306	3.194
US23; 1.198-1.598	750 NB	0.0435	0.1856	0.2585	1.4002	1.8878
US23; 1.197-1.597	750 SB	0.0435	0.1856	0.2585	1.4002	1.8878
US23; 1.599-2.462	750 - Orange NB	0.1063	0.4753	0.6075	3.4404	4.6295
US23; 1.598-2.461	750 - Orange SB	0.1067	0.478	0.6108	3.4664	4.6619
US23; 2.463-2.863	Orange NB	0.0435	0.1856	0.2585	1.4002	1.8878
US23; 2.462-2.862	Orange SB	0.0435	0.1856	0.2585	1.4002	1.8878
US23; 2.864-3.014	Orange - N NB	0.0293	0.1422	0.158	0.8465	1.176
US23; 2.863-3.013	Orange - N SB	0.0176	0.0814	0.0968	0.6461	0.8419



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Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.1333	0.1440		0.0718
Head On	1.9380	2.0326		0.0098
Rear End	58.7408	54.2913		0.0000
Backing	2.3188	1.9836		2.1643
Sideswipe - Meeting	0.4965	0.4447		0.0000
Sideswipe - Passing	14.1337	12.6204		0.0008
Angle	20.2418	20.2792		0.0000
Parked Vehicle	0.8500	0.9101		6.0328
Pedestrian	0.3949	0.3949		1.2730
Animal	1.6548	1.8515		0.1073
Train	0.0088	0.0088		0.8624
Pedalcycles	0.2256	0.2256		0.0249
Other Non-Vehicle	0.0001	0.0001		0.0000
Fixed Object	5.1757	5.3869		20.5555
Other Object	0.2454	0.2692		4.1110
Overturning	0.3165	0.3003		18.3918
Other Non-Collision	0.4287	0.4568		20.5561
Left Turn	11.2314	11.1930		0.0000
Right Turn	4.9132	4.4255		0.0000



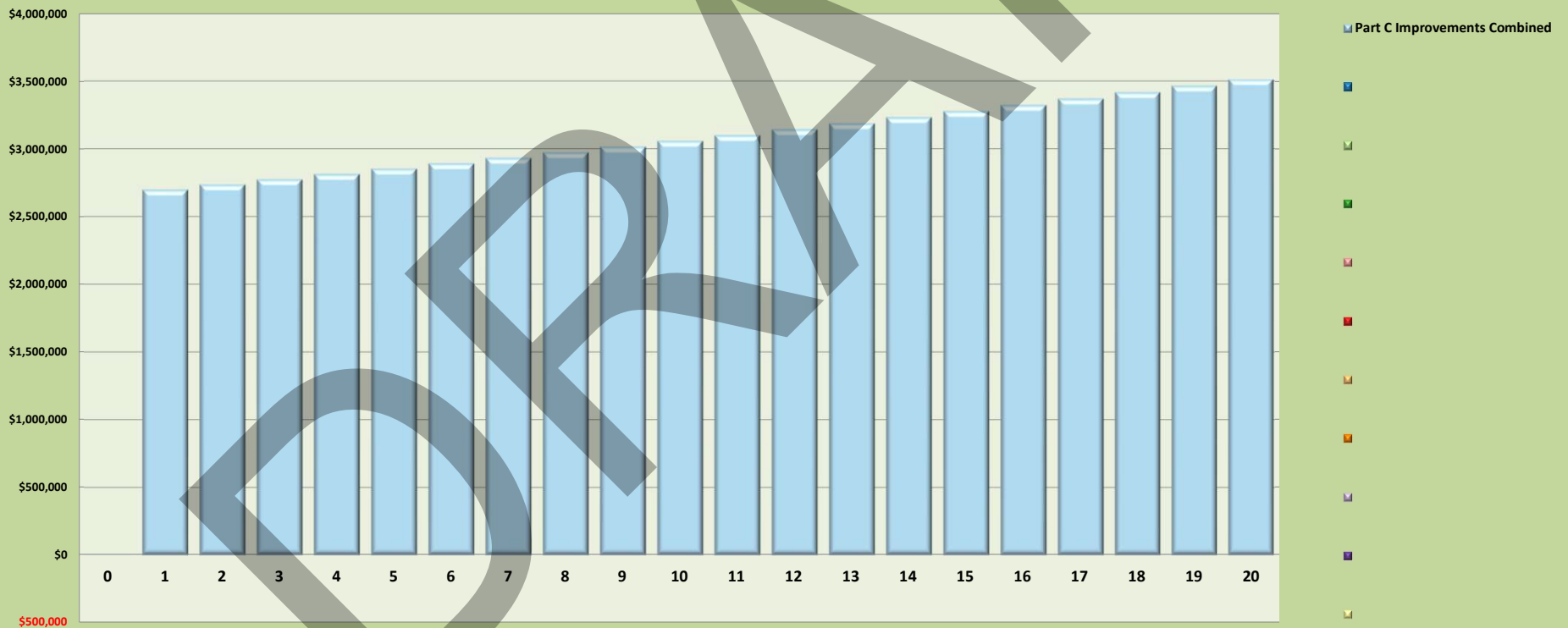
Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	Expected Annual Crash Adjustment	Comments:
<p>Net Present Value of Project \$4.00</p> <p>Net Present Value of Safety Benefits \$41,219,412.34</p> <p>Net Benefit \$41,219,408.34</p> <p>Benefit / Cost Ratio 10304853.08</p>	<p>Number of Fatal & Incapacitating Injury Crashes -2.311</p> <p>Number of Injury Crashes -29.784</p> <p>Number of Total Crashes -96.944</p>	

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year





Safety Benefit - Cost Analysis

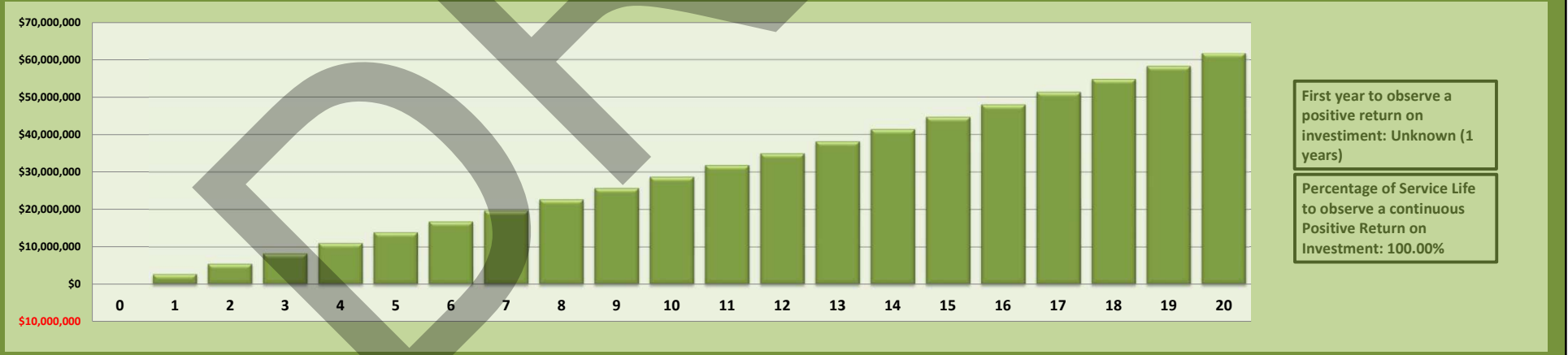
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
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Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



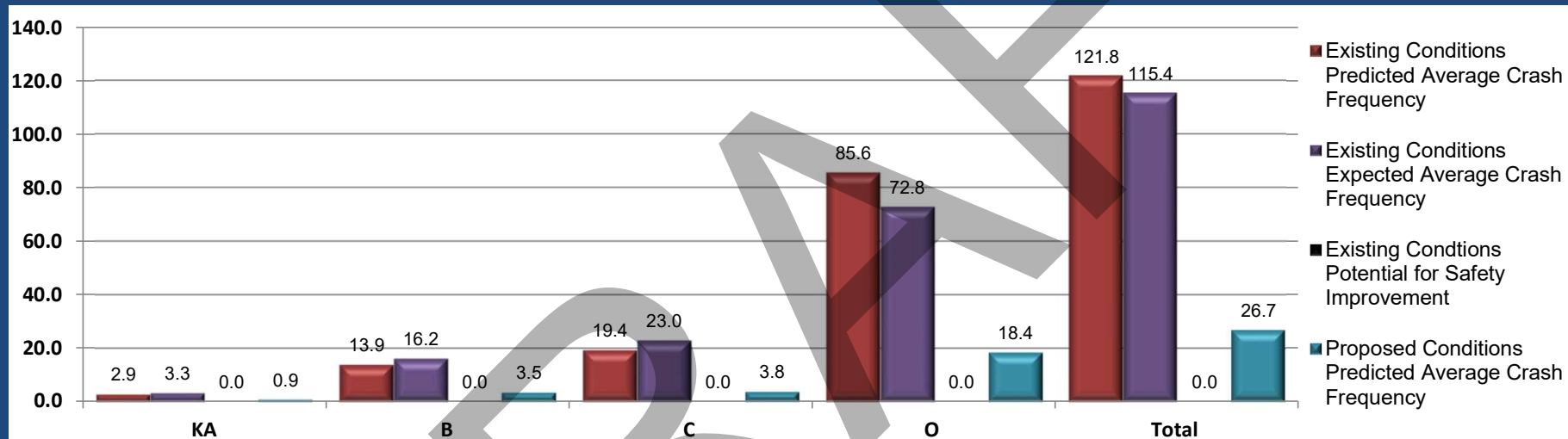


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.8871	13.9119	19.4415	85.5511	121.7916
N_{expected} - Existing Conditions	3.3228	16.2436	22.9968	72.8036	115.3668
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	0.9361	3.5478	3.7678	18.4365	26.6882



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
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Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0.7-1.114	S of Green Meadows	0.0883	0.4475	0.4486	2.5973	3.5817
US23; 1.114-1.397	Green Meadows - SR 750	0.06	0.3044	0.3048	1.7636	2.4328
US23; 1.397-1.506	SR 750 - Neverland	0.0237	0.121	0.1192	0.6793	0.9432
US23; 1.506-1.855	Meadow Park - Stone Bend	0.0702	0.3528	0.3538	2.0408	2.8176
US23; 1.855-2.069	Stone Bend - Windbrush	0.044	0.221	0.2217	1.2786	1.7653
US23; 2.069-2.206	Walmart Backdrive - Evergreen	0.028	0.1405	0.141	0.813	1.1225
US23; 2.206-2.346	Evergreen - Hidden Ravines	0.0261	0.131	0.1314	0.7579	1.0464
US23; 2.346-2.662	Hidden Ravines - Orange	0.0589	0.2964	0.2968	1.7106	2.3627
US23; 2.662-2.868	Orange - Parkway	0.0396	0.2004	0.1993	1.1429	1.5822
US23; 2.868-2.98	N of Parkway	0.021	0.1053	0.1057	0.6097	0.8417
US23; 1.114	Green Meadows	0.3839	1.8231	2.7299	11.0272	15.9641
US23; 1.397	SR 750	0.5129	2.4703	3.7367	15.0517	21.7716
US23; 1.506	Neverland	0.0124	0.0723	0.0792	0.8566	1.0205
US23; 1.57	Hornbeam	0.0128	0.0748	0.0819	0.8859	1.0554
US23; 1.637	Meijer Drive	0.0117	0.068	0.0752	0.7214	0.8763
US23; 1.727	Meadow Park	0.3789	1.8097	2.721	10.8391	15.7487
US23; 1.855	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.009	Windbrush	0.33	1.5683	2.3495	9.3429	13.5907
US23; 2.069	Walmart Backdrive	0.0124	0.0726	0.0797	0.8297	0.9944
US23; 2.206	Evergreen	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.346	Hidden Ravines	0.28	1.3201	1.9659	7.7916	11.3576
US23; 2.662	Orange	0.3864	1.8466	2.7778	11.0677	16.0785
US23; 2.868	Parkway	0.0708	0.2618	0.2968	1.5794	2.2088
US23; 1.856	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763



Project Safety Performance Report

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Project Name	Route 23 Connect	Contact Email	
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Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0.7-1.114	S of Green Meadows	0.1201	0.6248	0.6334	2.4493	3.8276
US23; 1.114-1.397	Green Meadows - SR 750	0.0767	0.3961	0.3994	1.3916	2.2638
US23; 1.397-1.506	SR 750 - Neverland	0.0215	0.1088	0.1066	0.5865	0.8234
US23; 1.506-1.855	Meadow Park - Stone Bend	0.077	0.3919	0.3948	1.6996	2.5633
US23; 1.855-2.069	Stone Bend - Windbrush	0.0362	0.1772	0.1763	0.9985	1.3882
US23; 2.069-2.206	Walmart Backdrive - Evergreen	0.0246	0.1213	0.121	0.5048	0.7717
US23; 2.206-2.346	Evergreen - Hidden Ravines	0.0231	0.1142	0.1139	0.8664	1.1176
US23; 2.346-2.662	Hidden Ravines - Orange	0.0675	0.3454	0.3479	0.7673	1.5281
US23; 2.662-2.868	Orange - Parkway	0.0351	0.17	0.1664	0.9591	1.3306
US23; 2.868-2.98	N of Parkway	0.019	0.0942	0.0941	0.5286	0.7359
US23; 1.114	Green Meadows	0.4027	1.9193	2.881	6.5175	11.7205
US23; 1.397	SR 750	0.8958	4.4364	6.8349	21.6785	33.8456
US23; 1.506	Neverland	0.0102	0.06	0.064	0.9196	1.0538
US23; 1.57	Hornbeam	0.0204	0.1181	0.1352	0.7774	1.0511
US23; 1.637	Meijer Drive	0.0096	0.0563	0.0609	0.6952	0.822
US23; 1.727	Meadow Park	0.3846	1.8364	2.7606	7.2395	12.2211
US23; 1.855	Stone Bend	0.0285	0.1634	0.1927	1.2613	1.6459
US23; 2.009	Windbrush	0.4026	1.9543	2.9713	5.9073	11.2355
US23; 2.069	Walmart Backdrive	0.0151	0.0877	0.0983	1.057	1.2581
US23; 2.206	Evergreen	0.0237	0.1366	0.1597	0.6952	1.0152
US23; 2.346	Hidden Ravines	0.1792	0.8252	1.2089	4.0138	6.2271
US23; 2.662	Orange	0.3772	1.8187	2.753	9.5077	14.4566
US23; 2.868	Parkway	0.0628	0.231	0.2616	1.3699	1.9253
US23; 1.856	Stone Bend	0.0096	0.0563	0.0609	0.412	0.5388



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
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Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0.7-1.114	S of Green Meadows	0.0318	0.1773	0.1848	-0.148	0.2459
US23; 1.114-1.397	Green Meadows - SR 750	0.0167	0.0917	0.0946	-0.372	-0.169
US23; 1.397-1.506	SR 750 - Neverland	-0.0022	-0.0122	-0.0126	-0.0928	-0.1198
US23; 1.506-1.855	Meadow Park - Stone Bend	0.0068	0.0391	0.041	-0.3412	-0.2543
US23; 1.855-2.069	Stone Bend - Windbrush	-0.0078	-0.0438	-0.0454	-0.2801	-0.3771
US23; 2.069-2.206	Walmart Backdrive - Evergreen	-0.0034	-0.0192	-0.02	-0.3082	-0.3508
US23; 2.206-2.346	Evergreen - Hidden Ravines	-0.003	-0.0168	-0.0175	0.1085	0.0712
US23; 2.346-2.662	Hidden Ravines - Orange	0.0086	0.049	0.0511	-0.9433	-0.8346
US23; 2.662-2.868	Orange - Parkway	-0.0045	-0.0304	-0.0329	-0.1838	-0.2516
US23; 2.868-2.98	N of Parkway	-0.002	-0.0111	-0.0116	-0.0811	-0.1058
US23; 1.114	Green Meadows	0.0188	0.0962	0.1511	-4.5097	-4.2436
US23; 1.397	SR 750	0.3829	1.9661	3.0982	6.6268	12.074
US23; 1.506	Neverland	-0.0022	-0.0123	-0.0152	0.063	0.0333
US23; 1.57	Hornbeam	0.0076	0.0433	0.0533	-0.1085	-0.0043
US23; 1.637	Meijer Drive	-0.0021	-0.0117	-0.0143	-0.0262	-0.0543
US23; 1.727	Meadow Park	0.0057	0.0267	0.0396	-3.5996	-3.5276
US23; 1.855	Stone Bend	0.0168	0.0954	0.1175	0.5399	0.7696
US23; 2.009	Windbrush	0.0726	0.386	0.6218	-3.4356	-2.3552
US23; 2.069	Walmart Backdrive	0.0027	0.0151	0.0186	0.2273	0.2637
US23; 2.206	Evergreen	0.012	0.0686	0.0845	-0.0262	0.1389
US23; 2.346	Hidden Ravines	-0.1008	-0.4949	-0.757	-3.7778	-5.1305
US23; 2.662	Orange	-0.0092	-0.0279	-0.0248	-1.56	-1.6219
US23; 2.868	Parkway	-0.008	-0.0308	-0.0352	-0.2095	-0.2835
US23; 1.856	Stone Bend	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375



Project Safety Performance Report

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Project Name	Route 23 Connect	Contact Email	
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Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0.701-0.915	S of Green Meadows NB	0.0286	0.1304	0.1618	0.9922	1.313
US23; 0.7-0.914	S of Green Meadows SB	0.0434	0.2053	0.2377	1.1996	1.686
US23; 0.916-1.598	Green Meadows 750 NB	0.0743	0.3164	0.4405	2.387	3.2182
US23; 0.915-1.597	Green Meadows 750 SB	0.0743	0.3164	0.4405	2.387	3.2182
US23; 1.599-2.008	750 - Windbrush NB	0.0644	0.2773	0.2665	1.5489	2.1571
US23; 1.598-2.007	750 - Windbrush SB	0.0463	0.2052	0.2685	1.5745	2.0945
US23; 2.009-2.344	Windbrush - Hidden Ravines	0.0476	0.3337	0.3128	1.9573	2.6514
US23; 2.346-2.66	Hidden Ravines - Orange	0.0368	0.2584	0.2423	1.5155	2.053
US23; 2.662-2.98	N of Orange	0.0383	0.2687	0.2519	1.5764	2.1353
US23; 2.008	Windbrush	0.16	0.4102	0.3801	1.1025	2.0528
US23; 2.345	Hidden Ravines	0.1142	0.2925	0.271	0.8649	1.5426
US23; 2.661	Orange CRs	0.2079	0.5333	0.4942	1.3307	2.5661



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.1333	0.1440		0.0544
Head On	1.9380	2.0326		0.0939
Rear End	58.7408	54.2913		5.3865
Backing	2.3188	1.9836		1.6082
Sideswipe - Meeting	0.4965	0.4447		0.0688
Sideswipe - Passing	14.1337	12.6204		1.5821
Angle	20.2418	20.2792		2.6820
Parked Vehicle	0.8500	0.9101		3.5165
Pedestrian	0.3949	0.3949		0.8199
Animal	1.6548	1.8515		1.1795
Train	0.0088	0.0088		0.5395
Pedalcycles	0.2256	0.2256		0.0514
Other Non-Vehicle	0.0001	0.0001		0.0000
Fixed Object	5.1757	5.3869		12.6159
Other Object	0.2454	0.2692		2.3643
Overturning	0.3165	0.3003		10.1669
Other Non-Collision	0.4287	0.4568		11.5890
Left Turn	11.2314	11.1930		0.2721
Right Turn	4.9132	4.4255		1.1580



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-73.963	\$15,377,261
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	0.000	\$0
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-21.140	\$21,754,479
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-95.103	\$37,131,740



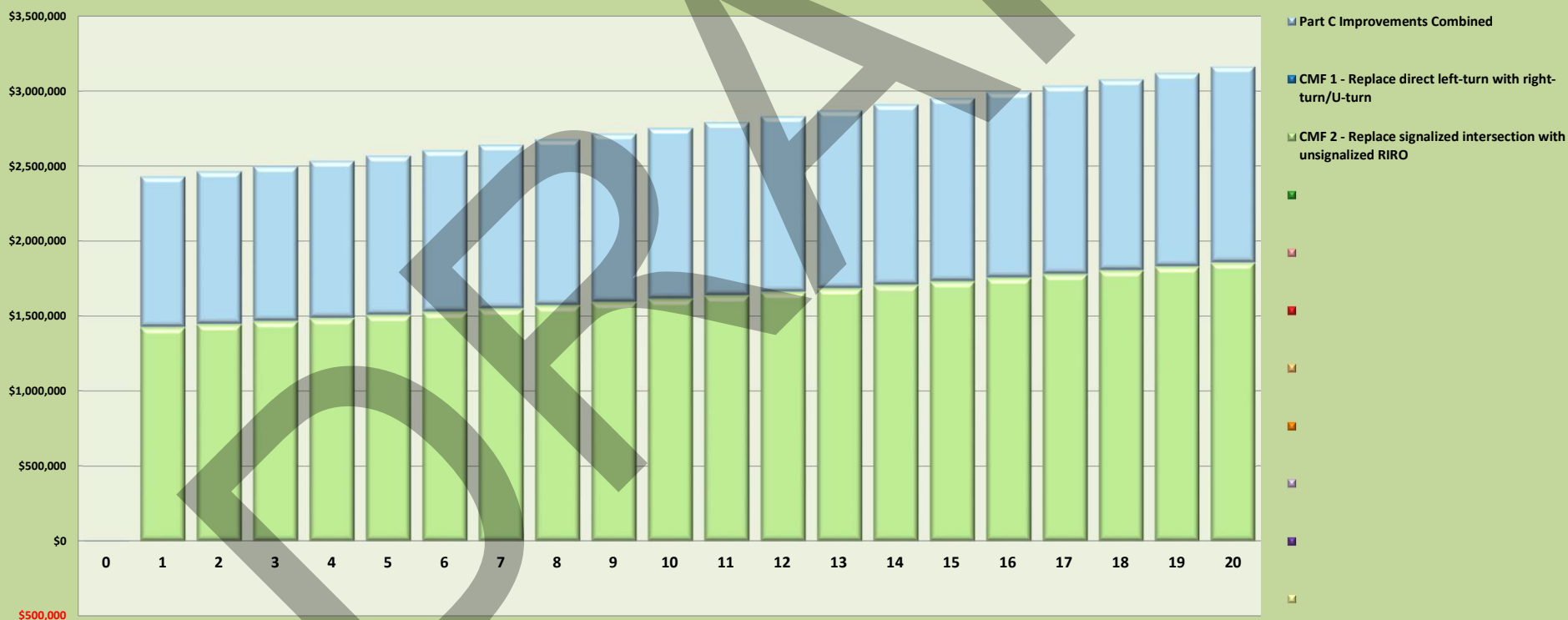
Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	Expected Annual Crash Adjustment	Comments:
<p>Net Present Value of Project \$6.00</p> <p>Net Present Value of Safety Benefits \$37,131,740.35</p> <p>Net Benefit \$37,131,734.35</p> <p>Benefit / Cost Ratio 6188623.39</p>	<p>Number of Fatal & Incapacitating Injury Crashes -1.951</p> <p>Number of Injury Crashes -27.988</p> <p>Number of Total Crashes -95.103</p>	

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



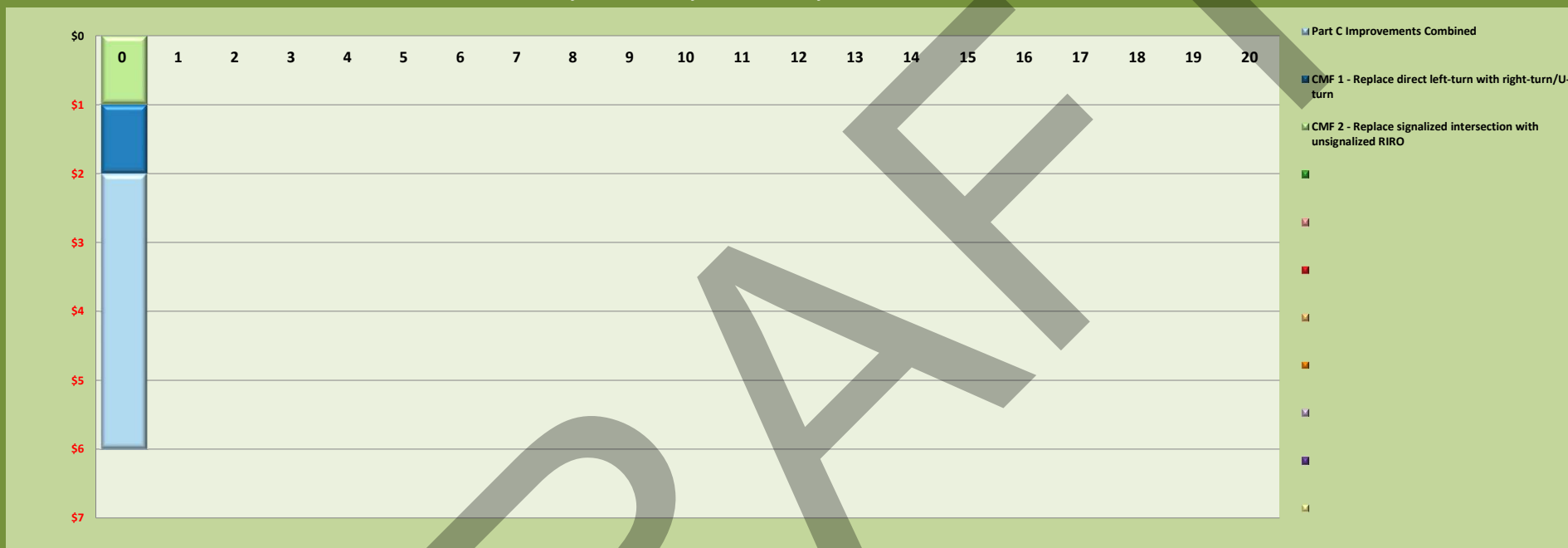


Safety Benefit - Cost Analysis

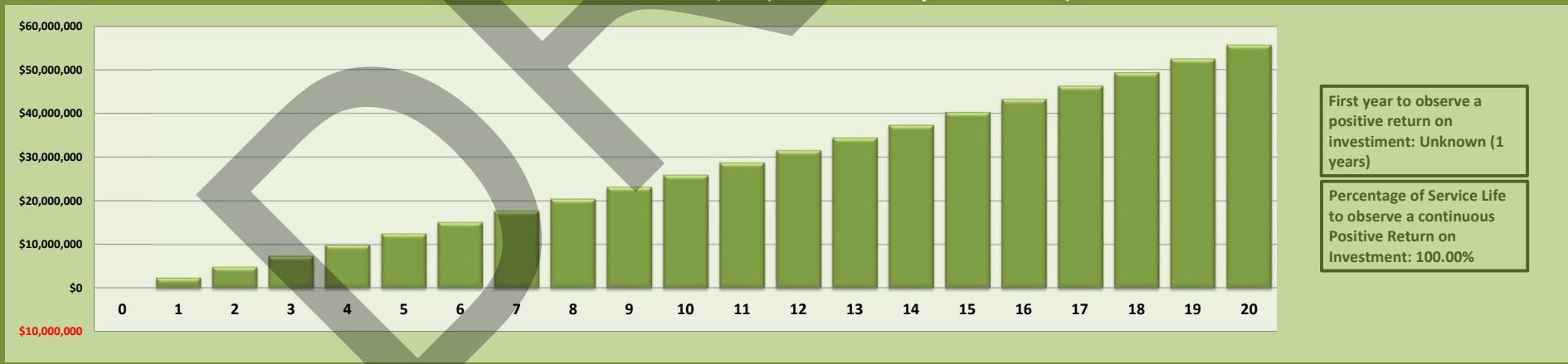
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



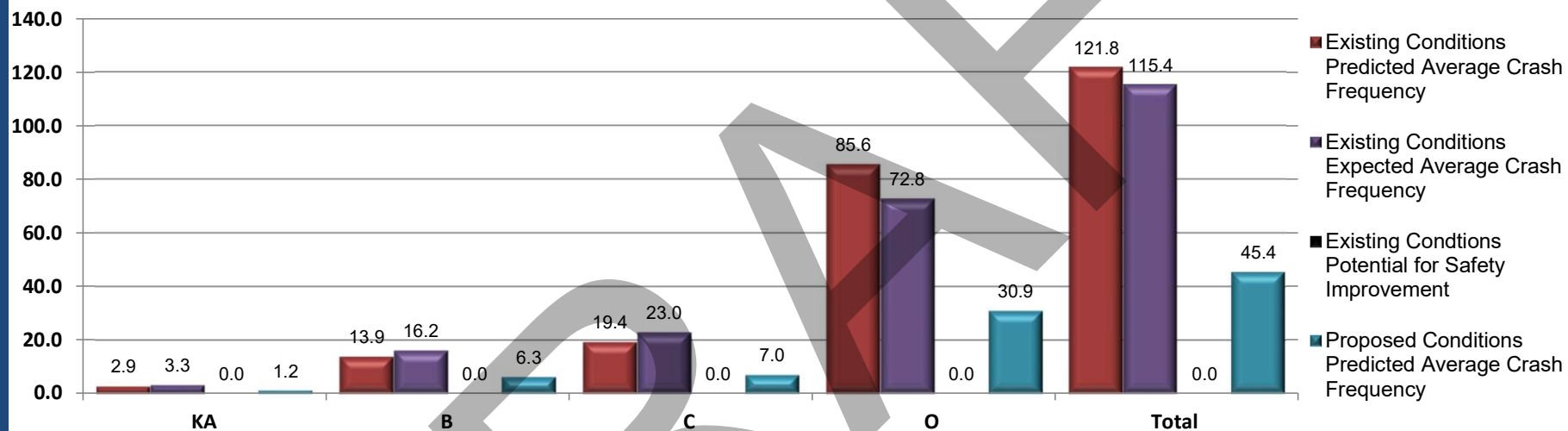


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.8871	13.9119	19.4415	85.5511	121.7916
N_{expected} - Existing Conditions	3.3228	16.2436	22.9968	72.8036	115.3668
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	1.2115	6.3064	7.0278	30.8719	45.4176



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0.7-1.114	S of Green Meadows	0.0883	0.4475	0.4486	2.5973	3.5817
US23; 1.114-1.397	Green Meadows - SR 750	0.06	0.3044	0.3048	1.7636	2.4328
US23; 1.397-1.506	SR 750 - Neverland	0.0237	0.121	0.1192	0.6793	0.9432
US23; 1.506-1.855	Meadow Park - Stone Bend	0.0702	0.3528	0.3538	2.0408	2.8176
US23; 1.855-2.069	Stone Bend - Windbrush	0.044	0.221	0.2217	1.2786	1.7653
US23; 2.069-2.206	Walmart Backdrive - Evergreen	0.028	0.1405	0.141	0.813	1.1225
US23; 2.206-2.346	Evergreen - Hidden Ravines	0.0261	0.131	0.1314	0.7579	1.0464
US23; 2.346-2.662	Hidden Ravines - Orange	0.0589	0.2964	0.2968	1.7106	2.3627
US23; 2.662-2.868	Orange - Parkway	0.0396	0.2004	0.1993	1.1429	1.5822
US23; 2.868-2.98	N of Parkway	0.021	0.1053	0.1057	0.6097	0.8417
US23; 1.114	Green Meadows	0.3839	1.8231	2.7299	11.0272	15.9641
US23; 1.397	SR 750	0.5129	2.4703	3.7367	15.0517	21.7716
US23; 1.506	Neverland	0.0124	0.0723	0.0792	0.8566	1.0205
US23; 1.57	Hornbeam	0.0128	0.0748	0.0819	0.8859	1.0554
US23; 1.637	Meijer Drive	0.0117	0.068	0.0752	0.7214	0.8763
US23; 1.727	Meadow Park	0.3789	1.8097	2.721	10.8391	15.7487
US23; 1.855	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.009	Windbrush	0.33	1.5683	2.3495	9.3429	13.5907
US23; 2.069	Walmart Backdrive	0.0124	0.0726	0.0797	0.8297	0.9944
US23; 2.206	Evergreen	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.346	Hidden Ravines	0.28	1.3201	1.9659	7.7916	11.3576
US23; 2.662	Orange	0.3864	1.8466	2.7778	11.0677	16.0785
US23; 2.868	Parkway	0.0708	0.2618	0.2968	1.5794	2.2088
US23; 1.856	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0.7-1.114	S of Green Meadows	0.1201	0.6248	0.6334	2.4493	3.8276
US23; 1.114-1.397	Green Meadows - SR 750	0.0767	0.3961	0.3994	1.3916	2.2638
US23; 1.397-1.506	SR 750 - Neverland	0.0215	0.1088	0.1066	0.5865	0.8234
US23; 1.506-1.855	Meadow Park - Stone Bend	0.077	0.3919	0.3948	1.6996	2.5633
US23; 1.855-2.069	Stone Bend - Windbrush	0.0362	0.1772	0.1763	0.9985	1.3882
US23; 2.069-2.206	Walmart Backdrive - Evergreen	0.0246	0.1213	0.121	0.5048	0.7717
US23; 2.206-2.346	Evergreen - Hidden Ravines	0.0231	0.1142	0.1139	0.8664	1.1176
US23; 2.346-2.662	Hidden Ravines - Orange	0.0675	0.3454	0.3479	0.7673	1.5281
US23; 2.662-2.868	Orange - Parkway	0.0351	0.17	0.1664	0.9591	1.3306
US23; 2.868-2.98	N of Parkway	0.019	0.0942	0.0941	0.5286	0.7359
US23; 1.114	Green Meadows	0.4027	1.9193	2.881	6.5175	11.7205
US23; 1.397	SR 750	0.8958	4.4364	6.8349	21.6785	33.8456
US23; 1.506	Neverland	0.0102	0.06	0.064	0.9196	1.0538
US23; 1.57	Hornbeam	0.0204	0.1181	0.1352	0.7774	1.0511
US23; 1.637	Meijer Drive	0.0096	0.0563	0.0609	0.6952	0.822
US23; 1.727	Meadow Park	0.3846	1.8364	2.7606	7.2395	12.2211
US23; 1.855	Stone Bend	0.0285	0.1634	0.1927	1.2613	1.6459
US23; 2.009	Windbrush	0.4026	1.9543	2.9713	5.9073	11.2355
US23; 2.069	Walmart Backdrive	0.0151	0.0877	0.0983	1.057	1.2581
US23; 2.206	Evergreen	0.0237	0.1366	0.1597	0.6952	1.0152
US23; 2.346	Hidden Ravines	0.1792	0.8252	1.2089	4.0138	6.2271
US23; 2.662	Orange	0.3772	1.8187	2.753	9.5077	14.4566
US23; 2.868	Parkway	0.0628	0.231	0.2616	1.3699	1.9253
US23; 1.856	Stone Bend	0.0096	0.0563	0.0609	0.412	0.5388



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 0.7-1.114	S of Green Meadows	0.0318	0.1773	0.1848	-0.148	0.2459
US23: 1.114-1.397	Green Meadows - SR 750	0.0167	0.0917	0.0946	-0.372	-0.169
US23: 1.397-1.506	SR 750 - Neverland	-0.0022	-0.0122	-0.0126	-0.0928	-0.1198
US23: 1.506-1.855	Meadow Park - Stone Bend	0.0068	0.0391	0.041	-0.3412	-0.2543
US23: 1.855-2.069	Stone Bend - Windbrush	-0.0078	-0.0438	-0.0454	-0.2801	-0.3771
US23: 2.069-2.206	Walmart Backdrive - Evergreen	-0.0034	-0.0192	-0.02	-0.3082	-0.3508
US23: 2.206-2.346	Evergreen - Hidden Ravines	-0.003	-0.0168	-0.0175	0.1085	0.0712
US23: 2.346-2.662	Hidden Ravines - Orange	0.0086	0.049	0.0511	-0.9433	-0.8346
US23: 2.662-2.868	Orange - Parkway	-0.0045	-0.0304	-0.0329	-0.1838	-0.2516
US23: 2.868-2.98	N of Parkway	-0.002	-0.0111	-0.0116	-0.0811	-0.1058
US23: 1.114	Green Meadows	0.0188	0.0962	0.1511	-4.5097	-4.2436
US23: 1.397	SR 750	0.3829	1.9661	3.0982	6.6268	12.074
US23: 1.506	Neverland	-0.0022	-0.0123	-0.0152	0.063	0.0333
US23: 1.57	Hornbeam	0.0076	0.0433	0.0533	-0.1085	-0.0043
US23: 1.637	Meijer Drive	-0.0021	-0.0117	-0.0143	-0.0262	-0.0543
US23: 1.727	Meadow Park	0.0057	0.0267	0.0396	-3.5996	-3.5276
US23: 1.855	Stone Bend	0.0168	0.0954	0.1175	0.5399	0.7696
US23: 2.009	Windbrush	0.0726	0.386	0.6218	-3.4356	-2.3552
US23: 2.069	Walmart Backdrive	0.0027	0.0151	0.0186	0.2273	0.2637
US23: 2.206	Evergreen	0.012	0.0686	0.0845	-0.0262	0.1389
US23: 2.346	Hidden Ravines	-0.1008	-0.4949	-0.757	-3.7778	-5.1305
US23: 2.662	Orange	-0.0092	-0.0279	-0.0248	-1.56	-1.6219
US23: 2.868	Parkway	-0.008	-0.0308	-0.0352	-0.2095	-0.2835
US23: 1.856	Stone Bend	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0.7-1.114	S of Green Meadows	0.0576	0.4055	0.3852	2.4114	3.2597
US23; 1.114-1.506	Green Meadows - Neverland	0.0568	0.3946	0.3751	2.3078	3.1343
US23; 1.506-1.854	Meadow Park - Stone Bend	0.0494	0.3466	0.3249	2.0333	2.7542
US23; 1.856-2.069	Stone Bend - Windbrush	0.0317	0.2223	0.2084	1.3041	1.7665
US23; 2.069-2.206	Walmart Backdrive - Evergreen	0.0201	0.1409	0.1321	0.8265	1.1196
US23; 2.206-2.345	Evergreen - Hidden Ravines	0.0165	0.1159	0.1086	0.6797	0.9207
US23; 2.347-2.661	Hidden Ravines - Orange	0.037	0.2589	0.2435	1.5179	2.0573
US23; 2.663-2.868	Orange - Parkway	0.0246	0.1707	0.1625	0.9979	1.3557
US23; 2.868-2.98	N of Parkway	0.0135	0.0946	0.0888	0.5552	0.7521
US23; 1.114	Green Meadows	0.1587	0.9138	1.1763	3.0391	5.2879
US23; 1.506	Neverland	0.0124	0.0723	0.0792	0.8566	1.0205
US23; 1.57	Hornbeam	0.0128	0.0748	0.0819	0.8859	1.0554
US23; 1.637	Meijer Drive	0.0117	0.068	0.0752	0.7214	0.8763
US23; 1.727	Meadow Park	0.1712	0.984	1.2929	3.4705	5.9186
US23; 1.854	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.009	Windbrush	0.1584	0.9055	1.1818	3.1484	5.3941
US23; 2.069	Walmart Backdrive	0.0124	0.0726	0.0797	0.8297	0.9944
US23; 2.206	Evergreen	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.345	Hidden Ravines	0.1142	0.2925	0.271	0.8649	1.5426
US23; 2.661	Orange CRs	0.2079	0.5333	0.4942	1.3307	2.5661
US23; 2.868	Parkway	0.0095	0.0356	0.0409	0.9267	1.0127
US23; 1.856	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.1333	0.1440		0.0589
Head On	1.9380	2.0326		0.3249
Rear End	58.7408	54.2913		19.2050
Backing	2.3188	1.9836		0.8069
Sideswipe - Meeting	0.4965	0.4447		0.1843
Sideswipe - Passing	14.1337	12.6204		6.7553
Angle	20.2418	20.2792		7.7014
Parked Vehicle	0.8500	0.9101		0.4265
Pedestrian	0.3949	0.3949		0.2685
Animal	1.6548	1.8515		2.7615
Train	0.0088	0.0088		0.0367
Pedalcycles	0.2256	0.2256		0.2411
Other Non-Vehicle	0.0001	0.0001		0.0000
Fixed Object	5.1757	5.3869		4.1264
Other Object	0.2454	0.2692		0.2596
Overturning	0.3165	0.3003		0.1739
Other Non-Collision	0.4287	0.4568		0.4437
Left Turn	11.2314	11.1930		2.7473
Right Turn	4.9132	4.4255		1.6573



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-61.629	\$14,480,416
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	0.000	\$0
CMF 2 - Signalized in one direction (no signal for through traffic in one direction)	20	\$1.00			\$1.00	\$1.00	-0.302	\$170,732
CMF 3 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-14.100	\$14,534,556
CMF 4 - Install RIRO at stop controlled intersection	20	\$1.00			\$1.00	\$1.00	-0.344	\$555,964
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$8.00	\$0.00	\$0.00	\$8.00	\$8.00	-76.374	\$29,741,669



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator

Net Present Value of Project: **\$8.00**

Net Present Value of Safety Benefits: **\$29,741,668.67**

Net Benefit: **\$29,741,660.67**

Benefit / Cost Ratio: **3717708.58**

Expected Annual Crash Adjustment

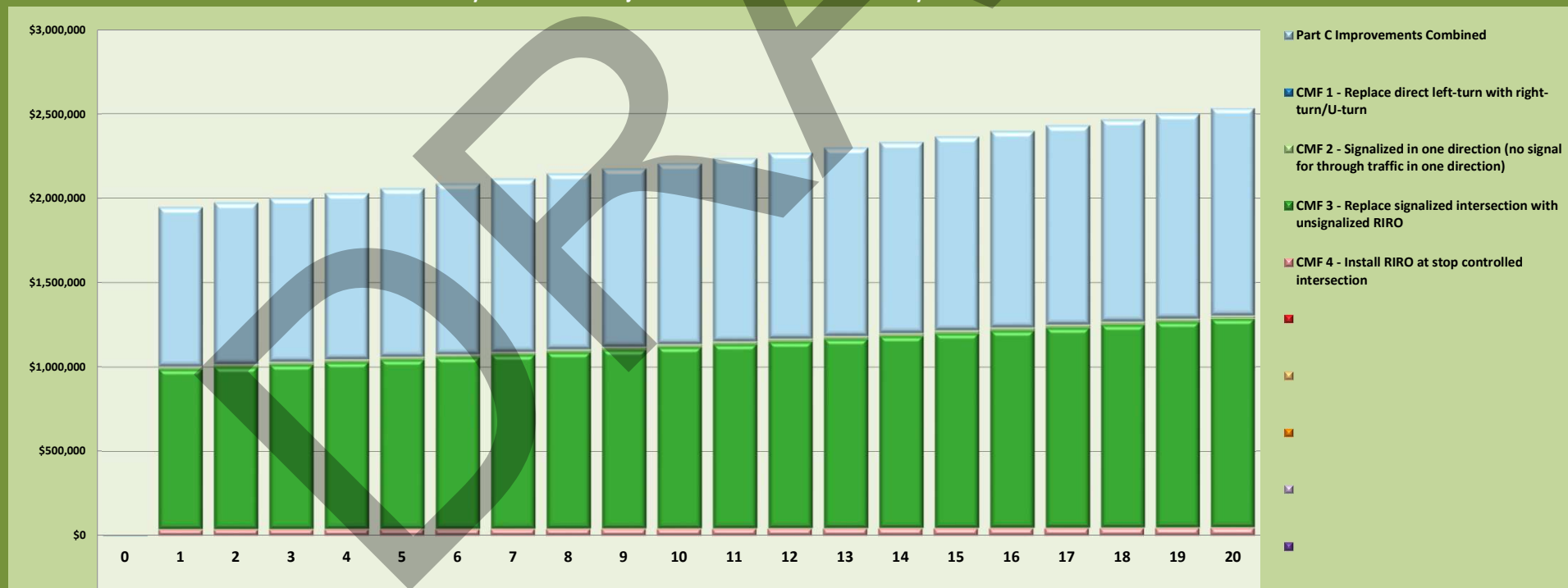
Number of Fatal & Incapacitating Injury Crashes: **-1.676**

Number of Injury Crashes: **-21.695**

Number of Total Crashes: **-76.374**

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year





Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

\$500,000

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Safety Benefit - Cost Analysis

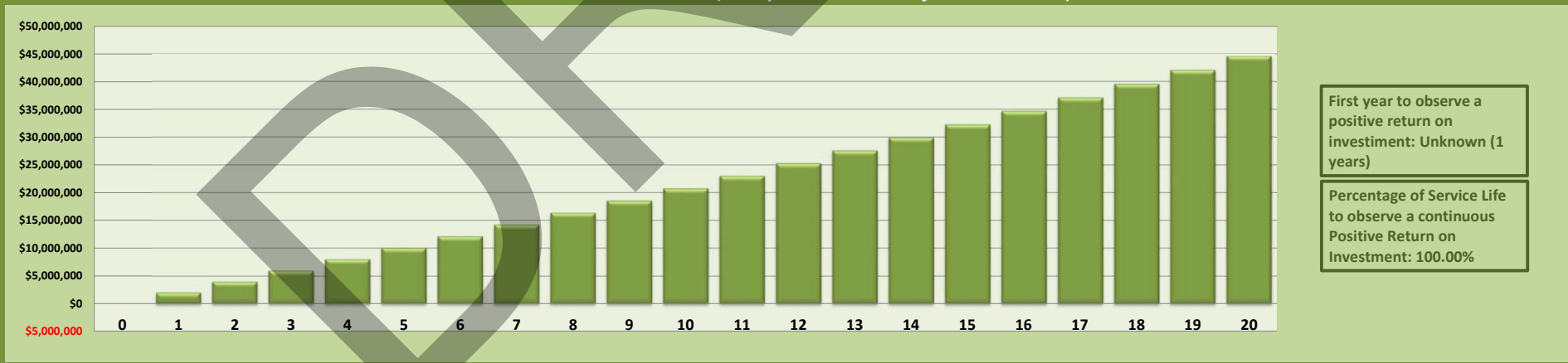
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



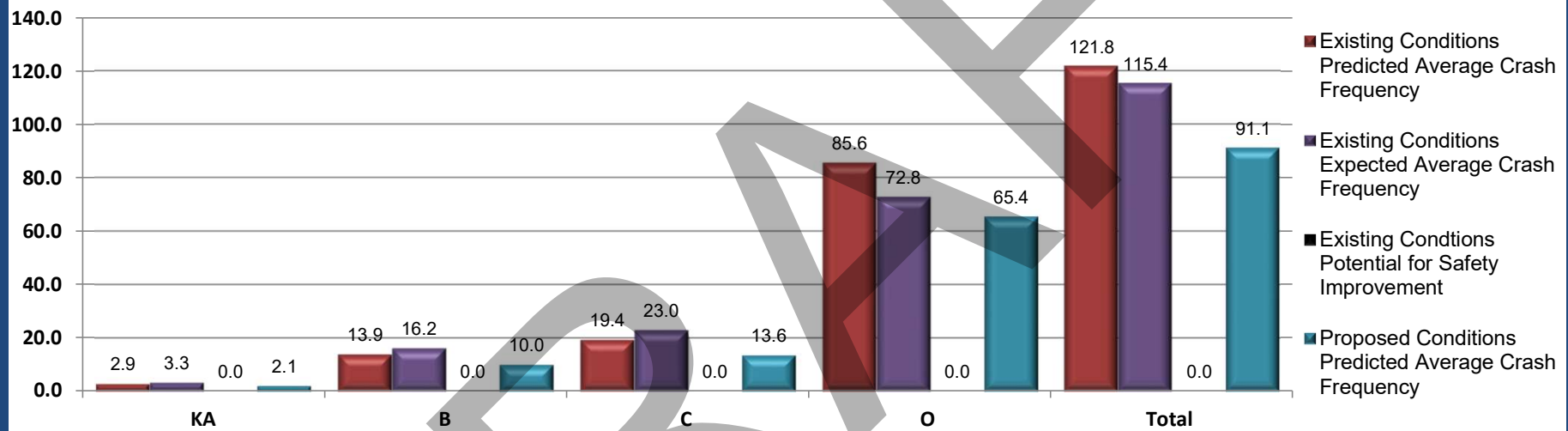


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.8871	13.9119	19.4415	85.5511	121.7916
N_{expected} - Existing Conditions	3.3228	16.2436	22.9968	72.8036	115.3668
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	2.1006	10.0177	13.5672	65.4002	91.0857



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0.7-1.114	S of Green Meadows	0.0883	0.4475	0.4486	2.5973	3.5817
US23; 1.114-1.397	Green Meadows - SR 750	0.06	0.3044	0.3048	1.7636	2.4328
US23; 1.397-1.506	SR 750 - Neverland	0.0237	0.121	0.1192	0.6793	0.9432
US23; 1.506-1.855	Meadow Park - Stone Bend	0.0702	0.3528	0.3538	2.0408	2.8176
US23; 1.855-2.069	Stone Bend - Windbrush	0.044	0.221	0.2217	1.2786	1.7653
US23; 2.069-2.206	Walmart Backdrive - Evergreen	0.028	0.1405	0.141	0.813	1.1225
US23; 2.206-2.346	Evergreen - Hidden Ravines	0.0261	0.131	0.1314	0.7579	1.0464
US23; 2.346-2.662	Hidden Ravines - Orange	0.0589	0.2964	0.2968	1.7106	2.3627
US23; 2.662-2.868	Orange - Parkway	0.0396	0.2004	0.1993	1.1429	1.5822
US23; 2.868-2.98	N of Parkway	0.021	0.1053	0.1057	0.6097	0.8417
US23; 1.114	Green Meadows	0.3839	1.8231	2.7299	11.0272	15.9641
US23; 1.397	SR 750	0.5129	2.4703	3.7367	15.0517	21.7716
US23; 1.506	Neverland	0.0124	0.0723	0.0792	0.8566	1.0205
US23; 1.57	Hornbeam	0.0128	0.0748	0.0819	0.8859	1.0554
US23; 1.637	Meijer Drive	0.0117	0.068	0.0752	0.7214	0.8763
US23; 1.727	Meadow Park	0.3789	1.8097	2.721	10.8391	15.7487
US23; 1.855	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.009	Windbrush	0.33	1.5683	2.3495	9.3429	13.5907
US23; 2.069	Walmart Backdrive	0.0124	0.0726	0.0797	0.8297	0.9944
US23; 2.206	Evergreen	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.346	Hidden Ravines	0.28	1.3201	1.9659	7.7916	11.3576
US23; 2.662	Orange	0.3864	1.8466	2.7778	11.0677	16.0785
US23; 2.868	Parkway	0.0708	0.2618	0.2968	1.5794	2.2088
US23; 1.856	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0.7-1.114	S of Green Meadows	0.1201	0.6248	0.6334	2.4493	3.8276
US23; 1.114-1.397	Green Meadows - SR 750	0.0767	0.3961	0.3994	1.3916	2.2638
US23; 1.397-1.506	SR 750 - Neverland	0.0215	0.1088	0.1066	0.5865	0.8234
US23; 1.506-1.855	Meadow Park - Stone Bend	0.077	0.3919	0.3948	1.6996	2.5633
US23; 1.855-2.069	Stone Bend - Windbrush	0.0362	0.1772	0.1763	0.9985	1.3882
US23; 2.069-2.206	Walmart Backdrive - Evergreen	0.0246	0.1213	0.121	0.5048	0.7717
US23; 2.206-2.346	Evergreen - Hidden Ravines	0.0231	0.1142	0.1139	0.8664	1.1176
US23; 2.346-2.662	Hidden Ravines - Orange	0.0675	0.3454	0.3479	0.7673	1.5281
US23; 2.662-2.868	Orange - Parkway	0.0351	0.17	0.1664	0.9591	1.3306
US23; 2.868-2.98	N of Parkway	0.019	0.0942	0.0941	0.5286	0.7359
US23; 1.114	Green Meadows	0.4027	1.9193	2.881	6.5175	11.7205
US23; 1.397	SR 750	0.8958	4.4364	6.8349	21.6785	33.8456
US23; 1.506	Neverland	0.0102	0.06	0.064	0.9196	1.0538
US23; 1.57	Hornbeam	0.0204	0.1181	0.1352	0.7774	1.0511
US23; 1.637	Meijer Drive	0.0096	0.0563	0.0609	0.6952	0.822
US23; 1.727	Meadow Park	0.3846	1.8364	2.7606	7.2395	12.2211
US23; 1.855	Stone Bend	0.0285	0.1634	0.1927	1.2613	1.6459
US23; 2.009	Windbrush	0.4026	1.9543	2.9713	5.9073	11.2355
US23; 2.069	Walmart Backdrive	0.0151	0.0877	0.0983	1.057	1.2581
US23; 2.206	Evergreen	0.0237	0.1366	0.1597	0.6952	1.0152
US23; 2.346	Hidden Ravines	0.1792	0.8252	1.2089	4.0138	6.2271
US23; 2.662	Orange	0.3772	1.8187	2.753	9.5077	14.4566
US23; 2.868	Parkway	0.0628	0.231	0.2616	1.3699	1.9253
US23; 1.856	Stone Bend	0.0096	0.0563	0.0609	0.412	0.5388



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 0.7-1.114	S of Green Meadows	0.0318	0.1773	0.1848	-0.148	0.2459
US23: 1.114-1.397	Green Meadows - SR 750	0.0167	0.0917	0.0946	-0.372	-0.169
US23: 1.397-1.506	SR 750 - Neverland	-0.0022	-0.0122	-0.0126	-0.0928	-0.1198
US23: 1.506-1.855	Meadow Park - Stone Bend	0.0068	0.0391	0.041	-0.3412	-0.2543
US23: 1.855-2.069	Stone Bend - Windbrush	-0.0078	-0.0438	-0.0454	-0.2801	-0.3771
US23: 2.069-2.206	Walmart Backdrive - Evergreen	-0.0034	-0.0192	-0.02	-0.3082	-0.3508
US23: 2.206-2.346	Evergreen - Hidden Ravines	-0.003	-0.0168	-0.0175	0.1085	0.0712
US23: 2.346-2.662	Hidden Ravines - Orange	0.0086	0.049	0.0511	-0.9433	-0.8346
US23: 2.662-2.868	Orange - Parkway	-0.0045	-0.0304	-0.0329	-0.1838	-0.2516
US23: 2.868-2.98	N of Parkway	-0.002	-0.0111	-0.0116	-0.0811	-0.1058
US23: 1.114	Green Meadows	0.0188	0.0962	0.1511	-4.5097	-4.2436
US23: 1.397	SR 750	0.3829	1.9661	3.0982	6.6268	12.074
US23: 1.506	Neverland	-0.0022	-0.0123	-0.0152	0.063	0.0333
US23: 1.57	Hornbeam	0.0076	0.0433	0.0533	-0.1085	-0.0043
US23: 1.637	Meijer Drive	-0.0021	-0.0117	-0.0143	-0.0262	-0.0543
US23: 1.727	Meadow Park	0.0057	0.0267	0.0396	-3.5996	-3.5276
US23: 1.855	Stone Bend	0.0168	0.0954	0.1175	0.5399	0.7696
US23: 2.009	Windbrush	0.0726	0.386	0.6218	-3.4356	-2.3552
US23: 2.069	Walmart Backdrive	0.0027	0.0151	0.0186	0.2273	0.2637
US23: 2.206	Evergreen	0.012	0.0686	0.0845	-0.0262	0.1389
US23: 2.346	Hidden Ravines	-0.1008	-0.4949	-0.757	-3.7778	-5.1305
US23: 2.662	Orange	-0.0092	-0.0279	-0.0248	-1.56	-1.6219
US23: 2.868	Parkway	-0.008	-0.0308	-0.0352	-0.2095	-0.2835
US23: 1.856	Stone Bend	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 0.7-1.114	S of Green Meadows	0.0582	0.4096	0.3892	2.4357	3.2927
US23; 1.114-1.397	Green Meadows - SR 750	0.0389	0.2738	0.2605	1.6275	2.2007
US23; 1.397-1.506	SR 750 - Neverland	0.0164	0.1125	0.1089	0.6551	0.8929
US23; 1.506-1.855	Meadow Park - Stone Bend	0.0501	0.3511	0.3292	2.0597	2.7901
US23; 1.855-2.069	Stone Bend - Windbrush	0.0322	0.2255	0.2115	1.3234	1.7926
US23; 2.069-2.206	Walmart Backdrive - Evergreen	0.0203	0.1423	0.1335	0.8349	1.131
US23; 2.206-2.346	Evergreen - Hidden Ravines	0.0168	0.1179	0.1105	0.6916	0.9368
US23; 2.346-2.662	Hidden Ravines - Orange	0.0376	0.2632	0.2474	1.543	2.0912
US23; 2.662-2.868	Orange - Parkway	0.025	0.1733	0.1649	1.0128	1.376
US23; 2.868-2.98	N of Parkway	0.0136	0.0956	0.0896	0.5608	0.7596
US23; 1.113	Green Meadows	0.1644	0.4217	0.3907	1.1217	2.0985
US23; 1.397	SR 750	0.6108	3.0862	5.0738	21.0706	29.8414
US23; 1.506	Neverland	0.0124	0.0723	0.0792	0.8566	1.0205
US23; 1.57	Hornbeam	0.0128	0.0748	0.0819	0.8859	1.0554
US23; 1.637	Meijer Drive	0.0117	0.068	0.0752	0.7214	0.8763
US23; 1.726	Meadow Park	0.2013	0.5165	0.4785	1.3003	2.4966
US23; 1.854	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.009	Windbrush	0.2754	1.3665	2.1481	9.5289	13.3189
US23; 2.069	Walmart Backdrive	0.0124	0.0726	0.0797	0.8297	0.9944
US23; 2.206	Evergreen	0.0117	0.068	0.0752	0.7214	0.8763
US23; 2.345	Hidden Ravines	0.1142	0.2925	0.271	0.8649	1.5426
US23; 2.662	Orange	0.3228	1.6106	2.5421	11.2842	15.7597
US23; 2.868	Parkway	0.0182	0.0672	0.0762	2.0273	2.1889
US23; 1.856	Stone Bend	0.0117	0.068	0.0752	0.7214	0.8763



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.1333	0.1440		0.1026
Head On	1.9380	2.0326		1.2331
Rear End	58.7408	54.2913		44.2902
Backing	2.3188	1.9836		1.8549
Sideswipe - Meeting	0.4965	0.4447		0.2187
Sideswipe - Passing	14.1337	12.6204		11.6292
Angle	20.2418	20.2792		15.6486
Parked Vehicle	0.8500	0.9101		0.6006
Pedestrian	0.3949	0.3949		0.3904
Animal	1.6548	1.8515		2.7539
Train	0.0088	0.0088		0.0054
Pedalcycles	0.2256	0.2256		0.2625
Other Non-Vehicle	0.0001	0.0001		0.0000
Fixed Object	5.1757	5.3869		4.9647
Other Object	0.2454	0.2692		0.2576
Overturning	0.3165	0.3003		0.3134
Other Non-Collision	0.4287	0.4568		0.4142
Left Turn	11.2314	11.1930		4.3118
Right Turn	4.9132	4.4255		4.5877



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	1.473	(\$15,322,791)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-7.334	\$4,573,793
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-21.054	\$21,657,127
CMF 3 - Prohibit left turns at signalized intersection	20	\$1.00			\$1.00	\$1.00	-3.146	\$2,378,896
CMF 4 - Install RIRO at stop controlled intersection	20	\$1.00			\$1.00	\$1.00	-0.646	\$1,055,144
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$8.00	\$0.00	\$0.00	\$8.00	\$8.00	-30.706	\$14,342,170



Safety Benefit - Cost Analysis

General Information

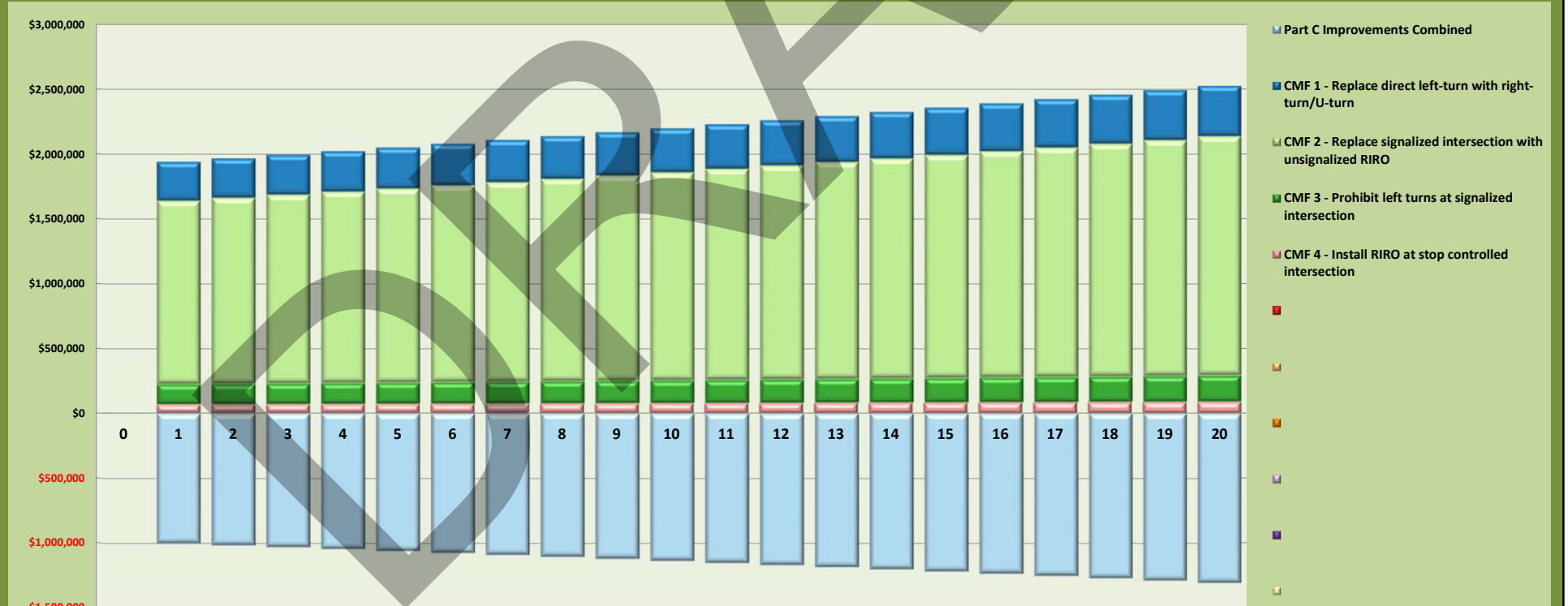
Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	
Net Present Value of Project	\$8.00
Net Present Value of Safety Benefits	\$14,342,169.70
Net Benefit	\$14,342,161.70
Benefit / Cost Ratio	1792771.21

Expected Annual Crash Adjustment	
Number of Fatal & Incapacitating Injury Crashes	-0.787
Number of Injury Crashes	-10.555
Number of Total Crashes	-30.706

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year





Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

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Safety Benefit - Cost Analysis

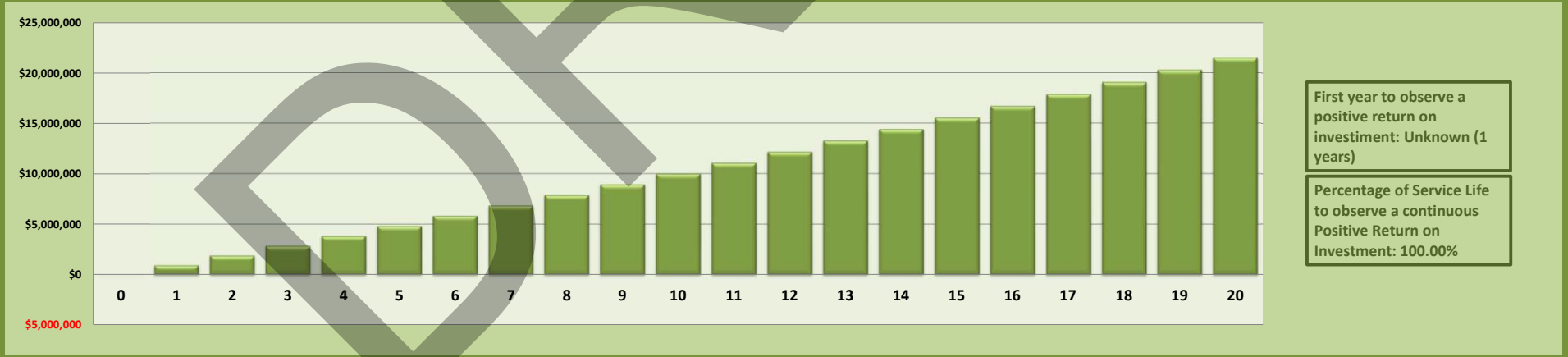
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 2	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



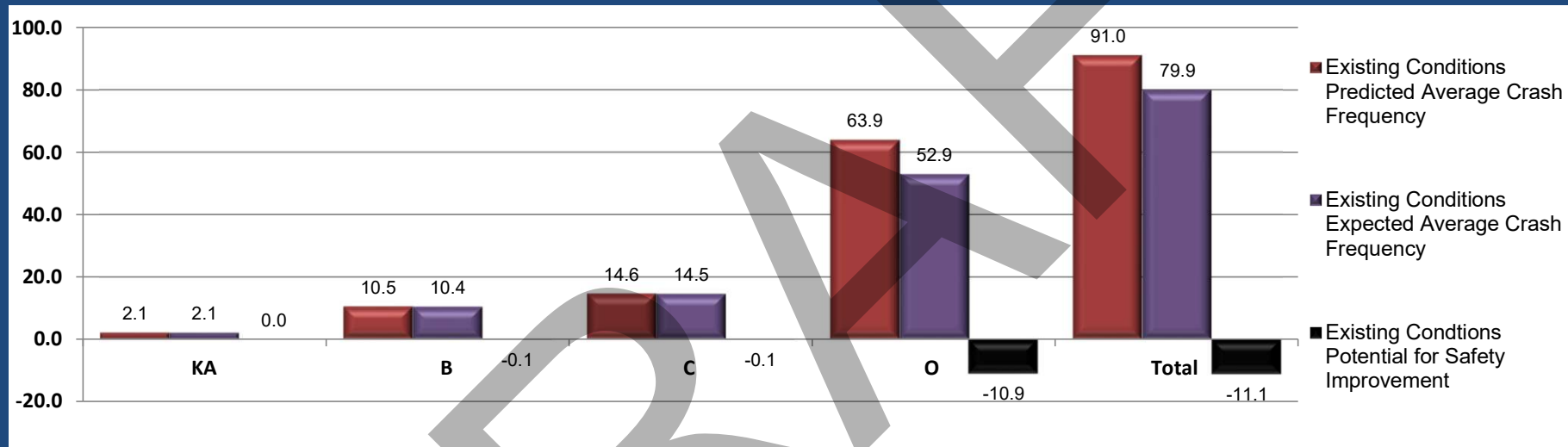


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}} - \text{Existing Conditions}$	2.1225	10.4532	14.5626	63.8881	91.0264
$N_{\text{expected}} - \text{Existing Conditions}$	2.0912	10.3892	14.4956	52.9412	79.9172
$N_{\text{potential for improvement}} - \text{Existing Conditions}$	-0.0313	-0.0640	-0.0670	-10.9469	-11.1092



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 2.98-3.07	S of Orange Point	0.0177	0.089	0.0893	0.515	0.711
US23; 3.07-3.345	Orange Point - Halfway	0.0557	0.2796	0.2805	1.6176	2.2334
US23; 3.345-3.58	Halfway - Corduory	0.0472	0.2372	0.238	1.3725	1.8949
US23; 3.58-3.835	Corduory - Slate Ridge	0.0484	0.2431	0.2436	1.4047	1.9398
US23; 3.835-4.05	Slate Ridge - Home	0.0414	0.2077	0.2084	1.2018	1.6593
US23; 4.05-4.36	Home - Artesian	0.0298	0.2064	0.1924	1.1882	1.6168
US23; 4.36-4.63	Lewis Center - Gallopers	0.0258	0.1791	0.1661	1.0321	1.4031
US23; 4.63-4.785	Gallopers - Olentangy	0.0148	0.1029	0.0954	0.5925	0.8056
US23; 4.785-4.915	Olentangy - Orangewick	0.0215	0.1081	0.1071	0.6092	0.8459
US23; 4.915-5.12	N of Orangewick	0.0198	0.137	0.1282	0.7876	1.0726
US23; 3.07	Orange Point	0.3105	1.472	2.2014	8.7457	12.7296
US23; 3.344	Halfway	0.0117	0.068	0.0752	0.7214	0.8763
US23; 3.346	Halfway	0.0106	0.0617	0.0689	0.5848	0.726
US23; 3.58	Corduory	0.2981	1.411	2.1077	8.368	12.1848
US23; 3.835	Slate Ridge	0.0117	0.068	0.0752	0.7214	0.8763
US23; 4.05	Home	0.4057	1.9421	2.9248	11.6598	16.9324
US23; 4.36	Artesian	0.0117	0.068	0.0752	0.7214	0.8763
US23; 4.455	Lewis Center	0.378	1.8075	2.7198	10.6263	15.5316
US23; 4.628	Gallopers	0.0135	0.079	0.0859	0.9959	1.1743
US23; 4.63	Gallopers	0.0117	0.068	0.0752	0.7214	0.8763
US23; 4.785	Olentangy Crossing	0.3266	1.5561	2.3354	9.116	13.3341
US23; 4.915	Orangewick	0.0106	0.0617	0.0689	0.5848	0.726



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 2.98-3.07	S of Orange Point	0.0163	0.0809	0.0808	0.3702	0.5482
US23: 3.07-3.345	Orange Point - Halfway	0.0576	0.2912	0.2927	1.171	1.8125
US23: 3.345-3.58	Halfway - Corduory	0.0445	0.222	0.2222	0.8586	1.3473
US23: 3.58-3.835	Corduory - Slate Ridge	0.0515	0.2615	0.2629	1.7779	2.3538
US23: 3.835-4.05	Slate Ridge - Home	0.0399	0.1995	0.1999	1.1711	1.6104
US23: 4.05-4.36	Home - Artesian	0.0371	0.2643	0.2458	2.883	3.4302
US23: 4.36-4.63	Lewis Center - Gallopers	0.0276	0.1906	0.1737	0.7137	1.1056
US23: 4.63-4.785	Gallopers - Olentangy	0.0162	0.1163	0.1099	0.8177	1.0601
US23: 4.785-4.915	Olentangy - Orangewick	0.0197	0.0976	0.0962	0.9919	1.2054
US23: 4.915-5.12	N of Orangewick	0.021	0.148	0.1401	1.5757	1.8848
US23: 3.07	Orange Point	0.2516	1.1901	1.7777	5.969	9.1884
US23: 3.344	Halfway	0.0096	0.0563	0.0609	0.6952	0.822
US23: 3.346	Halfway	0.0133	0.0767	0.0874	0.3635	0.5409
US23: 3.58	Corduory	0.2094	0.9774	1.4463	5.3079	7.941
US23: 3.835	Slate Ridge	0.0096	0.0563	0.0609	0.412	0.5388
US23: 4.05	Home	0.5252	2.5473	3.8699	11.8706	18.813
US23: 4.36	Artesian	0.0096	0.0563	0.0609	0.412	0.5388
US23: 4.455	Lewis Center	0.4707	2.2961	3.5023	9.1738	15.4429
US23: 4.628	Gallopers	0.0111	0.0651	0.0688	0.8249	0.9699
US23: 4.63	Gallopers	0.0096	0.0563	0.0609	0.5535	0.6803
US23: 4.785	Olentangy Crossing	0.2313	1.088	1.6191	4.6645	7.6029
US23: 4.915	Orangewick	0.0088	0.0514	0.0563	0.3635	0.48



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23: 2.98-3.07	S of Orange Point	-0.0014	-0.0081	-0.0085	-0.1448	-0.1628	
US23: 3.07-3.345	Orange Point - Halfway	0.0019	0.0116	0.0122	-0.4466	-0.4209	
US23: 3.345-3.58	Halfway - Corduory	-0.0027	-0.0152	-0.0158	-0.5139	-0.5476	
US23: 3.58-3.835	Corduory - Slate Ridge	0.0031	0.0184	0.0193	0.3732	0.414	
US23: 3.835-4.05	Slate Ridge - Home	-0.0015	-0.0082	-0.0085	-0.0307	-0.0489	
US23: 4.05-4.36	Home - Artesian	0.0073	0.0579	0.0534	1.6948	1.8134	
US23: 4.36-4.63	Lewis Center - Gallopers	0.0018	0.0115	0.0076	-0.3184	-0.2975	
US23: 4.63-4.785	Gallopers - Olentangy	0.0014	0.0134	0.0145	0.2252	0.2545	
US23: 4.785-4.915	Olentangy - Orangetwick	-0.0018	-0.0105	-0.0109	0.3827	0.3595	
US23: 4.915-5.12	N of Orangetwick	0.0012	0.011	0.0119	0.7881	0.8122	
US23: 3.07	Orange Point	-0.0589	-0.2819	-0.4237	-2.7767	-3.5412	
US23: 3.344	Halfway	-0.0021	-0.0117	-0.0143	-0.0262	-0.0543	
US23: 3.346	Halfway	0.0027	0.015	0.0185	-0.2213	-0.1851	
US23: 3.58	Corduory	-0.0887	-0.4336	-0.6614	-3.0601	-4.2438	
US23: 3.835	Slate Ridge	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375	
US23: 4.05	Home	0.1195	0.6052	0.9451	0.2108	1.8806	
US23: 4.36	Artesian	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375	
US23: 4.455	Lewis Center	0.0927	0.4886	0.7825	-1.4525	-0.0887	
US23: 4.628	Gallopers	-0.0024	-0.0139	-0.0171	-0.171	-0.2044	
US23: 4.63	Gallopers	-0.0021	-0.0117	-0.0143	-0.1679	-0.196	
US23: 4.785	Olentangy Crossing	-0.0953	-0.4681	-0.7163	-4.4515	-5.7312	
US23: 4.915	Orangetwick	-0.0018	-0.0103	-0.0126	-0.2213	-0.246	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

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Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.1047	0.1006	-0.0041	
Head On	1.3800	1.2502	-0.1298	
Rear End	43.4828	38.4468	-5.0360	
Backing	1.7207	1.3928	-0.3279	
Sideswipe - Meeting	0.3104	0.3090	-0.0014	
Sideswipe - Passing	10.8043	9.2809	-1.5235	
Angle	15.2220	13.1263	-2.0957	
Parked Vehicle	0.6547	0.6071	-0.0476	
Pedestrian	0.3323	0.3323	0.0000	
Animal	1.7554	2.5691	0.8137	
Train	0.0067	0.0057	-0.0010	
Pedalcycles	0.2100	0.2100	0.0000	
Other Non-Vehicle	0.0000	0.0000	0.0000	
Fixed Object	4.0930	3.8904	-0.2027	
Other Object	0.2045	0.2205	0.0160	
Overturning	0.2697	0.2468	-0.0229	
Other Non-Collision	0.3427	0.3515	0.0088	
Left Turn	8.2508	7.2551	-0.9956	
Right Turn	3.6357	2.8914	-0.7443	

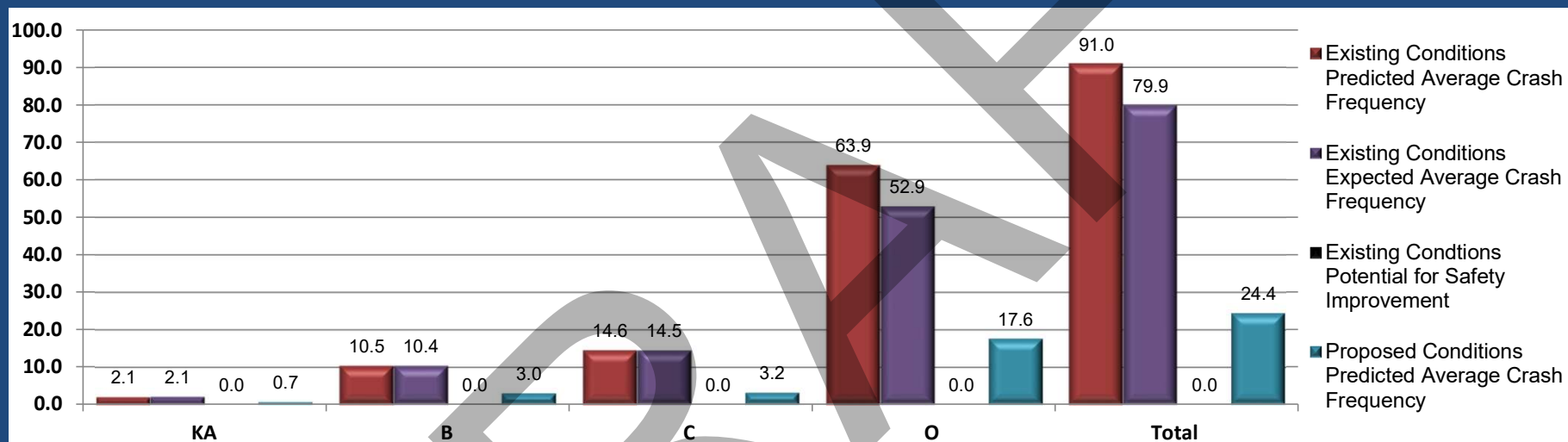


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.1225	10.4532	14.5626	63.8881	91.0264
N_{expected} - Existing Conditions	2.0912	10.3892	14.4956	52.9412	79.9172
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	0.7176	2.9625	3.1841	17.5551	24.4193



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 2.98-3.07	S of Orange Point	0.0177	0.089	0.0893	0.515	0.711
US23: 3.07-3.345	Orange Point - Halfway	0.0557	0.2796	0.2805	1.6176	2.2334
US23: 3.345-3.58	Halfway - Corduory	0.0472	0.2372	0.238	1.3725	1.8949
US23: 3.58-3.835	Corduory - Slate Ridge	0.0484	0.2431	0.2436	1.4047	1.9398
US23: 3.835-4.05	Slate Ridge - Home	0.0414	0.2077	0.2084	1.2018	1.6593
US23: 4.05-4.36	Home - Artesian	0.0298	0.2064	0.1924	1.1882	1.6168
US23: 4.36-4.63	Lewis Center - Gallopers	0.0258	0.1791	0.1661	1.0321	1.4031
US23: 4.63-4.785	Gallopers - Olentangy	0.0148	0.1029	0.0954	0.5925	0.8056
US23: 4.785-4.915	Olentangy - Orangetick	0.0215	0.1081	0.1071	0.6092	0.8459
US23: 4.915-5.12	N of Orangetick	0.0198	0.137	0.1282	0.7876	1.0726
US23: 3.07	Orange Point	0.3105	1.472	2.2014	8.7457	12.7296
US23: 3.344	Halfway	0.0117	0.068	0.0752	0.7214	0.8763
US23: 3.346	Halfway	0.0106	0.0617	0.0689	0.5848	0.726
US23: 3.58	Corduory	0.2981	1.411	2.1077	8.368	12.1848
US23: 3.835	Slate Ridge	0.0117	0.068	0.0752	0.7214	0.8763
US23: 4.05	Home	0.4057	1.9421	2.9248	11.6598	16.9324
US23: 4.36	Artesian	0.0117	0.068	0.0752	0.7214	0.8763
US23: 4.455	Lewis Center	0.378	1.8075	2.7198	10.6263	15.5316
US23: 4.628	Gallopers	0.0135	0.079	0.0859	0.9959	1.1743
US23: 4.63	Gallopers	0.0117	0.068	0.0752	0.7214	0.8763
US23: 4.785	Olentangy Crossing	0.3266	1.5561	2.3354	9.116	13.3341
US23: 4.915	Orangetick	0.0106	0.0617	0.0689	0.5848	0.726



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 2.98-3.07	S of Orange Point	0.0163	0.0809	0.0808	0.3702	0.5482
US23; 3.07-3.345	Orange Point - Halfway	0.0576	0.2912	0.2927	1.171	1.8125
US23; 3.345-3.58	Halfway - Corduory	0.0445	0.222	0.2222	0.8586	1.3473
US23; 3.58-3.835	Corduory - Slate Ridge	0.0515	0.2615	0.2629	1.7779	2.3538
US23; 3.835-4.05	Slate Ridge - Home	0.0399	0.1995	0.1999	1.1711	1.6104
US23; 4.05-4.36	Home - Artesian	0.0371	0.2643	0.2458	2.883	3.4302
US23; 4.36-4.63	Lewis Center - Gallopers	0.0276	0.1906	0.1737	0.7137	1.1056
US23; 4.63-4.785	Gallopers - Olentangy	0.0162	0.1163	0.1099	0.8177	1.0601
US23; 4.785-4.915	Olentangy - Orangewick	0.0197	0.0976	0.0962	0.9919	1.2054
US23; 4.915-5.12	N of Orangewick	0.021	0.148	0.1401	1.5757	1.8848
US23; 3.07	Orange Point	0.2516	1.1901	1.7777	5.969	9.1884
US23; 3.344	Halfway	0.0096	0.0563	0.0609	0.6952	0.822
US23; 3.346	Halfway	0.0133	0.0767	0.0874	0.3635	0.5409
US23; 3.58	Corduory	0.2094	0.9774	1.4463	5.3079	7.941
US23; 3.835	Slate Ridge	0.0096	0.0563	0.0609	0.412	0.5388
US23; 4.05	Home	0.5252	2.5473	3.8699	11.8706	18.813
US23; 4.36	Artesian	0.0096	0.0563	0.0609	0.412	0.5388
US23; 4.455	Lewis Center	0.4707	2.2961	3.5023	9.1738	15.4429
US23; 4.628	Gallopers	0.0111	0.0651	0.0688	0.8249	0.9699
US23; 4.63	Gallopers	0.0096	0.0563	0.0609	0.5535	0.6803
US23; 4.785	Olentangy Crossing	0.2313	1.088	1.6191	4.6645	7.6029
US23; 4.915	Orangewick	0.0088	0.0514	0.0563	0.3635	0.48



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23: 2.98-3.07	S of Orange Point	-0.0014	-0.0081	-0.0085	-0.1448	-0.1628	
US23: 3.07-3.345	Orange Point - Halfway	0.0019	0.0116	0.0122	-0.4466	-0.4209	
US23: 3.345-3.58	Halfway - Corduory	-0.0027	-0.0152	-0.0158	-0.5139	-0.5476	
US23: 3.58-3.835	Corduory - Slate Ridge	0.0031	0.0184	0.0193	0.3732	0.414	
US23: 3.835-4.05	Slate Ridge - Home	-0.0015	-0.0082	-0.0085	-0.0307	-0.0489	
US23: 4.05-4.36	Home - Artesian	0.0073	0.0579	0.0534	1.6948	1.8134	
US23: 4.36-4.63	Lewis Center - Gallopers	0.0018	0.0115	0.0076	-0.3184	-0.2975	
US23: 4.63-4.785	Gallopers - Olentangy	0.0014	0.0134	0.0145	0.2252	0.2545	
US23: 4.785-4.915	Olentangy - Orangewick	-0.0018	-0.0105	-0.0109	0.3827	0.3595	
US23: 4.915-5.12	N of Orangewick	0.0012	0.011	0.0119	0.7881	0.8122	
US23: 3.07	Orange Point	-0.0589	-0.2819	-0.4237	-2.7767	-3.5412	
US23: 3.344	Halfway	-0.0021	-0.0117	-0.0143	-0.0262	-0.0543	
US23: 3.346	Halfway	0.0027	0.015	0.0185	-0.2213	-0.1851	
US23: 3.58	Corduory	-0.0887	-0.4336	-0.6614	-3.0601	-4.2438	
US23: 3.835	Slate Ridge	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375	
US23: 4.05	Home	0.1195	0.6052	0.9451	0.2108	1.8806	
US23: 4.36	Artesian	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375	
US23: 4.455	Lewis Center	0.0927	0.4886	0.7825	-1.4525	-0.0887	
US23: 4.628	Gallopers	-0.0024	-0.0139	-0.0171	-0.171	-0.2044	
US23: 4.63	Gallopers	-0.0021	-0.0117	-0.0143	-0.1679	-0.196	
US23: 4.785	Olentangy Crossing	-0.0953	-0.4681	-0.7163	-4.4515	-5.7312	
US23: 4.915	Orangewick	-0.0018	-0.0103	-0.0126	-0.2213	-0.246	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 2.98-3.069	S of Orange Point	0.0122	0.0853	0.08	0.5004	0.6779
US23; 3.071-3.579	Orange Point - Corduroy	0.0741	0.5196	0.4872	3.0482	4.1291
US23; 3.58-3.849	Corduroy - Home SB	0.0499	0.2355	0.277	1.2873	1.8497
US23; 3.581-3.85	Corduroy - Home NB	0.03	0.1351	0.1714	1.0784	1.4149
US23; 3.85-4.25	Home SB	0.0356	0.1519	0.2111	1.2336	1.6322
US23; 3.851-4.251	Home NB	0.0356	0.1519	0.2111	1.2336	1.6322
US23; 4.251-4.629	Home - Gallopers SB	0.0353	0.1568	0.2039	1.2783	1.6743
US23; 4.252-4.63	Home - Gallopers NB	0.0463	0.2127	0.2605	1.4343	1.9538
US23; 4.631-4.784	Gallopers - Olentangy	0.0125	0.0859	0.0786	0.485	0.662
US23; 4.786-5.12	N of Olentangy	0.0268	0.1839	0.1682	1.0374	1.4163
US23; 3.069	Orange Point	0.1444	0.3701	0.3429	1.0241	1.8815
US23; 3.58	Corduroy	0.039	0.1449	0.1782	1.2289	1.591
US23; 4.629	Gallopers	0.012	0.0703	0.0771	0.809	0.9684
US23; 4.784	Olentangy	0.1519	0.3883	0.3598	1.0676	1.9676
US23; 4.631	Gallopers	0.012	0.0703	0.0771	0.809	0.9684



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.1047	0.1006		0.0497
Head On	1.3800	1.2502		0.0931
Rear End	43.4828	38.4468		5.6529
Backing	1.7207	1.3928		1.0637
Sideswipe - Meeting	0.3104	0.3090		0.0701
Sideswipe - Passing	10.8043	9.2809		2.0283
Angle	15.2220	13.1263		2.8617
Parked Vehicle	0.6547	0.6071		2.4762
Pedestrian	0.3323	0.3323		0.5849
Animal	1.7554	2.5691		1.2640
Train	0.0067	0.0057		0.3325
Pedalcycles	0.2100	0.2100		0.0861
Other Non-Vehicle	0.0000	0.0000		0.0001
Fixed Object	4.0930	3.8904		9.6411
Other Object	0.2045	0.2205		1.7524
Overturning	0.2697	0.2468		7.6259
Other Non-Collision	0.3427	0.3515		8.4864
Left Turn	8.2508	7.2551		0.3513
Right Turn	3.6357	2.8914		1.1251



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-48.117	\$11,745,072
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	0.000	\$0
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-18.491	\$16,270,021
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-66.608	\$28,015,093



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
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Agency/Company	ms consultants		

Benefit - Cost Calculator	
Net Present Value of Project	\$6.00
Net Present Value of Safety Benefits	\$28,015,093.36
Net Benefit	\$28,015,087.36
Benefit / Cost Ratio	4669182.23

Expected Annual Crash Adjustment	
Number of Fatal & Incapacitating Injury Crashes	-1.405
Number of Injury Crashes	-20.275
Number of Total Crashes	-66.608

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



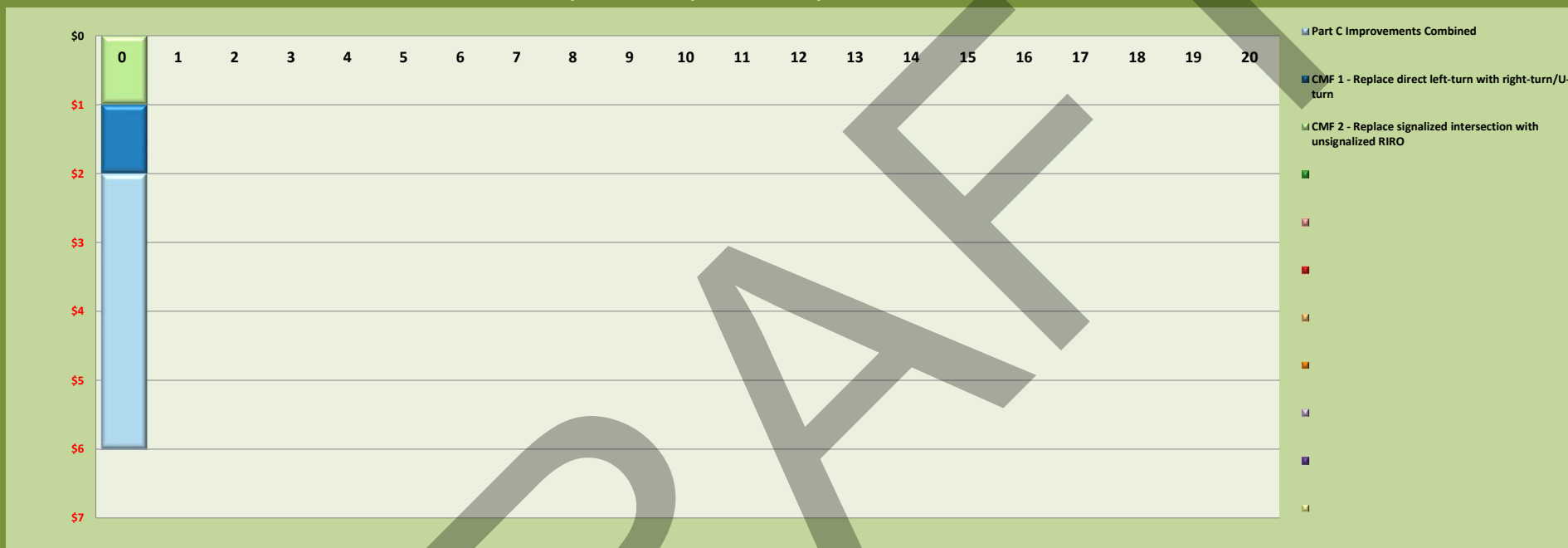


Safety Benefit - Cost Analysis

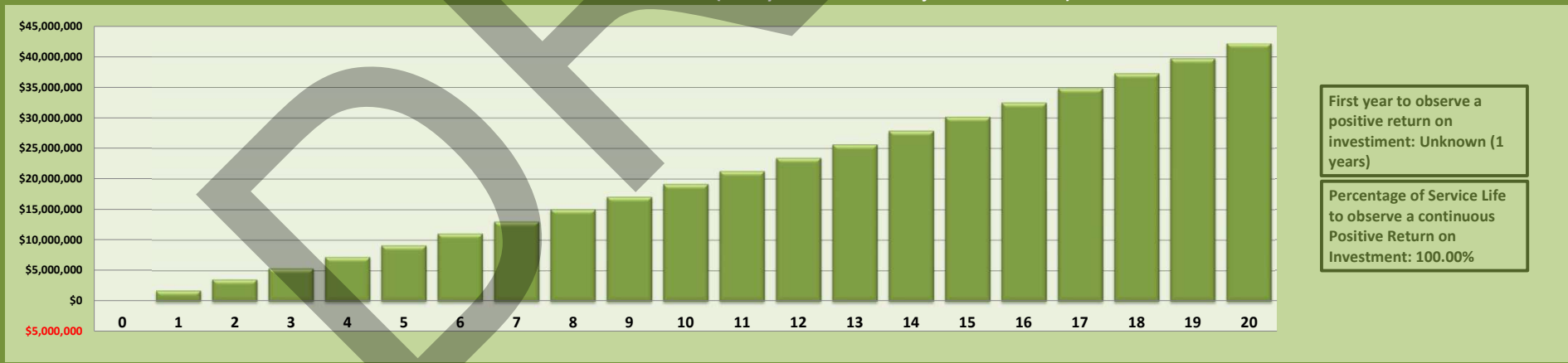
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



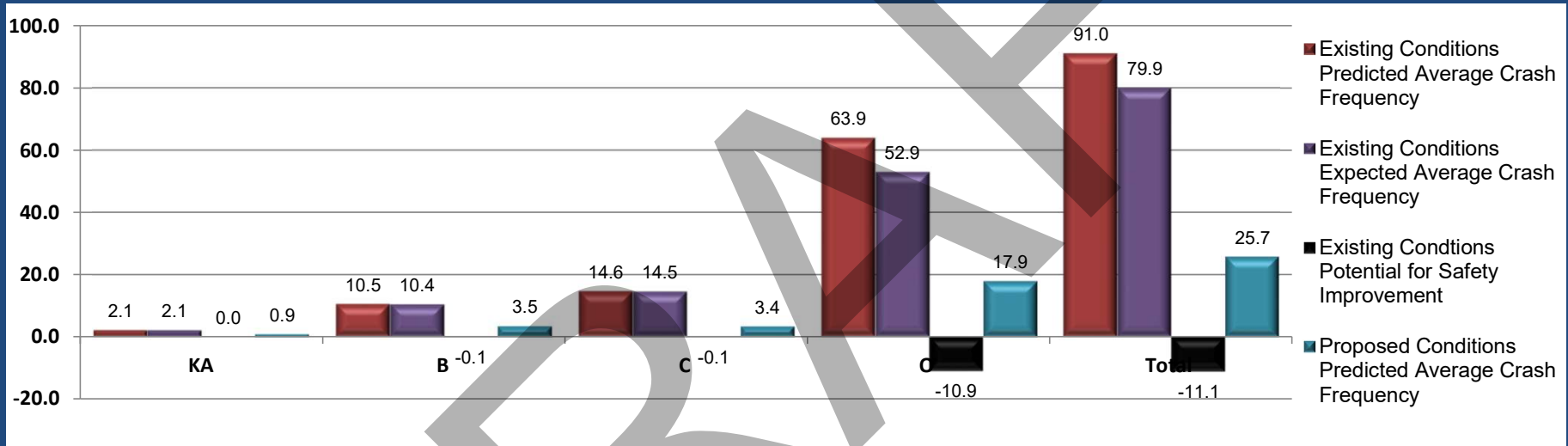


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}} - \text{Existing Conditions}$	2.1225	10.4532	14.5626	63.8881	91.0264
$N_{\text{expected}} - \text{Existing Conditions}$	2.0912	10.3892	14.4956	52.9412	79.9172
$N_{\text{potential for improvement}} - \text{Existing Conditions}$	-0.0313	-0.0640	-0.0670	-10.9469	-11.1092
$N_{\text{expected}} - \text{Proposed Conditions}$	0.8776	3.5465	3.3751	17.9065	25.7057



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 2.98-3.069	S of Orange Point	0.0177	0.089	0.0893	0.515	0.711
US23; 3.071-3.579	Orange Point - Halfway	0.0557	0.2796	0.2805	1.6176	2.2334
US23; 3.581-4.049	Halfway - Corduory	0.0472	0.2372	0.238	1.3725	1.8949
US23; 4.051-4.454	Corduory - Slate Ridge	0.0484	0.2431	0.2436	1.4047	1.9398
US23; 4.456-4.629	Slate Ridge - Home	0.0414	0.2077	0.2084	1.2018	1.6593
US23; 4.631-4.915	Home - Artesian	0.0298	0.2064	0.1924	1.1882	1.6168
US23; 4.915-5.12	Lewis Center - Gallopers	0.0258	0.1791	0.1661	1.0321	1.4031
US23; 3.069	Gallopers - Olentangy	0.0148	0.1029	0.0954	0.5925	0.8056
US23; 3.579	Olentangy - Orangetick	0.0215	0.1081	0.1071	0.6092	0.8459
US23; 4.049	N of Orangetick	0.0198	0.137	0.1282	0.7876	1.0726
US23; 4.454	Orange Point	0.3105	1.472	2.2014	8.7457	12.7296
US23; 4.628	Halfway	0.0117	0.068	0.0752	0.7214	0.8763
US23; 4.63	Halfway	0.0106	0.0617	0.0689	0.5848	0.726
US23; 4.915	Corduory	0.2981	1.411	2.1077	8.368	12.1848



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 2.98-3.069	S of Orange Point	0.0163	0.0809	0.0808	0.3702	0.5482
US23; 3.071-3.579	Orange Point - Halfway	0.0576	0.2912	0.2927	1.171	1.8125
US23; 3.581-4.049	Halfway - Corduory	0.0445	0.222	0.2222	0.8586	1.3473
US23; 4.051-4.454	Corduory - Slate Ridge	0.0515	0.2615	0.2629	1.7779	2.3538
US23; 4.456-4.629	Slate Ridge - Home	0.0399	0.1995	0.1999	1.1711	1.6104
US23; 4.631-4.915	Home - Artesian	0.0371	0.2643	0.2458	2.883	3.4302
US23; 4.915-5.12	Lewis Center - Gallopers	0.0276	0.1906	0.1737	0.7137	1.1056
US23; 3.069	Gallopers - Olentangy	0.0162	0.1163	0.1099	0.8177	1.0601
US23; 3.579	Olentangy - Orangetwick	0.0197	0.0976	0.0962	0.9919	1.2054
US23; 4.049	N of Orangetwick	0.021	0.148	0.1401	1.5757	1.8848
US23; 4.454	Orange Point	0.2516	1.1901	1.7777	5.969	9.1884
US23; 4.628	Halfway	0.0096	0.0563	0.0609	0.6952	0.822
US23; 4.63	Halfway	0.0133	0.0767	0.0874	0.3635	0.5409
US23; 4.915	Corduory	0.2094	0.9774	1.4463	5.3079	7.941



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 2.98-3.069	S of Orange Point	-0.0014	-0.0081	-0.0085	-0.1448	-0.1628	
US23; 3.071-3.579	Orange Point - Halfway	0.0019	0.0116	0.0122	-0.4466	-0.4209	
US23; 3.581-4.049	Halfway - Corduory	-0.0027	-0.0152	-0.0158	-0.5139	-0.5476	
US23; 4.051-4.454	Corduory - Slate Ridge	0.0031	0.0184	0.0193	0.3732	0.414	
US23; 4.456-4.629	Slate Ridge - Home	-0.0015	-0.0082	-0.0085	-0.0307	-0.0489	
US23; 4.631-4.915	Home - Artesian	0.0073	0.0579	0.0534	1.6948	1.8134	
US23; 4.915-5.12	Lewis Center - Gallopers	0.0018	0.0115	0.0076	-0.3184	-0.2975	
US23; 3.069	Gallopers - Olentangy	0.0014	0.0134	0.0145	0.2252	0.2545	
US23; 3.579	Olentangy - Orangetwick	-0.0018	-0.0105	-0.0109	0.3827	0.3595	
US23; 4.049	N of Orangetwick	0.0012	0.011	0.0119	0.7881	0.8122	
US23; 4.454	Orange Point	-0.0589	-0.2819	-0.4237	-2.7767	-3.5412	
US23; 4.628	Halfway	-0.0021	-0.0117	-0.0143	-0.0262	-0.0543	
US23; 4.63	Halfway	0.0027	0.015	0.0185	-0.2213	-0.1851	
US23; 4.915	Corduory	-0.0887	-0.4336	-0.6614	-3.0601	-4.2438	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 2.98-3.069	S of Orange Point	0.0122	0.0853	0.08	0.5004	0.6779
US23; 3.071-3.579	Orange Point - Corduroy	0.0741	0.5196	0.4872	3.0482	4.1291
US23; 3.581-4.049	Corduroy - Home	0.0595	0.4169	0.391	2.4459	3.3133
US23; 4.051-4.454	Home - Lewis Center	0.0512	0.359	0.3366	2.1061	2.8529
US23; 4.456-4.629	Lewis Center - Gallopers	0.0191	0.1337	0.1254	0.7844	1.0626
US23; 4.631-4.915	Gallopers - Orangetwick	0.0233	0.1596	0.146	0.9001	1.229
US23; 4.915-5.12	N of Orangetwick	0.0165	0.1128	0.1033	0.6367	0.8693
US23; 3.069	Orange Point	0.1444	0.3701	0.3429	1.0241	1.8815
US23; 3.579	Corduroy	0.0336	0.1247	0.1533	1.0574	1.369
US23; 4.049	Home CRs	0.2252	0.5779	0.5356	1.4096	2.7483
US23; 4.454	Lewis Center	0.1797	0.4599	0.4262	1.2057	2.2715
US23; 4.628	Gallopers	0.0147	0.0863	0.0928	1.2072	1.401
US23; 4.63	Gallopers	0.0135	0.079	0.0859	0.9959	1.1743
US23; 4.915	Orangetwick	0.0106	0.0617	0.0689	0.5848	0.726



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.0709	0.0394	-0.0315	0.0345
Head On	0.6231	0.1459	-0.4771	0.1330
Rear End	18.6599	5.6642	-12.9958	10.6778
Backing	1.0301	0.2484	-0.7817	0.4041
Sideswipe - Meeting	0.1688	0.0691	-0.0997	0.1403
Sideswipe - Passing	6.2156	1.8964	-4.3192	3.7828
Angle	15.8038	3.8521	-11.9517	4.9802
Parked Vehicle	0.3700	0.2152	-0.1548	0.2349
Pedestrian	0.2861	0.2861	0.0000	0.1675
Animal	2.4110	1.5215	-0.8895	2.4110
Train	0.0008	0.0005	-0.0003	0.0002
Pedalcycles	0.1406	0.1406	0.0000	0.1420
Other Non-Vehicle	0.0002	0.0002	-0.0001	0.0000
Fixed Object	5.3309	3.1303	-2.2007	2.1912
Other Object	0.2452	0.1394	-0.1057	0.1409
Overturning	0.3150	0.2026	-0.1124	0.1479
Other Non-Collision	0.4012	0.2294	-0.1718	0.1944
Left Turn	2.9582	0.7306	-2.2276	0.6503
Right Turn	1.3682	0.3155	-1.0528	1.6833



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-37.035	(\$1,909,081)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	0.000	\$0
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-28.286	\$27,873,487
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-65.321	\$25,964,406



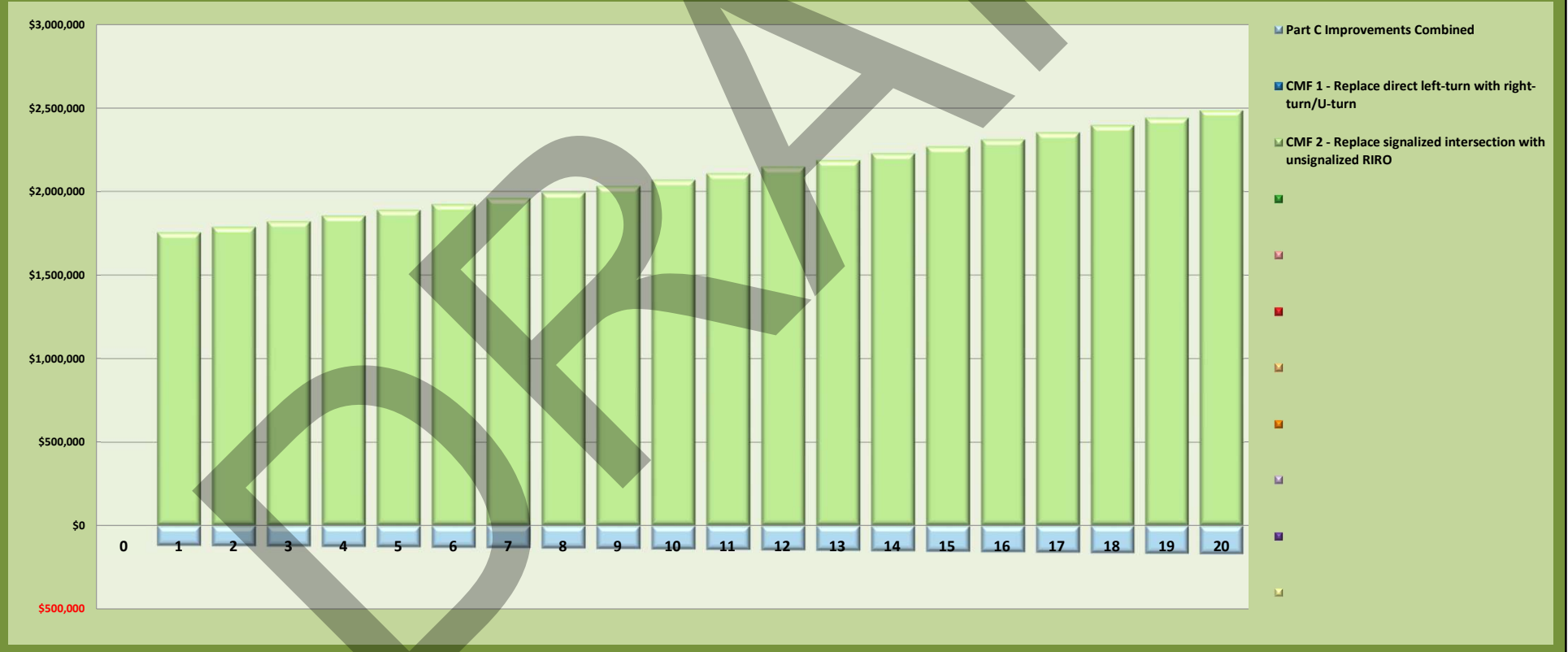
Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	Expected Annual Crash Adjustment	Comments:
Net Present Value of Project: \$6.00	Number of Fatal & Incapacitating Injury Crashes: -1.245	
Net Present Value of Safety Benefits: \$25,964,405.91	Number of Injury Crashes: -19.339	
Net Benefit: \$25,964,399.91	Number of Total Crashes: -65.321	
Benefit / Cost Ratio: 4327400.98		

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year





Safety Benefit - Cost Analysis

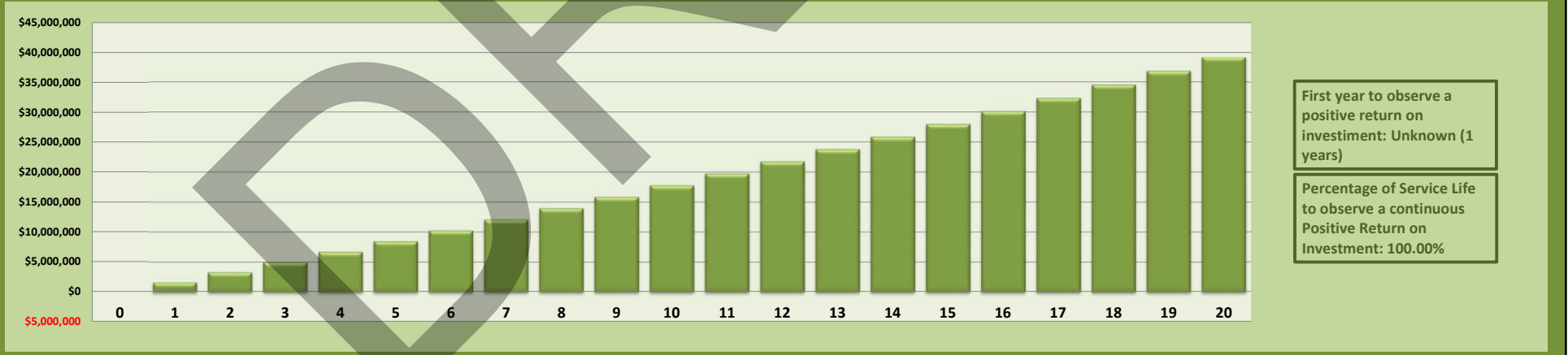
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



First year to observe a positive return on investment: Unknown (1 years)

Percentage of Service Life to observe a continuous Positive Return on Investment: 100.00%

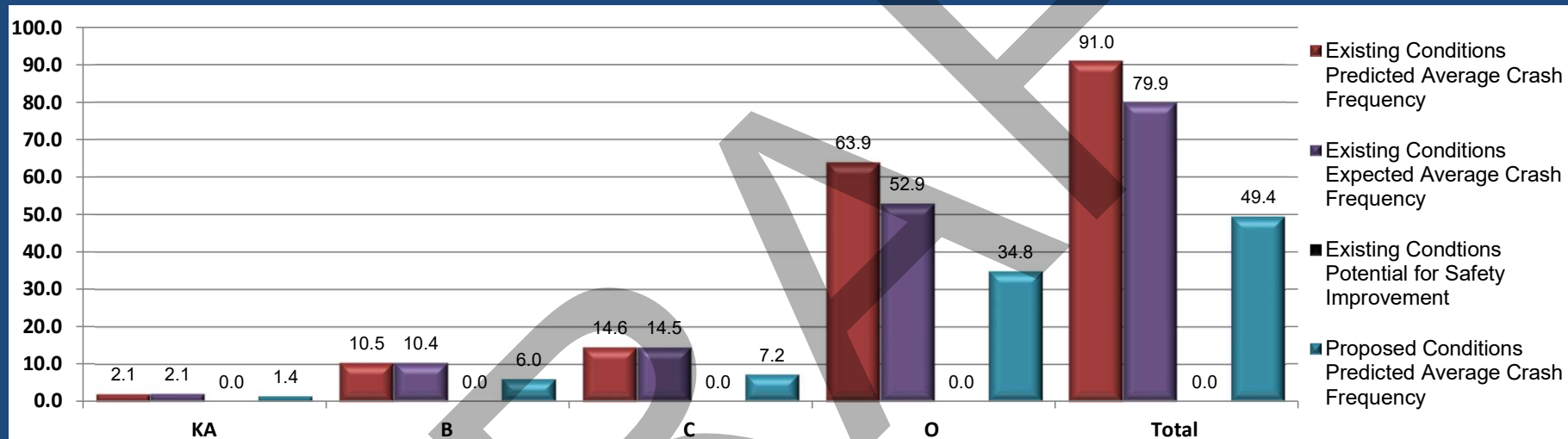


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.1225	10.4532	14.5626	63.8881	91.0264
N_{expected} - Existing Conditions	2.0912	10.3892	14.4956	52.9412	79.9172
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	1.3646	5.9915	7.1887	34.8124	49.3572



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 2.98-3.07	S of Orange Point	0.0177	0.089	0.0893	0.515	0.711
US23: 3.07-3.345	Orange Point - Halfway	0.0557	0.2796	0.2805	1.6176	2.2334
US23: 3.345-3.58	Halfway - Corduory	0.0472	0.2372	0.238	1.3725	1.8949
US23: 3.58-3.835	Corduory - Slate Ridge	0.0484	0.2431	0.2436	1.4047	1.9398
US23: 3.835-4.05	Slate Ridge - Home	0.0414	0.2077	0.2084	1.2018	1.6593
US23: 4.05-4.36	Home - Artesian	0.0298	0.2064	0.1924	1.1882	1.6168
US23: 4.36-4.63	Lewis Center - Gallopers	0.0258	0.1791	0.1661	1.0321	1.4031
US23: 4.63-4.785	Gallopers - Olentangy	0.0148	0.1029	0.0954	0.5925	0.8056
US23: 4.785-4.915	Olentangy - Orangewick	0.0215	0.1081	0.1071	0.6092	0.8459
US23: 4.915-5.12	N of Orangewick	0.0198	0.137	0.1282	0.7876	1.0726
US23: 3.07	Orange Point	0.3105	1.472	2.2014	8.7457	12.7296
US23: 3.344	Halfway	0.0117	0.068	0.0752	0.7214	0.8763
US23: 3.346	Halfway	0.0106	0.0617	0.0689	0.5848	0.726
US23: 3.58	Corduory	0.2981	1.411	2.1077	8.368	12.1848
US23: 3.835	Slate Ridge	0.0117	0.068	0.0752	0.7214	0.8763
US23: 4.05	Home	0.4057	1.9421	2.9248	11.6598	16.9324
US23: 4.36	Artesian	0.0117	0.068	0.0752	0.7214	0.8763
US23: 4.455	Lewis Center	0.378	1.8075	2.7198	10.6263	15.5316
US23: 4.628	Gallopers	0.0135	0.079	0.0859	0.9959	1.1743
US23: 4.63	Gallopers	0.0117	0.068	0.0752	0.7214	0.8763
US23: 4.785	Olentangy Crossing	0.3266	1.5561	2.3354	9.116	13.3341
US23: 4.915	Orangewick	0.0106	0.0617	0.0689	0.5848	0.726



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 2.98-3.07	S of Orange Point	0.0163	0.0809	0.0808	0.3702	0.5482
US23: 3.07-3.345	Orange Point - Halfway	0.0576	0.2912	0.2927	1.171	1.8125
US23: 3.345-3.58	Halfway - Corduory	0.0445	0.222	0.2222	0.8586	1.3473
US23: 3.58-3.835	Corduory - Slate Ridge	0.0515	0.2615	0.2629	1.7779	2.3538
US23: 3.835-4.05	Slate Ridge - Home	0.0399	0.1995	0.1999	1.1711	1.6104
US23: 4.05-4.36	Home - Artesian	0.0371	0.2643	0.2458	2.883	3.4302
US23: 4.36-4.63	Lewis Center - Gallopers	0.0276	0.1906	0.1737	0.7137	1.1056
US23: 4.63-4.785	Gallopers - Olentangy	0.0162	0.1163	0.1099	0.8177	1.0601
US23: 4.785-4.915	Olentangy - Orangetown	0.0197	0.0976	0.0962	0.9919	1.2054
US23: 4.915-5.12	N of Orangetown	0.021	0.148	0.1401	1.5757	1.8848
US23: 3.07	Orange Point	0.2516	1.1901	1.7777	5.969	9.1884
US23: 3.344	Halfway	0.0096	0.0563	0.0609	0.6952	0.822
US23: 3.346	Halfway	0.0133	0.0767	0.0874	0.3635	0.5409
US23: 3.58	Corduory	0.2094	0.9774	1.4463	5.3079	7.941
US23: 3.835	Slate Ridge	0.0096	0.0563	0.0609	0.412	0.5388
US23: 4.05	Home	0.5252	2.5473	3.8699	11.8706	18.813
US23: 4.36	Artesian	0.0096	0.0563	0.0609	0.412	0.5388
US23: 4.455	Lewis Center	0.4707	2.2961	3.5023	9.1738	15.4429
US23: 4.628	Gallopers	0.0111	0.0651	0.0688	0.8249	0.9699
US23: 4.63	Gallopers	0.0096	0.0563	0.0609	0.5535	0.6803
US23: 4.785	Olentangy Crossing	0.2313	1.088	1.6191	4.6645	7.6029
US23: 4.915	Orangetown	0.0088	0.0514	0.0563	0.3635	0.48



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23: 2.98-3.07	S of Orange Point	-0.0014	-0.0081	-0.0085	-0.1448	-0.1628	
US23: 3.07-3.345	Orange Point - Halfway	0.0019	0.0116	0.0122	-0.4466	-0.4209	
US23: 3.345-3.58	Halfway - Corduory	-0.0027	-0.0152	-0.0158	-0.5139	-0.5476	
US23: 3.58-3.835	Corduory - Slate Ridge	0.0031	0.0184	0.0193	0.3732	0.414	
US23: 3.835-4.05	Slate Ridge - Home	-0.0015	-0.0082	-0.0085	-0.0307	-0.0489	
US23: 4.05-4.36	Home - Artesian	0.0073	0.0579	0.0534	1.6948	1.8134	
US23: 4.36-4.63	Lewis Center - Gallopers	0.0018	0.0115	0.0076	-0.3184	-0.2975	
US23: 4.63-4.785	Gallopers - Olentangy	0.0014	0.0134	0.0145	0.2252	0.2545	
US23: 4.785-4.915	Olentangy - Orangewick	-0.0018	-0.0105	-0.0109	0.3827	0.3595	
US23: 4.915-5.12	N of Orangewick	0.0012	0.011	0.0119	0.7881	0.8122	
US23: 3.07	Orange Point	-0.0589	-0.2819	-0.4237	-2.7767	-3.5412	
US23: 3.344	Halfway	-0.0021	-0.0117	-0.0143	-0.0262	-0.0543	
US23: 3.346	Halfway	0.0027	0.015	0.0185	-0.2213	-0.1851	
US23: 3.58	Corduory	-0.0887	-0.4336	-0.6614	-3.0601	-4.2438	
US23: 3.835	Slate Ridge	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375	
US23: 4.05	Home	0.1195	0.6052	0.9451	0.2108	1.8806	
US23: 4.36	Artesian	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375	
US23: 4.455	Lewis Center	0.0927	0.4886	0.7825	-1.4525	-0.0887	
US23: 4.628	Gallopers	-0.0024	-0.0139	-0.0171	-0.171	-0.2044	
US23: 4.63	Gallopers	-0.0021	-0.0117	-0.0143	-0.1679	-0.196	
US23: 4.785	Olentangy Crossing	-0.0953	-0.4681	-0.7163	-4.4515	-5.7312	
US23: 4.915	Orangewick	-0.0018	-0.0103	-0.0126	-0.2213	-0.246	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 2.98-3.069	S of Orange Point	0.0122	0.0853	0.08	0.5004	0.6779
US23: 3.071-3.344	Orange Point - Halfway	0.0397	0.2782	0.2609	1.6321	2.2109
US23: 3.346-3.579	Halfway - Corduory	0.0333	0.2338	0.2191	1.3713	1.8575
US23: 3.581-3.835	Corduory - Slate Ridge	0.0317	0.2219	0.2084	1.3018	1.7638
US23: 3.835-4.049	Slate Ridge - Home	0.0277	0.1945	0.1823	1.1407	1.5452
US23: 4.051-4.36	Home - Artesian	0.0297	0.2057	0.1917	1.1843	1.6114
US23: 4.36-4.63	Lewis Center - Gallopers	0.0263	0.1827	0.1695	1.0531	1.4316
US23: 4.63-4.784	Gallopers - Olentangy	0.015	0.1042	0.0967	0.6007	0.8166
US23: 4.786-4.915	Olentangy - Orangewick	0.0129	0.0886	0.0837	0.5084	0.6936
US23: 4.915-5.12	N of Orangewick	0.0202	0.1397	0.1308	0.8035	1.0942
US23: 3.07	Orange Point	0.259	1.2819	2.0119	8.9211	12.4739
US23: 3.343	Halfway	0.0121	0.0705	0.0777	0.7802	0.9405
US23: 3.579	Corduory	0.1348	0.3455	0.3201	0.9746	1.775
US23: 3.834	Slate Ridge	0.0121	0.0705	0.0777	0.7802	0.9405
US23: 4.049	Home CRs	0.2252	0.5779	0.5356	1.4096	2.7483
US23: 4.359	Artesian	0.0077	0.0445	0.051	0.2907	0.3939
US23: 4.454	Lewis Center	0.1971	0.505	0.468	1.2842	2.4543
US23: 4.629	Gallopers	0.012	0.0703	0.0771	0.809	0.9684
US23: 4.785	Olentangy	0.2267	1.1207	1.7578	7.649	10.7542
US23: 4.914	Orangewick	0.0051	0.0293	0.0339	0.2283	0.2966
US23: 4.631	Gallopers	0.012	0.0703	0.0771	0.809	0.9684
US23: 3.345	Halfway	0.0121	0.0705	0.0777	0.7802	0.9405



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.1047	0.1006		0.0634
Head On	1.3800	1.2502		0.5036
Rear End	43.4828	38.4468		22.0240
Backing	1.7207	1.3928		0.9249
Sideswipe - Meeting	0.3104	0.3090		0.1512
Sideswipe - Passing	10.8043	9.2809		6.6115
Angle	15.2220	13.1263		8.6910
Parked Vehicle	0.6547	0.6071		0.3969
Pedestrian	0.3323	0.3323		0.2475
Animal	1.7554	2.5691		2.3564
Train	0.0067	0.0057		0.0023
Pedalcycles	0.2100	0.2100		0.1924
Other Non-Vehicle	0.0000	0.0000		0.0000
Fixed Object	4.0930	3.8904		3.1463
Other Object	0.2045	0.2205		0.1799
Overturning	0.2697	0.2468		0.2108
Other Non-Collision	0.3427	0.3515		0.2670
Left Turn	8.2508	7.2551		3.0782
Right Turn	3.6357	2.8914		2.6669



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-11.713	(\$13,646,745)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-5.965	\$3,923,987
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-23.991	\$26,244,022
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-41.669	\$16,521,264



Safety Benefit - Cost Analysis

General Information

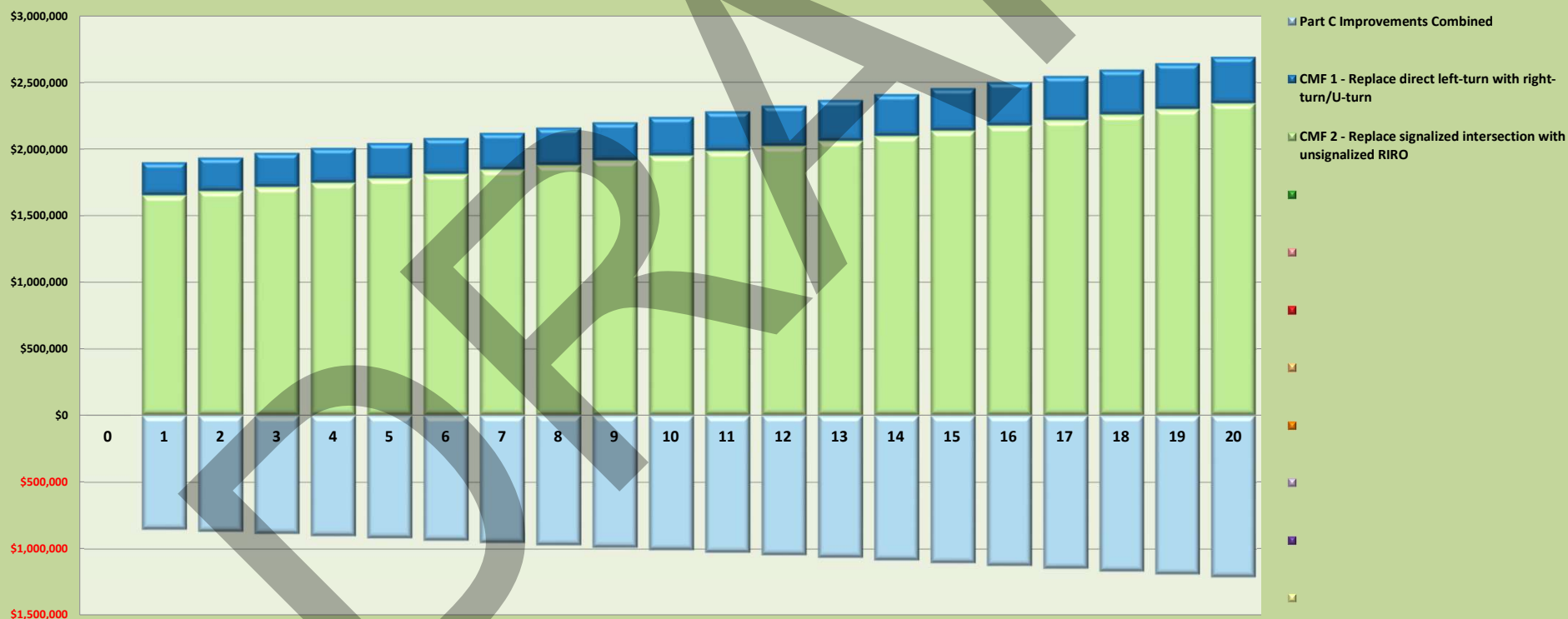
Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	
Net Present Value of Project	\$6.00
Net Present Value of Safety Benefits	\$16,521,263.69
Net Benefit	\$16,521,257.69
Benefit / Cost Ratio	2753543.95

Expected Annual Crash Adjustment	
Number of Fatal & Incapacitating Injury Crashes	-0.758
Number of Injury Crashes	-12.594
Number of Total Crashes	-41.669

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



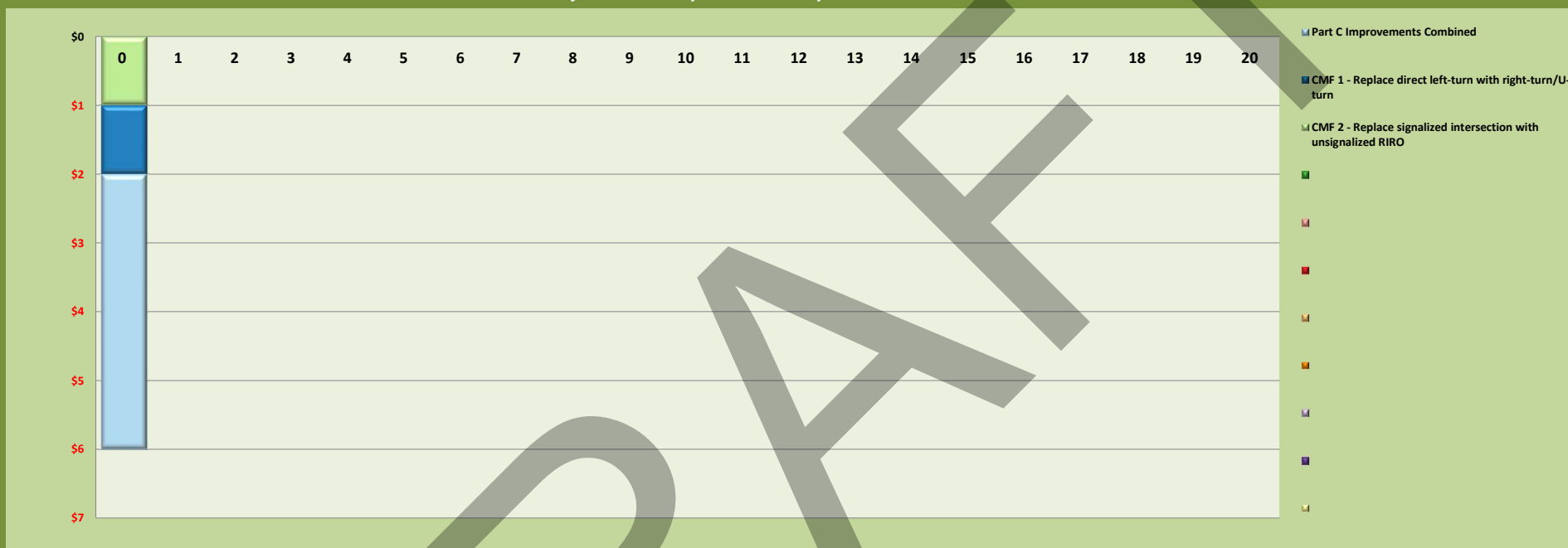


Safety Benefit - Cost Analysis

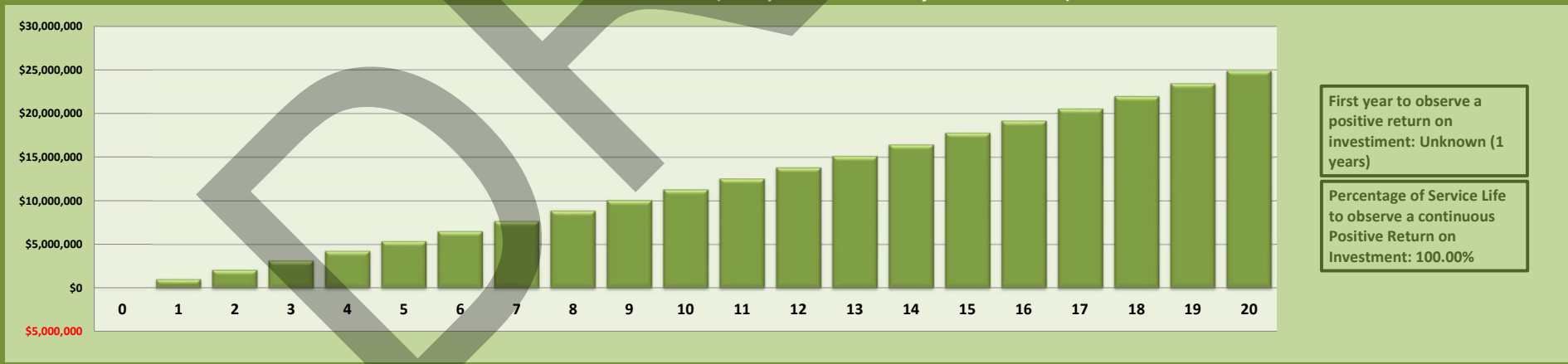
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



First year to observe a positive return on investment: Unknown (1 years)

Percentage of Service Life to observe a continuous Positive Return on Investment: 100.00%

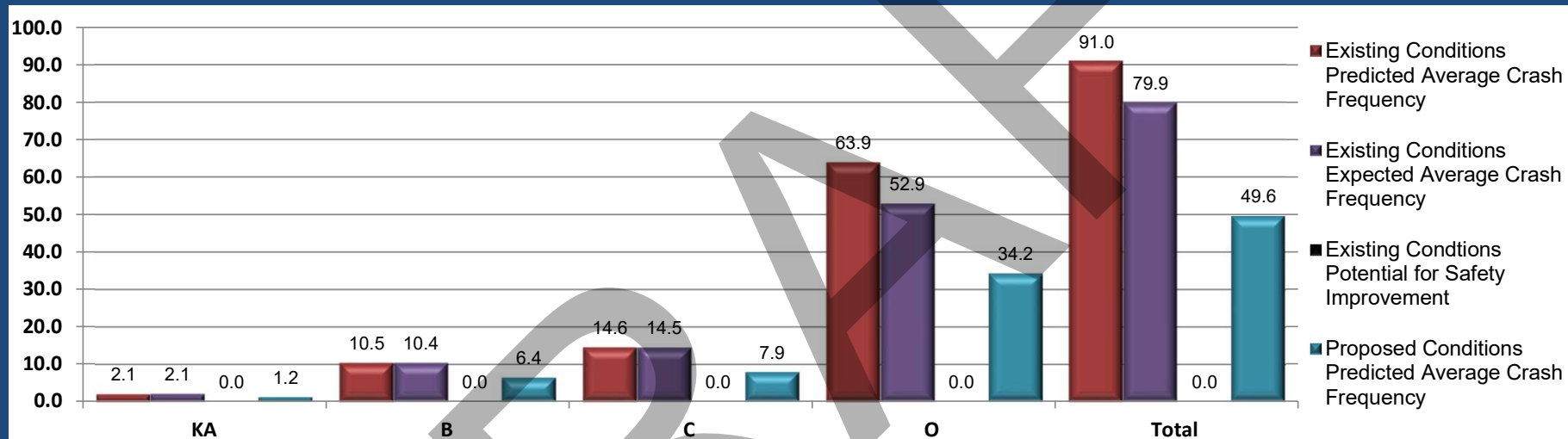


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.1225	10.4532	14.5626	63.8881	91.0264
N_{expected} - Existing Conditions	2.0912	10.3892	14.4956	52.9412	79.9172
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	1.1673	6.3759	7.8511	34.2150	49.6093



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 2.98-3.069	S of Orange Point	0.0177	0.089	0.0893	0.515	0.711
US23; 3.071-3.344	Orange Point - Halfway	0.0557	0.2796	0.2805	1.6176	2.2334
US23; 3.346-3.579	Halfway - Corduory	0.0472	0.2372	0.238	1.3725	1.8949
US23; 3.581-3.835	Corduory - Slate Ridge	0.0484	0.2431	0.2436	1.4047	1.9398
US23; 3.835-4.049	Slate Ridge - Home	0.0414	0.2077	0.2084	1.2018	1.6593
US23; 4.051-4.36	Home - Artesian	0.0298	0.2064	0.1924	1.1882	1.6168
US23; 4.36-4.63	Lewis Center - Gallopers	0.0258	0.1791	0.1661	1.0321	1.4031
US23; 4.63-4.784	Gallopers - Olentangy	0.0148	0.1029	0.0954	0.5925	0.8056
US23; 4.786-4.915	Olentangy - Orangewick	0.0215	0.1081	0.1071	0.6092	0.8459
US23; 4.915-5.12	N of Orangewick	0.0198	0.137	0.1282	0.7876	1.0726
US23; 3.07	Orange Point	0.3105	1.472	2.2014	8.7457	12.7296
US23; 3.343	Halfway	0.0117	0.068	0.0752	0.7214	0.8763
US23; 3.579	Halfway	0.0106	0.0617	0.0689	0.5848	0.726
US23; 3.834	Corduory	0.2981	1.411	2.1077	8.368	12.1848
US23; 4.049	Slate Ridge	0.0117	0.068	0.0752	0.7214	0.8763
US23; 4.359	Home	0.4057	1.9421	2.9248	11.6598	16.9324
US23; 4.454	Artesian	0.0117	0.068	0.0752	0.7214	0.8763
US23; 4.629	Lewis Center	0.378	1.8075	2.7198	10.6263	15.5316
US23; 4.785	Gallopers	0.0135	0.079	0.0859	0.9959	1.1743
US23; 4.914	Gallopers	0.0117	0.068	0.0752	0.7214	0.8763
US23; 4.631	Olentangy Crossing	0.3266	1.5561	2.3354	9.116	13.3341
US23; 3.345	Orangewick	0.0106	0.0617	0.0689	0.5848	0.726



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 2.98-3.069	S of Orange Point	0.0163	0.0809	0.0808	0.3702	0.5482
US23; 3.071-3.344	Orange Point - Halfway	0.0576	0.2912	0.2927	1.171	1.8125
US23; 3.346-3.579	Halfway - Corduory	0.0445	0.222	0.2222	0.8586	1.3473
US23; 3.581-3.835	Corduory - Slate Ridge	0.0515	0.2615	0.2629	1.7779	2.3538
US23; 3.835-4.049	Slate Ridge - Home	0.0399	0.1995	0.1999	1.1711	1.6104
US23; 4.051-4.36	Home - Artesian	0.0371	0.2643	0.2458	2.883	3.4302
US23; 4.36-4.63	Lewis Center - Gallopers	0.0276	0.1906	0.1737	0.7137	1.1056
US23; 4.63-4.784	Gallopers - Olentangy	0.0162	0.1163	0.1099	0.8177	1.0601
US23; 4.786-4.915	Olentangy - Orangewick	0.0197	0.0976	0.0962	0.9919	1.2054
US23; 4.915-5.12	N of Orangewick	0.021	0.148	0.1401	1.5757	1.8848
US23; 3.07	Orange Point	0.2516	1.1901	1.7777	5.969	9.1884
US23; 3.343	Halfway	0.0096	0.0563	0.0609	0.6952	0.822
US23; 3.579	Halfway	0.0133	0.0767	0.0874	0.3635	0.5409
US23; 3.834	Corduory	0.2094	0.9774	1.4463	5.3079	7.941
US23; 4.049	Slate Ridge	0.0096	0.0563	0.0609	0.412	0.5388
US23; 4.359	Home	0.5252	2.5473	3.8699	11.8706	18.813
US23; 4.454	Artesian	0.0096	0.0563	0.0609	0.412	0.5388
US23; 4.629	Lewis Center	0.4707	2.2961	3.5023	9.1738	15.4429
US23; 4.785	Gallopers	0.0111	0.0651	0.0688	0.8249	0.9699
US23; 4.914	Gallopers	0.0096	0.0563	0.0609	0.5535	0.6803
US23; 4.631	Olentangy Crossing	0.2313	1.088	1.6191	4.6645	7.6029
US23; 3.345	Orangewick	0.0088	0.0514	0.0563	0.3635	0.48



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23: 2.98-3.069	S of Orange Point	-0.0014	-0.0081	-0.0085	-0.1448	-0.1628	
US23: 3.071-3.344	Orange Point - Halfway	0.0019	0.0116	0.0122	-0.4466	-0.4209	
US23: 3.346-3.579	Halfway - Corduory	-0.0027	-0.0152	-0.0158	-0.5139	-0.5476	
US23: 3.581-3.835	Corduory - Slate Ridge	0.0031	0.0184	0.0193	0.3732	0.414	
US23: 3.835-4.049	Slate Ridge - Home	-0.0015	-0.0082	-0.0085	-0.0307	-0.0489	
US23: 4.051-4.36	Home - Artesian	0.0073	0.0579	0.0534	1.6948	1.8134	
US23: 4.36-4.63	Lewis Center - Gallopers	0.0018	0.0115	0.0076	-0.3184	-0.2975	
US23: 4.63-4.784	Gallopers - Olentangy	0.0014	0.0134	0.0145	0.2252	0.2545	
US23: 4.786-4.915	Olentangy - Orangewick	-0.0018	-0.0105	-0.0109	0.3827	0.3595	
US23: 4.915-5.12	N of Orangewick	0.0012	0.011	0.0119	0.7881	0.8122	
US23: 3.07	Orange Point	-0.0589	-0.2819	-0.4237	-2.7767	-3.5412	
US23: 3.343	Halfway	-0.0021	-0.0117	-0.0143	-0.0262	-0.0543	
US23: 3.579	Halfway	0.0027	0.015	0.0185	-0.2213	-0.1851	
US23: 3.834	Corduory	-0.0887	-0.4336	-0.6614	-3.0601	-4.2438	
US23: 4.049	Slate Ridge	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375	
US23: 4.359	Home	0.1195	0.6052	0.9451	0.2108	1.8806	
US23: 4.454	Artesian	-0.0021	-0.0117	-0.0143	-0.3094	-0.3375	
US23: 4.629	Lewis Center	0.0927	0.4886	0.7825	-1.4525	-0.0887	
US23: 4.785	Gallopers	-0.0024	-0.0139	-0.0171	-0.171	-0.2044	
US23: 4.914	Gallopers	-0.0021	-0.0117	-0.0143	-0.1679	-0.196	
US23: 4.631	Olentangy Crossing	-0.0953	-0.4681	-0.7163	-4.4515	-5.7312	
US23: 3.345	Orangewick	-0.0018	-0.0103	-0.0126	-0.2213	-0.246	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 2.98-3.069	S of Orange Point	0.0122	0.0853	0.08	0.5004	0.6779
US23: 3.071-3.344	Orange Point - Halfway	0.0397	0.2782	0.2609	1.6321	2.2109
US23: 3.346-3.579	Halfway - Corduory	0.0333	0.2338	0.2191	1.3713	1.8575
US23: 3.581-3.835	Corduory - Slate Ridge	0.0317	0.2219	0.2084	1.3018	1.7638
US23: 3.835-4.049	Slate Ridge - Home	0.0277	0.1945	0.1823	1.1407	1.5452
US23: 4.051-4.36	Home - Artesian	0.0297	0.2057	0.1917	1.1843	1.6114
US23: 4.36-4.63	Lewis Center - Gallopers	0.0263	0.1827	0.1695	1.0531	1.4316
US23: 4.63-4.784	Gallopers - Olentangy	0.015	0.1042	0.0967	0.6007	0.8166
US23: 4.786-4.915	Olentangy - Orangewick	0.0129	0.0886	0.0837	0.5084	0.6936
US23: 4.915-5.12	N of Orangewick	0.0202	0.1397	0.1308	0.8035	1.0942
US23: 3.07	Orange Point	0.1424	0.8121	1.0565	2.8047	4.8157
US23: 3.343	Halfway	0.0121	0.0705	0.0777	0.7802	0.9405
US23: 3.579	Corduory	0.1348	0.3455	0.3201	0.9746	1.775
US23: 3.834	Slate Ridge	0.0121	0.0705	0.0777	0.7802	0.9405
US23: 4.049	Home	0.2762	1.3806	2.1816	9.6855	13.5239
US23: 4.359	Artesian Run	0.0077	0.0445	0.051	0.2907	0.3939
US23: 4.454	Lewis Center	0.1489	0.8565	1.1263	3.1666	5.2983
US23: 4.629	Gallopers	0.012	0.0703	0.0771	0.809	0.9684
US23: 4.785	Olentangy Crossing	0.1406	0.8055	1.0542	2.9473	4.9476
US23: 4.914	Orangewick	0.0077	0.0445	0.051	0.2907	0.3939
US23: 4.631	Gallopers	0.012	0.0703	0.0771	0.809	0.9684
US23: 3.345	Halfway	0.0121	0.0705	0.0777	0.7802	0.9405



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.0696	0.0481		0.0598
Head On	0.6557	0.2850		0.4765
Rear End	25.4651	11.4199		22.5593
Backing	1.1221	0.4450		0.9413
Sideswipe - Meeting	0.1638	0.0924		0.1567
Sideswipe - Passing	7.7363	3.4906		6.9674
Angle	11.1980	4.9021		7.6494
Parked Vehicle	0.4350	0.2972		0.4003
Pedestrian	0.2857	0.2857		0.2446
Animal	2.3567	1.7364		2.3567
Train	0.0328	0.0258		0.0325
Pedalcycles	0.2094	0.2094		0.2061
Other Non-Vehicle	0.0000	0.0000		0.0000
Fixed Object	4.3871	3.2285		3.6566
Other Object	0.2515	0.1772		0.2283
Overturning	0.2118	0.1657		0.1630
Other Non-Collision	0.4413	0.3175		0.3943
Left Turn	4.5716	2.1881		3.6814
Right Turn	1.8521	0.7255		1.7927



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-31.937	\$8,579,438
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-3.409	\$2,206,544
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-6.072	\$6,349,792
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-41.417	\$17,135,773



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator

Expected Annual Crash Adjustment

Comments:

Net Present Value of Project **\$6.00**

Net Present Value of Safety Benefits **\$17,135,773.42**

Net Benefit **\$17,135,767.42**

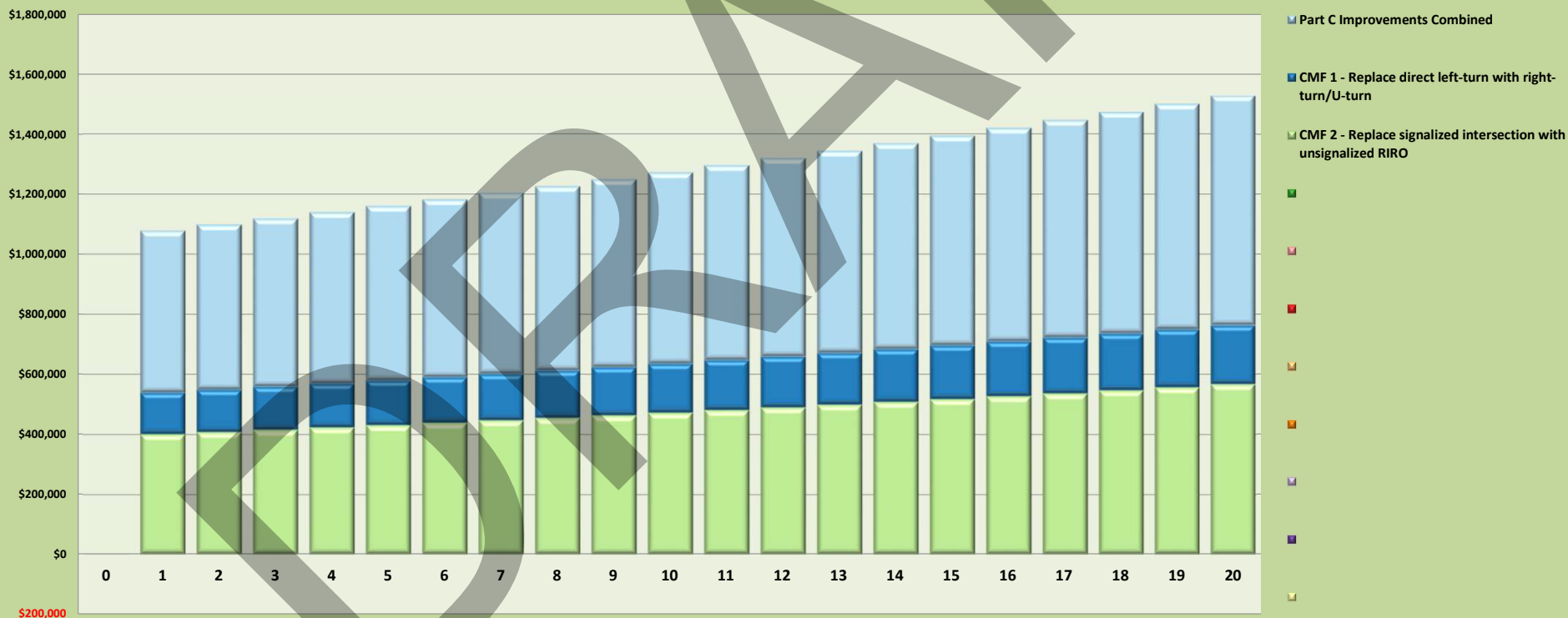
Benefit / Cost Ratio **2855962.24**

Number of Fatal & Incapacitating Injury Crashes **-0.955**

Number of Injury Crashes **-11.744**

Number of Total Crashes **-41.417**

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



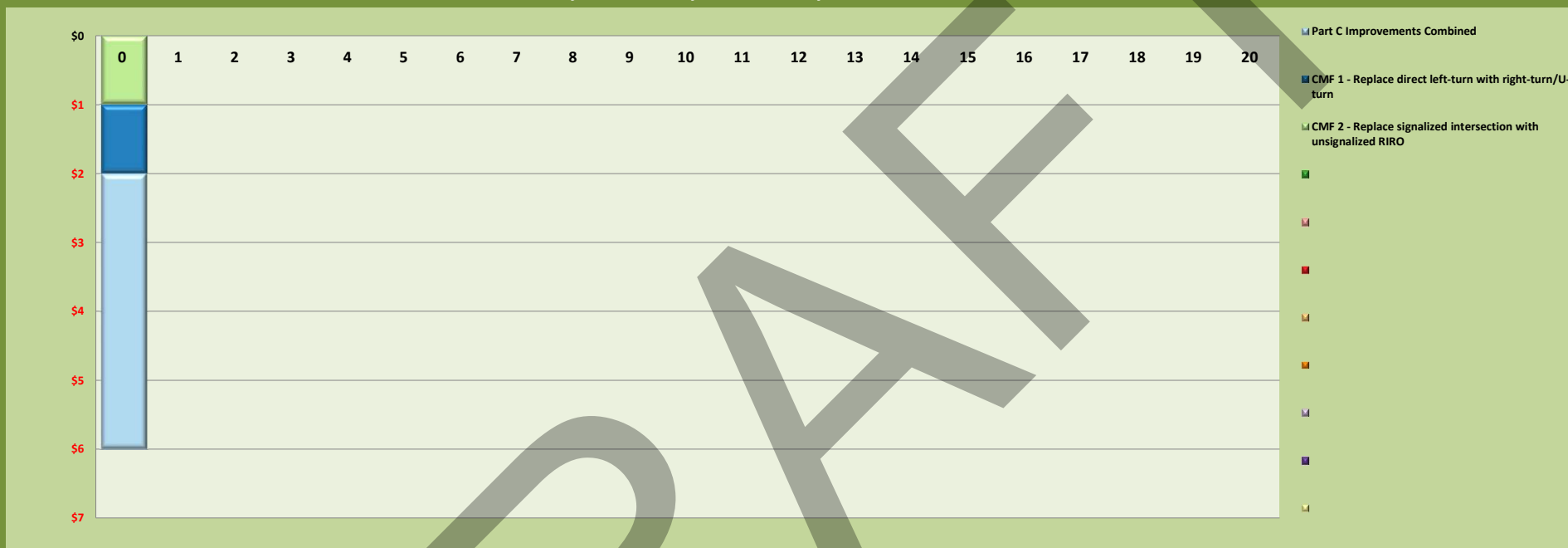


Safety Benefit - Cost Analysis

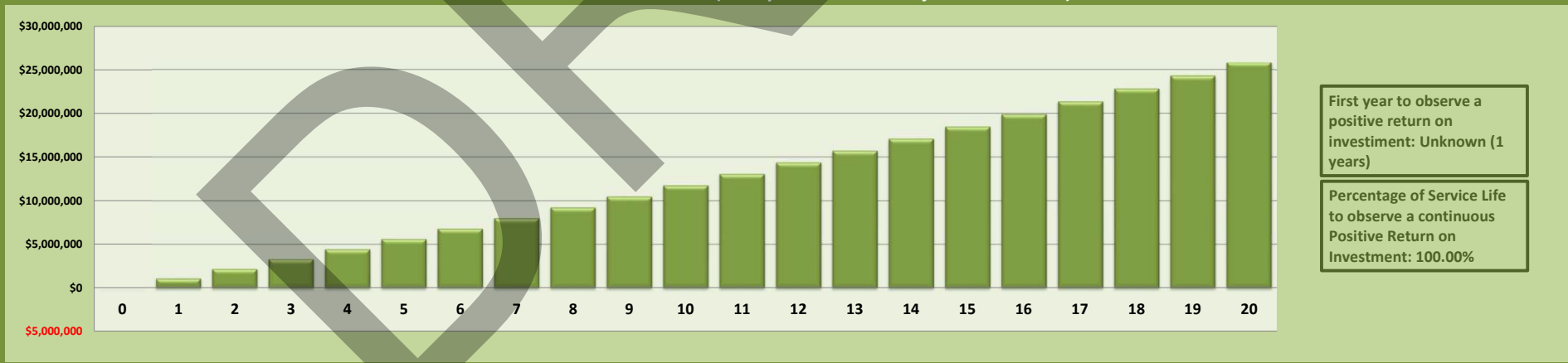
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 3	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



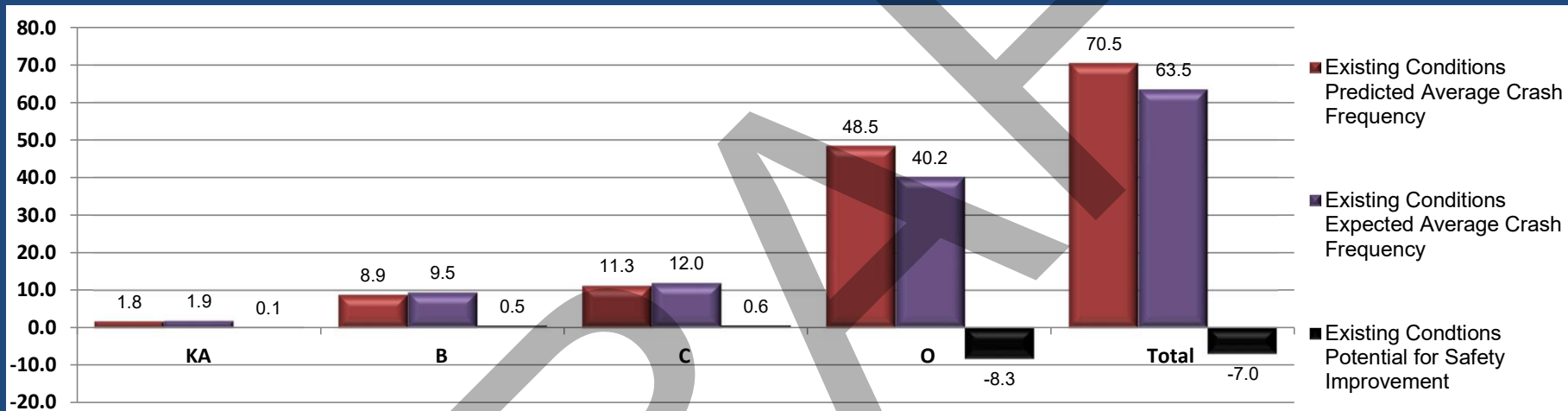


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.7793	8.9296	11.3298	48.4790	70.5177
N_{expected} - Existing Conditions	1.9153	9.4702	11.9710	40.1924	63.5489
$N_{\text{potential for improvement}}$ - Existing Conditions	0.1360	0.5406	0.6412	-8.2866	-6.9688



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 5.12-5.39	S of Hyatts/Shanahan	0.0259	0.1797	0.1673	1.0344	1.4073
US23: 5.39-5.865	Hyatts/Shanahan - Walnut	0.0457	0.3162	0.2948	1.8206	2.4773
US23: 5.865-6.3	Greif - Conner	0.0417	0.2889	0.2686	1.6646	2.2638
US23: 6.3-6.48	Conner - Glenn	0.0173	0.1197	0.1114	0.6894	0.9378
US23: 6.48-6.925	Glenn - OhioHealth	0.0358	0.2451	0.2244	1.3826	1.8879
US23: 6.925-7.296	OhioHealth - Cheshire Realigned	0.0298	0.2042	0.1868	1.1523	1.5731
US23: 7.6-7.87	Cheshire - Crystal Petal	0.0217	0.1486	0.136	0.8386	1.1449
US23: 7.87-8.12	Crystal Petal - Chapman	0.0201	0.1376	0.1259	0.7766	1.0602
US23: 8.12-8.41	Chapman - Perkins	0.0233	0.1598	0.1463	0.9012	1.2306
US23: 8.41-8.55	Perkins - Methodist School	0.0189	0.093	0.0925	0.5255	0.7299
US23: 8.55-8.62	Methodist School - Pollack	0.0095	0.0465	0.0463	0.2628	0.3651
US23: 5.39	Hyatts/Shanahan	0.3335	1.5915	2.3912	9.3376	13.6538
US23: 5.865	Walnut	0.0644	0.2408	0.2749	1.3076	1.8877
US23: 5.96	Greif	0.1351	0.7677	0.9942	2.7446	4.6416
US23: 6.3	Conner	0.032	0.1209	0.1391	0.5745	0.8665
US23: 6.48	Glenn	0.2816	1.3415	2.013	7.6751	11.3112
US23: 6.925	OhioHealth	0.2008	0.9372	1.385	5.2522	7.7752
US23: 7.6	Cheshire	0.1371	0.5026	0.5663	3.2373	4.4433
US23: 7.87	Crystal Petal	0.0084	0.0486	0.0552	0.3702	0.4824
US23: 8.12	Chapman	0.0084	0.0486	0.0552	0.3702	0.4824
US23: 8.41	Perkins	0.032	0.1209	0.1391	0.5745	0.8665
US23: 8.55	Methodist School	0.0275	0.104	0.1196	0.4941	0.7452
US23: 8.67	Pollack	0.0813	0.2985	0.3366	1.9004	2.6168
US23: 7.296	Cheshire Realigned	0.1231	0.7001	0.907	2.6478	4.378
US23: 7.296-7.6	Cheshire Realigned - Cheshire	0.0244	0.1674	0.1531	0.9443	1.2892



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 5.12-5.39	S of Hyatts/Shanahan	0.0362	0.273	0.264	1.2085	1.7817
US23: 5.39-5.865	Hyatts/Shanahan - Walnut	0.0481	0.3418	0.3235	2.0984	2.8118
US23: 5.865-6.3	Greif - Conner	0.0409	0.2738	0.2459	2.1613	2.7219
US23: 6.3-6.48	Conner - Glenn	0.0157	0.1033	0.0926	0.4013	0.6129
US23: 6.48-6.925	Glenn - OhioHealth	0.0355	0.2395	0.2161	1.4474	1.9385
US23: 6.925-7.296	OhioHealth - Cheshire Realigned	0.0247	0.1579	0.1386	0.5325	0.8537
US23: 7.6-7.87	Cheshire - Crystal Petal	0.0188	0.1221	0.1083	0.7364	0.9856
US23: 7.87-8.12	Crystal Petal - Chapman	0.0212	0.1487	0.1381	0.7042	1.0122
US23: 8.12-8.41	Chapman - Perkins	0.0282	0.2066	0.1964	0.4706	0.9018
US23: 8.41-8.55	Perkins - Methodist School	0.0174	0.0844	0.0836	0.3782	0.5636
US23: 8.55-8.62	Methodist School - Pollack	0.0091	0.0442	0.044	0.2196	0.3169
US23: 5.39	Hyatts/Shanahan	0.444	2.1679	3.3087	7.0019	12.9225
US23: 5.865	Walnut	0.0981	0.3627	0.4076	1.2447	2.1131
US23: 5.96	Greif	0.1314	0.7517	0.9814	3.115	4.9795
US23: 6.3	Conner	0.0273	0.1019	0.1166	0.635	0.8808
US23: 6.48	Glenn	0.2258	1.0705	1.6013	4.4036	7.3012
US23: 6.925	OhioHealth	0.1379	0.6306	0.9183	4.3886	6.0754
US23: 7.6	Cheshire	0.247	0.9391	1.0774	3.1976	5.4611
US23: 7.87	Crystal Petal	0.0109	0.0631	0.073	0.5426	0.6896
US23: 8.12	Chapman	0.0071	0.0414	0.0463	0.6345	0.7293
US23: 8.41	Perkins	0.0273	0.1019	0.1166	0.4365	0.6823
US23: 8.55	Methodist School	0.0339	0.1304	0.1512	0.6398	0.9553
US23: 8.67	Pollack	0.1	0.3651	0.4081	1.5173	2.3905
US23: 7.296	Cheshire Realigned	0.108	0.614	0.7944	1.5949	3.1113
US23: 7.296-7.6	Cheshire Realigned - Cheshire	0.0208	0.1346	0.119	0.482	0.7564



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 5.12-5.39	S of Hyatts/Shanahan	0.0103	0.0933	0.0967	0.1741	0.3744
US23: 5.39-5.865	Hyatts/Shanahan - Walnut	0.0024	0.0256	0.0287	0.2778	0.3345
US23: 5.865-6.3	Greif - Conner	-0.0008	-0.0151	-0.0227	0.4967	0.4581
US23: 6.3-6.48	Conner - Glenn	-0.0016	-0.0164	-0.0188	-0.2881	-0.3249
US23: 6.48-6.925	Glenn - OhioHealth	-0.0003	-0.0056	-0.0083	0.0648	0.0506
US23: 6.925-7.296	OhioHealth - Cheshire Realigned	-0.0051	-0.0463	-0.0482	-0.6198	-0.7194
US23: 7.6-7.87	Cheshire - Crystal Petal	-0.0029	-0.0265	-0.0277	-0.1022	-0.1593
US23: 7.87-8.12	Crystal Petal - Chapman	0.0011	0.0111	0.0122	-0.0724	-0.048
US23: 8.12-8.41	Chapman - Perkins	0.0049	0.0468	0.0501	-0.4306	-0.3288
US23: 8.41-8.55	Perkins - Methodist School	-0.0015	-0.0086	-0.0089	-0.1473	-0.1663
US23: 8.55-8.62	Methodist School - Pollack	-0.0004	-0.0023	-0.0023	-0.0432	-0.0482
US23: 5.39	Hyatts/Shanahan	0.1105	0.5764	0.9175	-2.3357	-0.7313
US23: 5.865	Walnut	0.0337	0.1219	0.1327	-0.0629	0.2254
US23: 5.96	Greif	-0.0037	-0.016	-0.0128	0.3704	0.3379
US23: 6.3	Conner	-0.0047	-0.019	-0.0225	0.0605	0.0143
US23: 6.48	Glenn	-0.0558	-0.271	-0.4117	-3.2715	-4.01
US23: 6.925	OhioHealth	-0.0629	-0.3066	-0.4667	-0.8636	-1.6998
US23: 7.6	Cheshire	0.1099	0.4365	0.5111	-0.0397	1.0178
US23: 7.87	Crystal Petal	0.0025	0.0145	0.0178	0.1724	0.2072
US23: 8.12	Chapman	-0.0013	-0.0072	-0.0089	0.2643	0.2469
US23: 8.41	Perkins	-0.0047	-0.019	-0.0225	-0.138	-0.1842
US23: 8.55	Methodist School	0.0064	0.0264	0.0316	0.1457	0.2101
US23: 8.67	Pollack	0.0187	0.0666	0.0715	-0.3831	-0.2263
US23: 7.296	Cheshire Realigned	-0.0151	-0.0861	-0.1126	-1.0529	-1.2667
US23: 7.296-7.6	Cheshire Realigned - Cheshire	-0.0036	-0.0328	-0.0341	-0.4623	-0.5328



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

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Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.1020	0.1165	0.0145	
Head On	0.9900	0.9720	-0.0180	
Rear End	33.5465	29.0392	-4.5073	
Backing	1.3066	1.0526	-0.2540	
Sideswipe - Meeting	0.2246	0.2083	-0.0164	
Sideswipe - Passing	8.0415	6.8402	-1.2013	
Angle	9.9470	9.2413	-0.7057	
Parked Vehicle	0.5329	0.6058	0.0729	
Pedestrian	0.2663	0.2663	0.0000	
Animal	3.1028	4.0428	0.9399	
Train	0.0262	0.0241	-0.0022	
Pedalcycles	0.1450	0.1450	0.0000	
Other Non-Vehicle	0.0004	0.0005	0.0002	
Fixed Object	6.2006	6.7254	0.5248	
Other Object	0.3140	0.3639	0.0499	
Overturning	0.2984	0.3138	0.0154	
Other Non-Collision	0.5767	0.6403	0.0636	
Left Turn	5.6363	5.0523	-0.5840	
Right Turn	2.3611	1.9419	-0.4192	

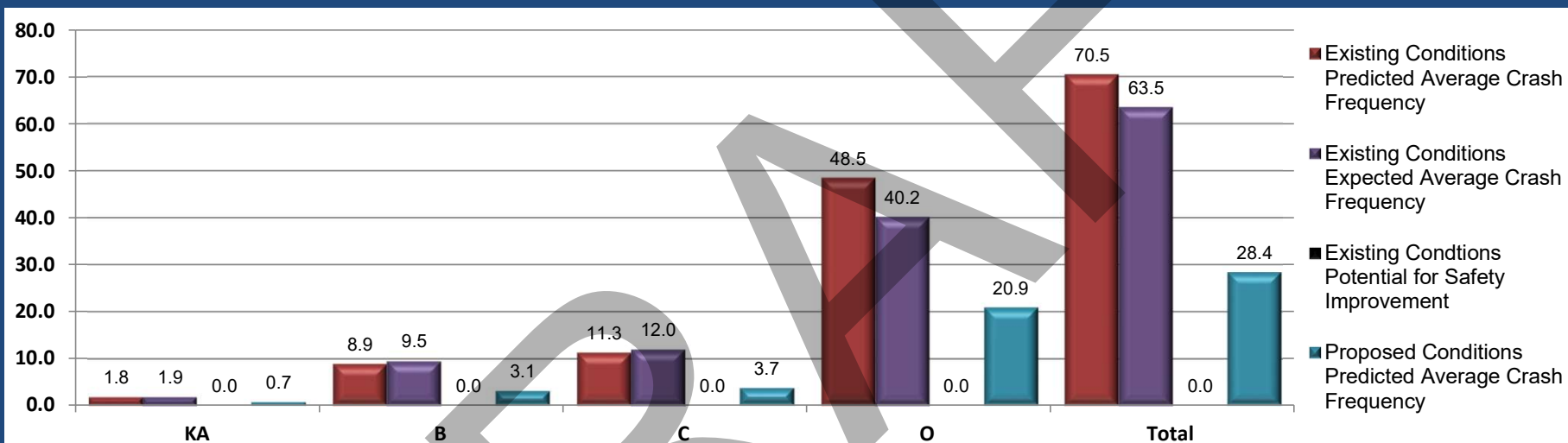


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.7793	8.9296	11.3298	48.4790	70.5177
N_{expected} - Existing Conditions	1.9153	9.4702	11.9710	40.1924	63.5489
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	0.7131	3.1030	3.6901	20.9020	28.4082



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 5.12-5.39	S of Hyatts/Shanahan	0.0259	0.1797	0.1673	1.0344	1.4073	
US23; 5.39-5.865	Hyatts/Shanahan - Walnut	0.0457	0.3162	0.2948	1.8206	2.4773	
US23; 5.865-6.3	Greif - Conner	0.0417	0.2889	0.2686	1.6646	2.2638	
US23; 6.3-6.48	Conner - Glenn	0.0173	0.1197	0.1114	0.6894	0.9378	
US23; 6.48-6.925	Glenn - OhioHealth	0.0358	0.2451	0.2244	1.3826	1.8879	
US23; 6.925-7.296	OhioHealth - Cheshire Realigned	0.0298	0.2042	0.1868	1.1523	1.5731	
US23; 7.6-7.87	Cheshire - Crystal Petal	0.0217	0.1486	0.136	0.8386	1.1449	
US23; 7.87-8.12	Crystal Petal - Chapman	0.0201	0.1376	0.1259	0.7766	1.0602	
US23; 8.12-8.41	Chapman - Perkins	0.0233	0.1598	0.1463	0.9012	1.2306	
US23; 8.41-8.55	Perkins - Methodist School	0.0189	0.093	0.0925	0.5255	0.7299	
US23; 8.55-8.62	Methodist School - Pollack	0.0095	0.0465	0.0463	0.2628	0.3651	
US23; 5.39	Hyatts/Shanahan	0.3335	1.5915	2.3912	9.3376	13.6538	
US23; 5.865	Walnut	0.0644	0.2408	0.2749	1.3076	1.8877	
US23; 5.96	Greif	0.1351	0.7677	0.9942	2.7446	4.6416	
US23; 6.3	Conner	0.032	0.1209	0.1391	0.5745	0.8665	
US23; 6.48	Glenn	0.2816	1.3415	2.013	7.6751	11.3112	
US23; 6.925	OhioHealth	0.2008	0.9372	1.385	5.2522	7.7752	
US23; 7.6	Cheshire	0.1371	0.5026	0.5663	3.2373	4.4433	
US23; 7.87	Crystal Petal	0.0084	0.0486	0.0552	0.3702	0.4824	
US23; 8.12	Chapman	0.0084	0.0486	0.0552	0.3702	0.4824	
US23; 8.41	Perkins	0.032	0.1209	0.1391	0.5745	0.8665	
US23; 8.55	Methodist School	0.0275	0.104	0.1196	0.4941	0.7452	
US23; 8.67	Pollack	0.0813	0.2985	0.3366	1.9004	2.6168	
US23; 7.296	Cheshire Realigned	0.1231	0.7001	0.907	2.6478	4.378	
US23; 7.296-7.6	Cheshire Realigned - Cheshire	0.0244	0.1674	0.1531	0.9443	1.2892	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 5.12-5.39	S of Hyatts/Shanahan	0.0362	0.273	0.264	1.2085	1.7817
US23; 5.39-5.865	Hyatts/Shanahan - Walnut	0.0481	0.3418	0.3235	2.0984	2.8118
US23; 5.865-6.3	Greif - Conner	0.0409	0.2738	0.2459	2.1613	2.7219
US23; 6.3-6.48	Conner - Glenn	0.0157	0.1033	0.0926	0.4013	0.6129
US23; 6.48-6.925	Glenn - OhioHealth	0.0355	0.2395	0.2161	1.4474	1.9385
US23; 6.925-7.296	OhioHealth - Cheshire Realigned	0.0247	0.1579	0.1386	0.5325	0.8537
US23; 7.6-7.87	Cheshire - Crystal Petal	0.0188	0.1221	0.1083	0.7364	0.9856
US23; 7.87-8.12	Crystal Petal - Chapman	0.0212	0.1487	0.1381	0.7042	1.0122
US23; 8.12-8.41	Chapman - Perkins	0.0282	0.2066	0.1964	0.4706	0.9018
US23; 8.41-8.55	Perkins - Methodist School	0.0174	0.0844	0.0836	0.3782	0.5636
US23; 8.55-8.62	Methodist School - Pollack	0.0091	0.0442	0.044	0.2196	0.3169
US23; 5.39	Hyatts/Shanahan	0.444	2.1679	3.3087	7.0019	12.9225
US23; 5.865	Walnut	0.0981	0.3627	0.4076	1.2447	2.1131
US23; 5.96	Greif	0.1314	0.7517	0.9814	3.115	4.9795
US23; 6.3	Conner	0.0273	0.1019	0.1166	0.635	0.8808
US23; 6.48	Glenn	0.2258	1.0705	1.6013	4.4036	7.3012
US23; 6.925	OhioHealth	0.1379	0.6306	0.9183	4.3886	6.0754
US23; 7.6	Cheshire	0.247	0.9391	1.0774	3.1976	5.4611
US23; 7.87	Crystal Petal	0.0109	0.0631	0.073	0.5426	0.6896
US23; 8.12	Chapman	0.0071	0.0414	0.0463	0.6345	0.7293
US23; 8.41	Perkins	0.0273	0.1019	0.1166	0.4365	0.6823
US23; 8.55	Methodist School	0.0339	0.1304	0.1512	0.6398	0.9553
US23; 8.67	Pollack	0.1	0.3651	0.4081	1.5173	2.3905
US23; 7.296	Cheshire Realigned	0.108	0.614	0.7944	1.5949	3.1113
US23; 7.296-7.6	Cheshire Realigned - Cheshire	0.0208	0.1346	0.119	0.482	0.7564



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 5.12-5.39	S of Hyatts/Shanahan	0.0103	0.0933	0.0967	0.1741	0.3744
US23; 5.39-5.865	Hyatts/Shanahan - Walnut	0.0024	0.0256	0.0287	0.2778	0.3345
US23; 5.865-6.3	Greif - Conner	-0.0008	-0.0151	-0.0227	0.4967	0.4581
US23; 6.3-6.48	Conner - Glenn	-0.0016	-0.0164	-0.0188	-0.2881	-0.3249
US23; 6.48-6.925	Glenn - OhioHealth	-0.0003	-0.0056	-0.0083	0.0648	0.0506
US23; 6.925-7.296	OhioHealth - Cheshire Realigned	-0.0051	-0.0463	-0.0482	-0.6198	-0.7194
US23; 7.6-7.87	Cheshire - Crystal Petal	-0.0029	-0.0265	-0.0277	-0.1022	-0.1593
US23; 7.87-8.12	Crystal Petal - Chapman	0.0011	0.0111	0.0122	-0.0724	-0.048
US23; 8.12-8.41	Chapman - Perkins	0.0049	0.0468	0.0501	-0.4306	-0.3288
US23; 8.41-8.55	Perkins - Methodist School	-0.0015	-0.0086	-0.0089	-0.1473	-0.1663
US23; 8.55-8.62	Methodist School - Pollack	-0.0004	-0.0023	-0.0023	-0.0432	-0.0482
US23; 5.39	Hyatts/Shanahan	0.1105	0.5764	0.9175	-2.3357	-0.7313
US23; 5.865	Walnut	0.0337	0.1219	0.1327	-0.0629	0.2254
US23; 5.96	Greif	-0.0037	-0.016	-0.0128	0.3704	0.3379
US23; 6.3	Conner	-0.0047	-0.019	-0.0225	0.0605	0.0143
US23; 6.48	Glenn	-0.0558	-0.271	-0.4117	-3.2715	-4.01
US23; 6.925	OhioHealth	-0.0629	-0.3066	-0.4667	-0.8636	-1.6998
US23; 7.6	Cheshire	0.1099	0.4365	0.5111	-0.0397	1.0178
US23; 7.87	Crystal Petal	0.0025	0.0145	0.0178	0.1724	0.2072
US23; 8.12	Chapman	-0.0013	-0.0072	-0.0089	0.2643	0.2469
US23; 8.41	Perkins	-0.0047	-0.019	-0.0225	-0.138	-0.1842
US23; 8.55	Methodist School	0.0064	0.0264	0.0316	0.1457	0.2101
US23; 8.67	Pollack	0.0187	0.0666	0.0715	-0.3831	-0.2263
US23; 7.296	Cheshire Realigned	-0.0151	-0.0861	-0.1126	-1.0529	-1.2667
US23; 7.296-7.6	Cheshire Realigned - Cheshire	-0.0036	-0.0328	-0.0341	-0.4623	-0.5328



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 4.989-5.189	S - Hyatts/Shanahan SB	0.0335	0.1603	0.1836	0.9045	1.2819
US23; 4.99-5.19	S - Hyatts/Shanahan NB	0.0192	0.0878	0.1084	0.7212	0.9366
US23; 5.19-5.59	Hyatts/Shanahan SB	0.0356	0.1519	0.2111	1.2336	1.6322
US23; 5.191-5.591	Hyatts/Shanahan NB	0.0356	0.1519	0.2111	1.2336	1.6322
US23; 5.591-6.279	Hyatts/Shanahan - Glenn SB	0.0776	0.3533	0.4392	2.4992	3.3693
US23; 5.592-6.28	Hyatts/Shanahan - Glenn NB	0.0754	0.3425	0.4269	2.5001	3.3449
US23; 6.28-6.68	Glenn SB	0.0356	0.1519	0.2111	1.2336	1.6322
US23; 6.281-6.681	Glenn NB	0.0356	0.1519	0.2111	1.2336	1.6322
US23; 6.68-7.597	Glenn - Cheshire SB	0.0688	0.2976	0.403	2.5036	3.273
US23; 6.681-7.598	Glenn - Cheshire NB	0.0759	0.335	0.4399	2.6445	3.4953
US23; 7.6-8.62	North of Cheshire	0.0828	0.5673	0.5189	3.2005	4.3695
US23; 7.599	Cheshire CRs	0.1375	0.3516	0.3258	0.994	1.8089



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.1020	0.1165		0.0745
Head On	0.9900	0.9720		0.0340
Rear End	33.5465	29.0392		2.8839
Backing	1.3066	1.0526		2.1317
Sideswipe - Meeting	0.2246	0.2083		0.0414
Sideswipe - Passing	8.0415	6.8402		0.8284
Angle	9.9470	9.2413		0.9298
Parked Vehicle	0.5329	0.6058		5.6986
Pedestrian	0.2663	0.2663		1.2285
Animal	3.1028	4.0428		1.0061
Train	0.0262	0.0241		0.8114
Pedalcycles	0.1450	0.1450		0.0481
Other Non-Vehicle	0.0004	0.0005		0.0000
Fixed Object	6.2006	6.7254		19.3804
Other Object	0.3140	0.3639		3.7948
Overtuning	0.2984	0.3138		16.7520
Other Non-Collision	0.5767	0.6403		18.8119
Left Turn	5.6363	5.0523		0.1380
Right Turn	2.3611	1.9419		0.3418



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-35.914	\$13,275,702
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	0.000	\$0
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-6.196	\$6,050,617
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-42.109	\$19,326,319



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	Expected Annual Crash Adjustment	Comments:
<p>Net Present Value of Project \$6.00</p> <p>Net Present Value of Safety Benefits \$19,326,318.84</p> <p>Net Benefit \$19,326,312.84</p> <p>Benefit / Cost Ratio 3221053.14</p>	<p>Number of Fatal & Incapacitating Injury Crashes -1.066</p> <p>Number of Injury Crashes -14.532</p> <p>Number of Total Crashes -42.109</p>	

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



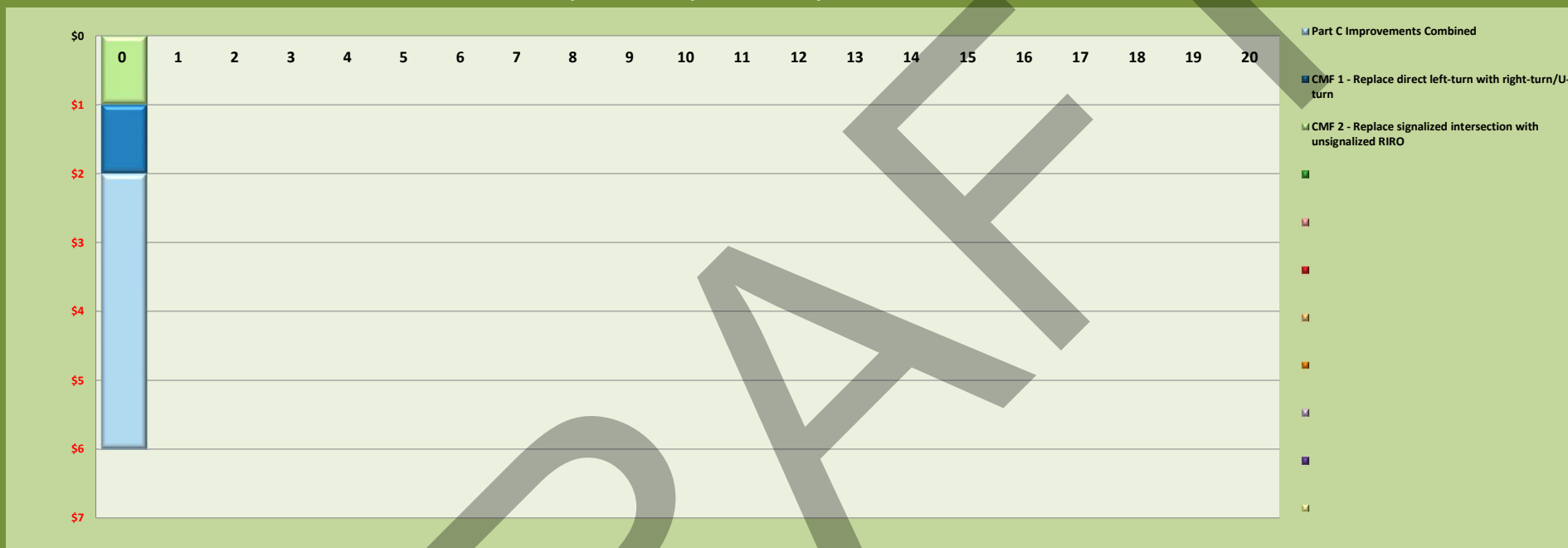


Safety Benefit - Cost Analysis

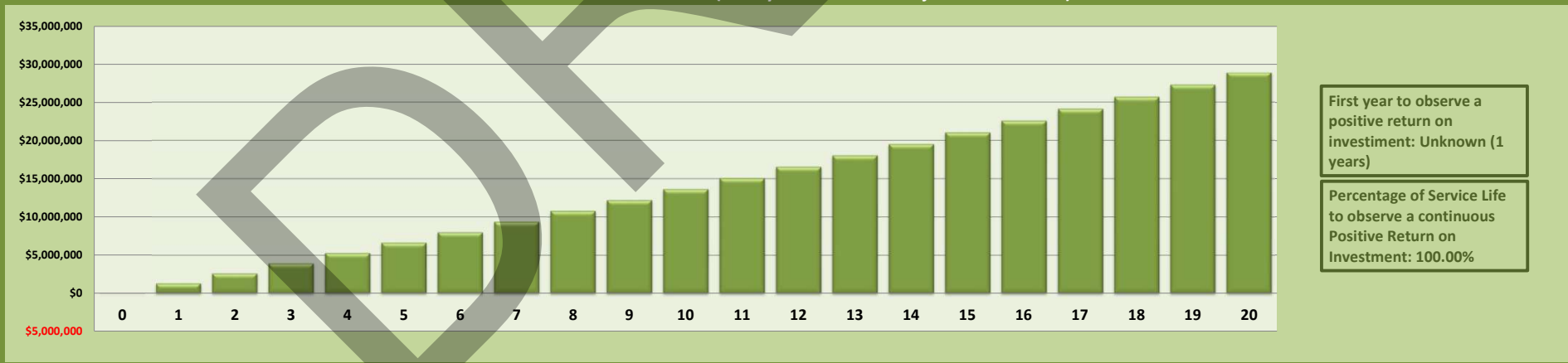
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



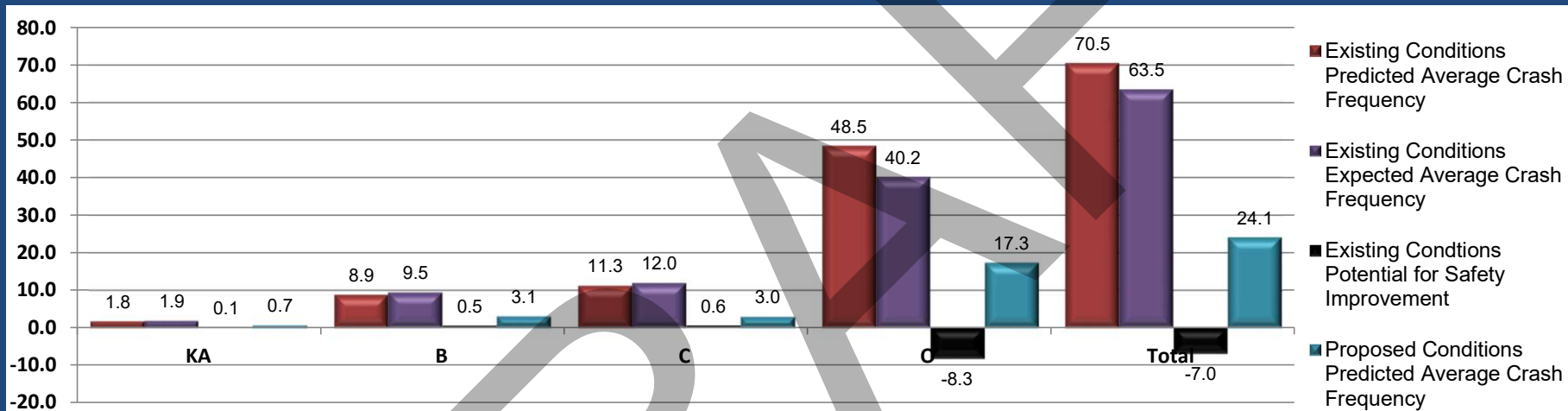


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4 - one way site types	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.7793	8.9296	11.3298	48.4790	70.5177
N_{expected} - Existing Conditions	1.9153	9.4702	11.9710	40.1924	63.5489
$N_{\text{potential for improvement}}$ - Existing Conditions	0.1360	0.5406	0.6412	-8.2866	-6.9688
N_{expected} - Proposed Conditions	0.7373	3.0911	2.9522	17.3332	24.1138



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4 - one way site types	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23: 5.12-5.39	S of Hyatts/Shanahan	0.0259	0.1797	0.1673	1.0344	1.4073	
US23: 5.39-5.865	Hyatts/Shanahan - Walnut	0.0457	0.3162	0.2948	1.8206	2.4773	
US23: 5.865-6.3	Greif - Conner	0.0417	0.2889	0.2686	1.6646	2.2638	
US23: 6.3-6.48	Conner - Glenn	0.0173	0.1197	0.1114	0.6894	0.9378	
US23: 6.48-6.925	Glenn - OhioHealth	0.0358	0.2451	0.2244	1.3826	1.8879	
US23: 6.925-7.296	OhioHealth - Cheshire Realigned	0.0298	0.2042	0.1868	1.1523	1.5731	
US23: 7.6-7.87	Cheshire - Crystal Petal	0.0217	0.1486	0.136	0.8386	1.1449	
US23: 7.87-8.12	Crystal Petal - Chapman	0.0201	0.1376	0.1259	0.7766	1.0602	
US23: 8.12-8.41	Chapman - Perkins	0.0233	0.1598	0.1463	0.9012	1.2306	
US23: 8.41-8.55	Perkins - Methodist School	0.0189	0.093	0.0925	0.5255	0.7299	
US23: 8.55-8.62	Methodist School - Pollack	0.0095	0.0465	0.0463	0.2628	0.3651	
US23: 5.39	Hyatts/Shanahan	0.3335	1.5915	2.3912	9.3376	13.6538	
US23: 5.865	Walnut	0.0644	0.2408	0.2749	1.3076	1.8877	
US23: 5.96	Greif	0.1351	0.7677	0.9942	2.7446	4.6416	
US23: 6.3	Conner	0.032	0.1209	0.1391	0.5745	0.8665	
US23: 6.48	Glenn	0.2816	1.3415	2.013	7.6751	11.3112	
US23: 6.925	OhioHealth	0.2008	0.9372	1.385	5.2522	7.7752	
US23: 7.6	Cheshire	0.1371	0.5026	0.5663	3.2373	4.4433	
US23: 7.87	Crystal Petal	0.0084	0.0486	0.0552	0.3702	0.4824	
US23: 8.12	Chapman	0.0084	0.0486	0.0552	0.3702	0.4824	
US23: 8.41	Perkins	0.032	0.1209	0.1391	0.5745	0.8665	
US23: 8.55	Methodist School	0.0275	0.104	0.1196	0.4941	0.7452	
US23: 8.67	Pollack	0.0813	0.2985	0.3366	1.9004	2.6168	
US23: 7.296	Cheshire Realigned	0.1231	0.7001	0.907	2.6478	4.378	
US23: 7.296-7.6	Cheshire Realigned - Cheshire	0.0244	0.1674	0.1531	0.9443	1.2892	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4 - one way site types	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 5.12-5.39	S of Hyatts/Shanahan	0.0362	0.273	0.264	1.2085	1.7817
US23; 5.39-5.865	Hyatts/Shanahan - Walnut	0.0481	0.3418	0.3235	2.0984	2.8118
US23; 5.865-6.3	Greif - Conner	0.0409	0.2738	0.2459	2.1613	2.7219
US23; 6.3-6.48	Conner - Glenn	0.0157	0.1033	0.0926	0.4013	0.6129
US23; 6.48-6.925	Glenn - OhioHealth	0.0355	0.2395	0.2161	1.4474	1.9385
US23; 6.925-7.296	OhioHealth - Cheshire Realigned	0.0247	0.1579	0.1386	0.5325	0.8537
US23; 7.6-7.87	Cheshire - Crystal Petal	0.0188	0.1221	0.1083	0.7364	0.9856
US23; 7.87-8.12	Crystal Petal - Chapman	0.0212	0.1487	0.1381	0.7042	1.0122
US23; 8.12-8.41	Chapman - Perkins	0.0282	0.2066	0.1964	0.4706	0.9018
US23; 8.41-8.55	Perkins - Methodist School	0.0174	0.0844	0.0836	0.3782	0.5636
US23; 8.55-8.62	Methodist School - Pollack	0.0091	0.0442	0.044	0.2196	0.3169
US23; 5.39	Hyatts/Shanahan	0.444	2.1679	3.3087	7.0019	12.9225
US23; 5.865	Walnut	0.0981	0.3627	0.4076	1.2447	2.1131
US23; 5.96	Greif	0.1314	0.7517	0.9814	3.115	4.9795
US23; 6.3	Conner	0.0273	0.1019	0.1166	0.635	0.8808
US23; 6.48	Glenn	0.2258	1.0705	1.6013	4.4036	7.3012
US23; 6.925	OhioHealth	0.1379	0.6306	0.9183	4.3886	6.0754
US23; 7.6	Cheshire	0.247	0.9391	1.0774	3.1976	5.4611
US23; 7.87	Crystal Petal	0.0109	0.0631	0.073	0.5426	0.6896
US23; 8.12	Chapman	0.0071	0.0414	0.0463	0.6345	0.7293
US23; 8.41	Perkins	0.0273	0.1019	0.1166	0.4365	0.6823
US23; 8.55	Methodist School	0.0339	0.1304	0.1512	0.6398	0.9553
US23; 8.67	Pollack	0.1	0.3651	0.4081	1.5173	2.3905
US23; 7.296	Cheshire Realigned	0.108	0.614	0.7944	1.5949	3.1113
US23; 7.296-7.6	Cheshire Realigned - Cheshire	0.0208	0.1346	0.119	0.482	0.7564



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4 - one way site types	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 5.12-5.39	S of Hyatts/Shanahan	0.0103	0.0933	0.0967	0.1741	0.3744
US23: 5.39-5.865	Hyatts/Shanahan - Walnut	0.0024	0.0256	0.0287	0.2778	0.3345
US23: 5.865-6.3	Greif - Conner	-0.0008	-0.0151	-0.0227	0.4967	0.4581
US23: 6.3-6.48	Conner - Glenn	-0.0016	-0.0164	-0.0188	-0.2881	-0.3249
US23: 6.48-6.925	Glenn - OhioHealth	-0.0003	-0.0056	-0.0083	0.0648	0.0506
US23: 6.925-7.296	OhioHealth - Cheshire Realigned	-0.0051	-0.0463	-0.0482	-0.6198	-0.7194
US23: 7.6-7.87	Cheshire - Crystal Petal	-0.0029	-0.0265	-0.0277	-0.1022	-0.1593
US23: 7.87-8.12	Crystal Petal - Chapman	0.0011	0.0111	0.0122	-0.0724	-0.048
US23: 8.12-8.41	Chapman - Perkins	0.0049	0.0468	0.0501	-0.4306	-0.3288
US23: 8.41-8.55	Perkins - Methodist School	-0.0015	-0.0086	-0.0089	-0.1473	-0.1663
US23: 8.55-8.62	Methodist School - Pollack	-0.0004	-0.0023	-0.0023	-0.0432	-0.0482
US23: 5.39	Hyatts/Shanahan	0.1105	0.5764	0.9175	-2.3357	-0.7313
US23: 5.865	Walnut	0.0337	0.1219	0.1327	-0.0629	0.2254
US23: 5.96	Greif	-0.0037	-0.016	-0.0128	0.3704	0.3379
US23: 6.3	Conner	-0.0047	-0.019	-0.0225	0.0605	0.0143
US23: 6.48	Glenn	-0.0558	-0.271	-0.4117	-3.2715	-4.01
US23: 6.925	OhioHealth	-0.0629	-0.3066	-0.4667	-0.8636	-1.6998
US23: 7.6	Cheshire	0.1099	0.4365	0.5111	-0.0397	1.0178
US23: 7.87	Crystal Petal	0.0025	0.0145	0.0178	0.1724	0.2072
US23: 8.12	Chapman	-0.0013	-0.0072	-0.0089	0.2643	0.2469
US23: 8.41	Perkins	-0.0047	-0.019	-0.0225	-0.138	-0.1842
US23: 8.55	Methodist School	0.0064	0.0264	0.0316	0.1457	0.2101
US23: 8.67	Pollack	0.0187	0.0666	0.0715	-0.3831	-0.2263
US23: 7.296	Cheshire Realigned	-0.0151	-0.0861	-0.1126	-1.0529	-1.2667
US23: 7.296-7.6	Cheshire Realigned - Cheshire	-0.0036	-0.0328	-0.0341	-0.4623	-0.5328



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4 - one way site types	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 5.12-5.389	S of Hyatts/Shanahan	0.0249	0.1639	0.1595	0.9495	1.2978
US23: 5.391-5.865	Hyatts/Shanahan - Walnut	0.0435	0.2861	0.2784	1.6565	2.2645
US23: 5.961-6.3	Greif - Connor	0.031	0.2044	0.1987	1.184	1.6181
US23: 6.3-6.479	Conner - Glenn	0.0138	0.0898	0.086	0.509	0.6986
US23: 6.481-6.924	Glenn - OhioHealth	0.034	0.222	0.2122	1.2591	1.7273
US23: 6.926-7.296	OhioHealth - Cheshire Realigned	0.0285	0.1855	0.1773	1.0517	1.443
US23: 7.296-8.12	Cheshire Realigned - Chapman	0.0633	0.4127	0.3946	2.3415	3.2121
US23: 8.12-8.67	Chapman - Pollock	0.0442	0.3028	0.277	1.7083	2.3323
US23: 5.389	Hyatts/Shanahan CRs	0.1662	0.4258	0.3947	1.1137	2.1004
US23: 5.865	Walnut	0.0087	0.0322	0.0369	0.8761	0.9539
US23: 5.959	Greif	0.0629	0.1608	0.1489	0.4719	0.8445
US23: 6.3	Conner	0.006	0.0224	0.0258	0.5604	0.6146
US23: 6.479	Glenn CRs	0.0794	0.2031	0.1882	0.5606	1.0313
US23: 6.924	OhioHealth	0.0334	0.085	0.0788	0.2936	0.4908
US23: 7.296	Cheshire CRs	0.0729	0.1863	0.1727	0.5267	0.9586
US23: 8.12	Chapman	0.0084	0.0486	0.0552	0.3702	0.4824
US23: 8.67	Pollock	0.0162	0.0597	0.0673	1.9004	2.0436



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4 - one way site types	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.1020	0.1165	0.0145	0.0427
Head On	0.9900	0.9720	-0.0180	0.1338
Rear End	33.5465	29.0392	-4.5073	11.5847
Backing	1.3066	1.0526	-0.2540	0.4052
Sideswipe - Meeting	0.2246	0.2083	-0.0164	0.1553
Sideswipe - Passing	8.0415	6.8402	-1.2013	3.3597
Angle	9.9470	9.2413	-0.7057	2.9265
Parked Vehicle	0.5329	0.6058	0.0729	0.2234
Pedestrian	0.2663	0.2663	0.0000	0.1276
Animal	3.1028	4.0428	0.9399	3.1072
Train	0.0262	0.0241	-0.0022	0.0008
Pedalcycles	0.1450	0.1450	0.0000	0.1047
Other Non-Vehicle	0.0004	0.0005	0.0002	0.0000
Fixed Object	6.2006	6.7254	0.5248	2.8439
Other Object	0.3140	0.3639	0.0499	0.1795
Overturning	0.2984	0.3138	0.0154	0.1683
Other Non-Collision	0.5767	0.6403	0.0636	0.2663
Left Turn	5.6363	5.0523	-0.5840	0.4096
Right Turn	2.3611	1.9419	-0.4192	1.1821



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4 - one way site types	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-25.617	(\$663,901)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-18.589	\$19,369,752
CMF 2 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	0.000	\$0
CMF 3 - Change in median density openings (close all)	20	\$1.00			\$1.00	\$1.00	-1.097	\$322,972
CMF 4 - Install RIRO at stop controlled intersection	20	\$1.00			\$1.00	\$1.00	-1.101	\$1,858,838
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$8.00	\$0.00	\$0.00	\$8.00	\$8.00	-46.404	\$20,887,660



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4 - one way site types	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator

Expected Annual Crash Adjustment

Comments:

Net Present Value of Project **\$8.00**

Net Present Value of Safety Benefits **\$20,887,660.40**

Net Benefit **\$20,887,652.40**

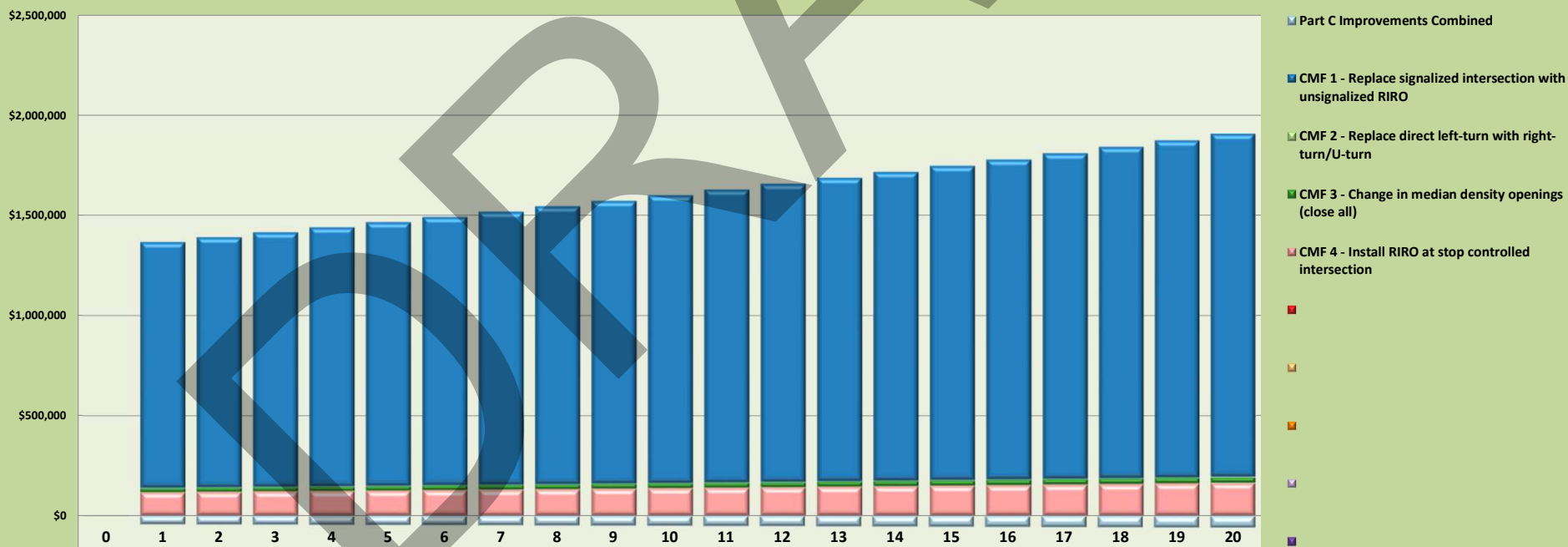
Benefit / Cost Ratio **2610957.55**

Number of Fatal & Incapacitating Injury Crashes **-1.042**

Number of Injury Crashes **-15.258**

Number of Total Crashes **-46.404**

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year





Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4 - one way site types	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

\$500,000

DRAFT



Safety Benefit - Cost Analysis

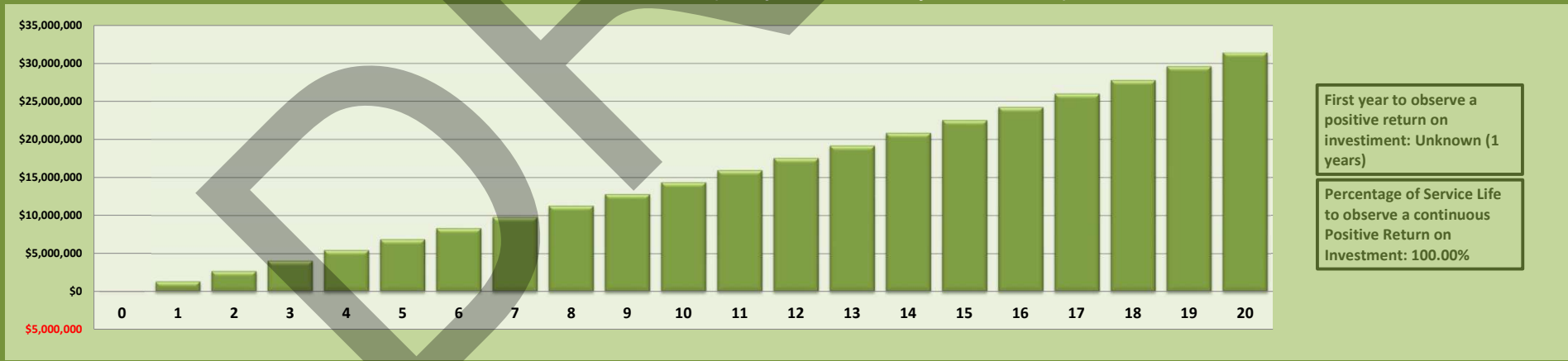
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4 - one way site types	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



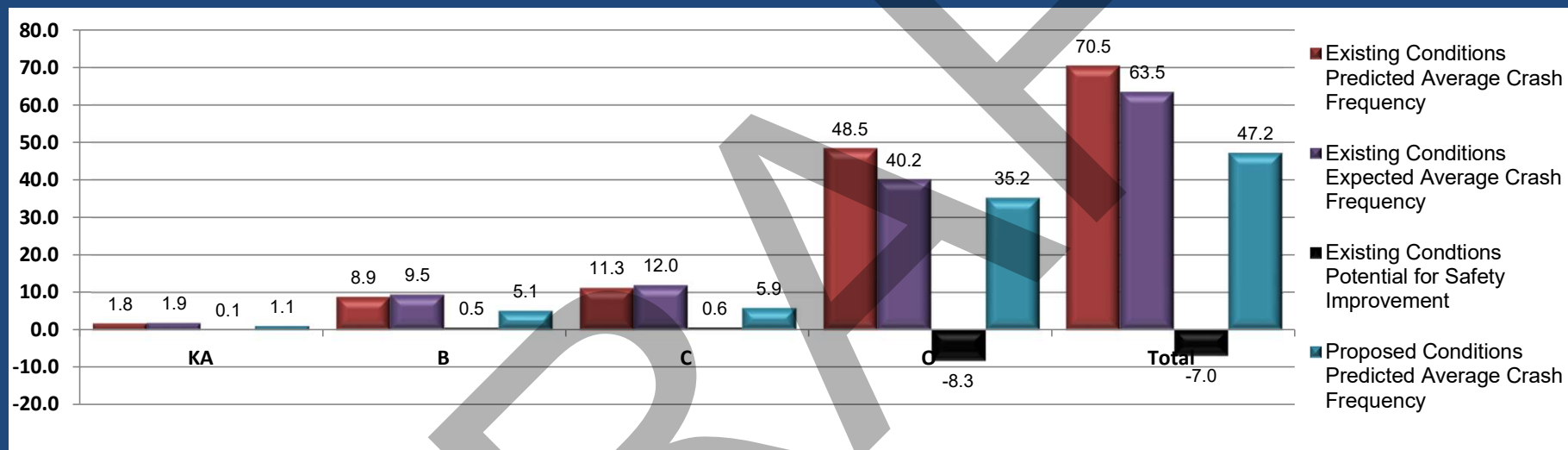


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.7793	8.9296	11.3298	48.4790	70.5177
N_{expected} - Existing Conditions	1.9153	9.4702	11.9710	40.1924	63.5489
$N_{\text{potential for improvement}}$ - Existing Conditions	0.1360	0.5406	0.6412	-8.2866	-6.9688
N_{expected} - Proposed Conditions	1.0917	5.0823	5.8529	35.2157	47.2426



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 5.12-5.39	S of Hyatts/Shanahan	0.0259	0.1797	0.1673	1.0344	1.4073	
US23; 5.39-5.865	Hyatts/Shanahan - Walnut	0.0457	0.3162	0.2948	1.8206	2.4773	
US23; 5.865-6.3	Greif - Conner	0.0417	0.2889	0.2686	1.6646	2.2638	
US23; 6.3-6.48	Conner - Glenn	0.0173	0.1197	0.1114	0.6894	0.9378	
US23; 6.48-6.925	Glenn - OhioHealth	0.0358	0.2451	0.2244	1.3826	1.8879	
US23; 6.925-7.296	OhioHealth - Cheshire Realigned	0.0298	0.2042	0.1868	1.1523	1.5731	
US23; 7.6-7.87	Cheshire - Crystal Petal	0.0217	0.1486	0.136	0.8386	1.1449	
US23; 7.87-8.12	Crystal Petal - Chapman	0.0201	0.1376	0.1259	0.7766	1.0602	
US23; 8.12-8.41	Chapman - Perkins	0.0233	0.1598	0.1463	0.9012	1.2306	
US23; 8.41-8.55	Perkins - Methodist School	0.0189	0.093	0.0925	0.5255	0.7299	
US23; 8.55-8.62	Methodist School - Pollack	0.0095	0.0465	0.0463	0.2628	0.3651	
US23; 5.39	Hyatts/Shanahan	0.3335	1.5915	2.3912	9.3376	13.6538	
US23; 5.865	Walnut	0.0644	0.2408	0.2749	1.3076	1.8877	
US23; 5.96	Greif	0.1351	0.7677	0.9942	2.7446	4.6416	
US23; 6.3	Conner	0.032	0.1209	0.1391	0.5745	0.8665	
US23; 6.48	Glenn	0.2816	1.3415	2.013	7.6751	11.3112	
US23; 6.925	OhioHealth	0.2008	0.9372	1.385	5.2522	7.7752	
US23; 7.6	Cheshire	0.1371	0.5026	0.5663	3.2373	4.4433	
US23; 7.87	Crystal Petal	0.0084	0.0486	0.0552	0.3702	0.4824	
US23; 8.12	Chapman	0.0084	0.0486	0.0552	0.3702	0.4824	
US23; 8.41	Perkins	0.032	0.1209	0.1391	0.5745	0.8665	
US23; 8.55	Methodist School	0.0275	0.104	0.1196	0.4941	0.7452	
US23; 8.67	Pollack	0.0813	0.2985	0.3366	1.9004	2.6168	
US23; 7.296	Cheshire Realigned	0.1231	0.7001	0.907	2.6478	4.378	
US23; 7.296-7.6	Cheshire Realigned - Cheshire	0.0244	0.1674	0.1531	0.9443	1.2892	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 5.12-5.39	S of Hyatts/Shanahan	0.0362	0.273	0.264	1.2085	1.7817
US23: 5.39-5.865	Hyatts/Shanahan - Walnut	0.0481	0.3418	0.3235	2.0984	2.8118
US23: 5.865-6.3	Greif - Conner	0.0409	0.2738	0.2459	2.1613	2.7219
US23: 6.3-6.48	Conner - Glenn	0.0157	0.1033	0.0926	0.4013	0.6129
US23: 6.48-6.925	Glenn - OhioHealth	0.0355	0.2395	0.2161	1.4474	1.9385
US23: 6.925-7.296	OhioHealth - Cheshire Realigned	0.0247	0.1579	0.1386	0.5325	0.8537
US23: 7.6-7.87	Cheshire - Crystal Petal	0.0188	0.1221	0.1083	0.7364	0.9856
US23: 7.87-8.12	Crystal Petal - Chapman	0.0212	0.1487	0.1381	0.7042	1.0122
US23: 8.12-8.41	Chapman - Perkins	0.0282	0.2066	0.1964	0.4706	0.9018
US23: 8.41-8.55	Perkins - Methodist School	0.0174	0.0844	0.0836	0.3782	0.5636
US23: 8.55-8.62	Methodist School - Pollack	0.0091	0.0442	0.044	0.2196	0.3169
US23: 5.39	Hyatts/Shanahan	0.444	2.1679	3.3087	7.0019	12.9225
US23: 5.865	Walnut	0.0981	0.3627	0.4076	1.2447	2.1131
US23: 5.96	Greif	0.1314	0.7517	0.9814	3.115	4.9795
US23: 6.3	Conner	0.0273	0.1019	0.1166	0.635	0.8808
US23: 6.48	Glenn	0.2258	1.0705	1.6013	4.4036	7.3012
US23: 6.925	OhioHealth	0.1379	0.6306	0.9183	4.3886	6.0754
US23: 7.6	Cheshire	0.247	0.9391	1.0774	3.1976	5.4611
US23: 7.87	Crystal Petal	0.0109	0.0631	0.073	0.5426	0.6896
US23: 8.12	Chapman	0.0071	0.0414	0.0463	0.6345	0.7293
US23: 8.41	Perkins	0.0273	0.1019	0.1166	0.4365	0.6823
US23: 8.55	Methodist School	0.0339	0.1304	0.1512	0.6398	0.9553
US23: 8.67	Pollack	0.1	0.3651	0.4081	1.5173	2.3905
US23: 7.296	Cheshire Realigned	0.108	0.614	0.7944	1.5949	3.1113
US23: 7.296-7.6	Cheshire Realigned - Cheshire	0.0208	0.1346	0.119	0.482	0.7564



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 5.12-5.39	S of Hyatts/Shanahan	0.0103	0.0933	0.0967	0.1741	0.3744
US23: 5.39-5.865	Hyatts/Shanahan - Walnut	0.0024	0.0256	0.0287	0.2778	0.3345
US23: 5.865-6.3	Greif - Conner	-0.0008	-0.0151	-0.0227	0.4967	0.4581
US23: 6.3-6.48	Conner - Glenn	-0.0016	-0.0164	-0.0188	-0.2881	-0.3249
US23: 6.48-6.925	Glenn - OhioHealth	-0.0003	-0.0056	-0.0083	0.0648	0.0506
US23: 6.925-7.296	OhioHealth - Cheshire Realigned	-0.0051	-0.0463	-0.0482	-0.6198	-0.7194
US23: 7.6-7.87	Cheshire - Crystal Petal	-0.0029	-0.0265	-0.0277	-0.1022	-0.1593
US23: 7.87-8.12	Crystal Petal - Chapman	0.0011	0.0111	0.0122	-0.0724	-0.048
US23: 8.12-8.41	Chapman - Perkins	0.0049	0.0468	0.0501	-0.4306	-0.3288
US23: 8.41-8.55	Perkins - Methodist School	-0.0015	-0.0086	-0.0089	-0.1473	-0.1663
US23: 8.55-8.62	Methodist School - Pollack	-0.0004	-0.0023	-0.0023	-0.0432	-0.0482
US23: 5.39	Hyatts/Shanahan	0.1105	0.5764	0.9175	-2.3357	-0.7313
US23: 5.865	Walnut	0.0337	0.1219	0.1327	-0.0629	0.2254
US23: 5.96	Greif	-0.0037	-0.016	-0.0128	0.3704	0.3379
US23: 6.3	Conner	-0.0047	-0.019	-0.0225	0.0605	0.0143
US23: 6.48	Glenn	-0.0558	-0.271	-0.4117	-3.2715	-4.01
US23: 6.925	OhioHealth	-0.0629	-0.3066	-0.4667	-0.8636	-1.6998
US23: 7.6	Cheshire	0.1099	0.4365	0.5111	-0.0397	1.0178
US23: 7.87	Crystal Petal	0.0025	0.0145	0.0178	0.1724	0.2072
US23: 8.12	Chapman	-0.0013	-0.0072	-0.0089	0.2643	0.2469
US23: 8.41	Perkins	-0.0047	-0.019	-0.0225	-0.138	-0.1842
US23: 8.55	Methodist School	0.0064	0.0264	0.0316	0.1457	0.2101
US23: 8.67	Pollack	0.0187	0.0666	0.0715	-0.3831	-0.2263
US23: 7.296	Cheshire Realigned	-0.0151	-0.0861	-0.1126	-1.0529	-1.2667
US23: 7.296-7.6	Cheshire Realigned - Cheshire	-0.0036	-0.0328	-0.0341	-0.4623	-0.5328



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 5.12-5.39	S of Hyatts/Shanahan	0.0223	0.1522	0.1398	0.8577	1.172
US23: 5.39-5.865	Hyatts/Shanahan - Walnut	0.0384	0.2625	0.2413	1.4794	2.0216
US23: 5.865-6.3	Greif - Conner	0.035	0.2398	0.2199	1.3526	1.8473
US23: 6.3-6.48	Conner - Glenn	0.0148	0.1014	0.0931	0.5716	0.7809
US23: 6.48-6.925	Glenn - OhioHealth	0.0358	0.2451	0.2244	1.3826	1.8879
US23: 6.925-7.296	OhioHealth - Cheshire Realigned	0.0298	0.2044	0.1872	1.1531	1.5745
US23: 7.6-7.87	Cheshire - Crystal Petal	0.0217	0.1486	0.136	0.8386	1.1449
US23: 7.87-8.12	Crystal Petal - Chapman	0.0201	0.1376	0.1259	0.7766	1.0602
US23: 8.12-8.41	Chapman - Perkins	0.0233	0.1598	0.1463	0.9012	1.2306
US23: 8.41-8.55	Perkins - Methodist School	0.0115	0.0786	0.072	0.4437	0.6058
US23: 8.55-8.62	Methodist School - Pollack	0.0057	0.0393	0.036	0.2219	0.3029
US23: 5.39	Hyatts/Shanahan	0.2691	1.3404	2.1131	9.1997	12.9223
US23: 5.865	Walnut	0.0129	0.0482	0.055	1.3076	1.4237
US23: 5.959	Greif	0.1186	0.3033	0.2811	0.8904	1.5934
US23: 6.3	Conner	0.0089	0.0335	0.0384	0.8364	0.9172
US23: 6.479	Glenn CRs	0.1644	0.421	0.3902	1.1271	2.1027
US23: 6.926	OhioHealth/Lazarus	0.0629	0.1604	0.1487	0.554	0.926
US23: 7.6	Cheshire	0.0274	0.1005	0.1133	3.2373	3.4785
US23: 7.87	Crystal Petal	0.0084	0.0486	0.0552	0.3702	0.4824
US23: 8.12	Chapman	0.0068	0.0394	0.0454	0.226	0.3176
US23: 8.41	Perkins	0.0082	0.031	0.0358	0.7375	0.8125
US23: 8.55	Methodist School	0.0082	0.031	0.0358	0.7375	0.8125
US23: 8.67	Pollack	0.0243	0.0891	0.1005	2.8365	3.0504
US23: 7.296	Cheshire Realigned	0.0888	0.4992	0.6654	2.2322	3.4856
US23: 7.296-7.6	Cheshire Realigned - Cheshire	0.0244	0.1674	0.1531	0.9443	1.2892



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.1020	0.1165	0.0145	0.0760
Head On	0.9900	0.9720	-0.0180	0.5136
Rear End	33.5465	29.0392	-4.5073	21.8405
Backing	1.3066	1.0526	-0.2540	0.9220
Sideswipe - Meeting	0.2246	0.2083	-0.0164	0.1732
Sideswipe - Passing	8.0415	6.8402	-1.2013	5.6517
Angle	9.9470	9.2413	-0.7057	6.5349
Parked Vehicle	0.5329	0.6058	0.0729	0.3933
Pedestrian	0.2663	0.2663	0.0000	0.1760
Animal	3.1028	4.0428	0.9399	3.0915
Train	0.0262	0.0241	-0.0022	0.0109
Pedalcycles	0.1450	0.1450	0.0000	0.1167
Other Non-Vehicle	0.0004	0.0005	0.0002	0.0002
Fixed Object	6.2006	6.7254	0.5248	5.0414
Other Object	0.3140	0.3639	0.0499	0.2691
Overturning	0.2984	0.3138	0.0154	0.2329
Other Non-Collision	0.5767	0.6403	0.0636	0.4618
Left Turn	5.6363	5.0523	-0.5840	2.7977
Right Turn	2.3611	1.9419	-0.4192	2.1199



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-0.111	(\$10,633,616)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-4.156	\$2,803,073
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-15.801	\$16,154,475
CMF 3 - Install RIRO at stop controlled intersection	20	\$1.00			\$1.00	\$1.00	-3.207	\$5,414,852
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$7.00	\$0.00	\$0.00	\$7.00	\$7.00	-23.275	\$13,738,785



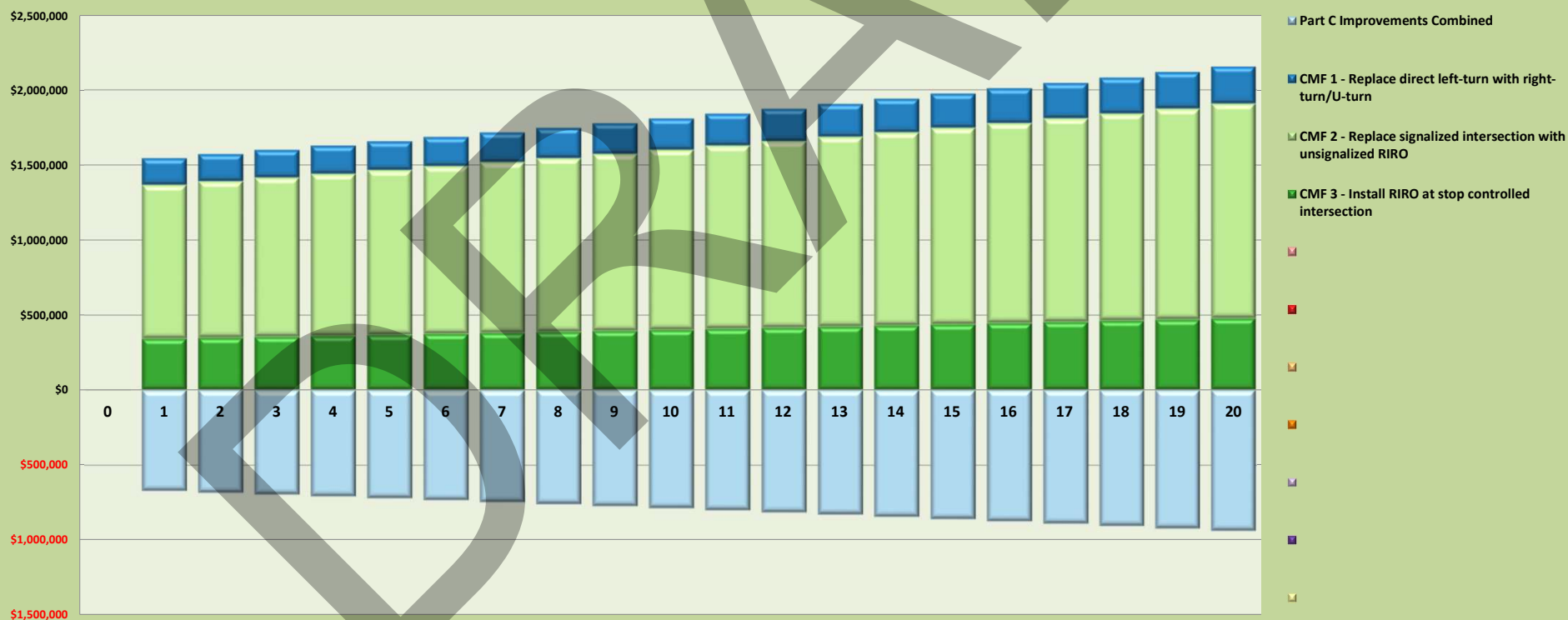
Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	Expected Annual Crash Adjustment	Comments:
<p>Net Present Value of Project: \$7.00</p> <p>Net Present Value of Safety Benefits: \$13,738,785.08</p> <p>Net Benefit: \$13,738,778.08</p> <p>Benefit / Cost Ratio: 1962683.58</p>	<p>Number of Fatal & Incapacitating Injury Crashes: -0.688</p> <p>Number of Injury Crashes: -10.012</p> <p>Number of Total Crashes: -23.275</p>	

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year





Safety Benefit - Cost Analysis

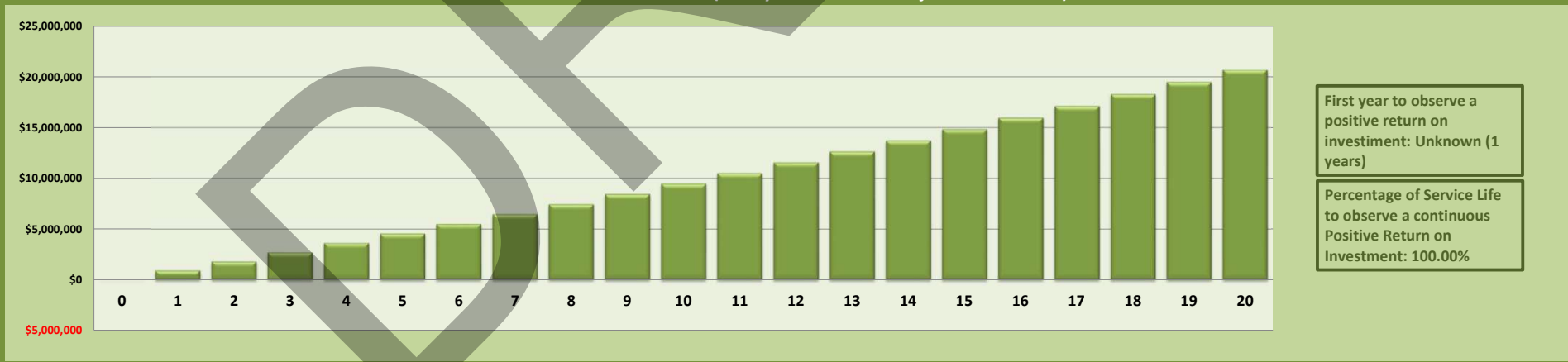
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



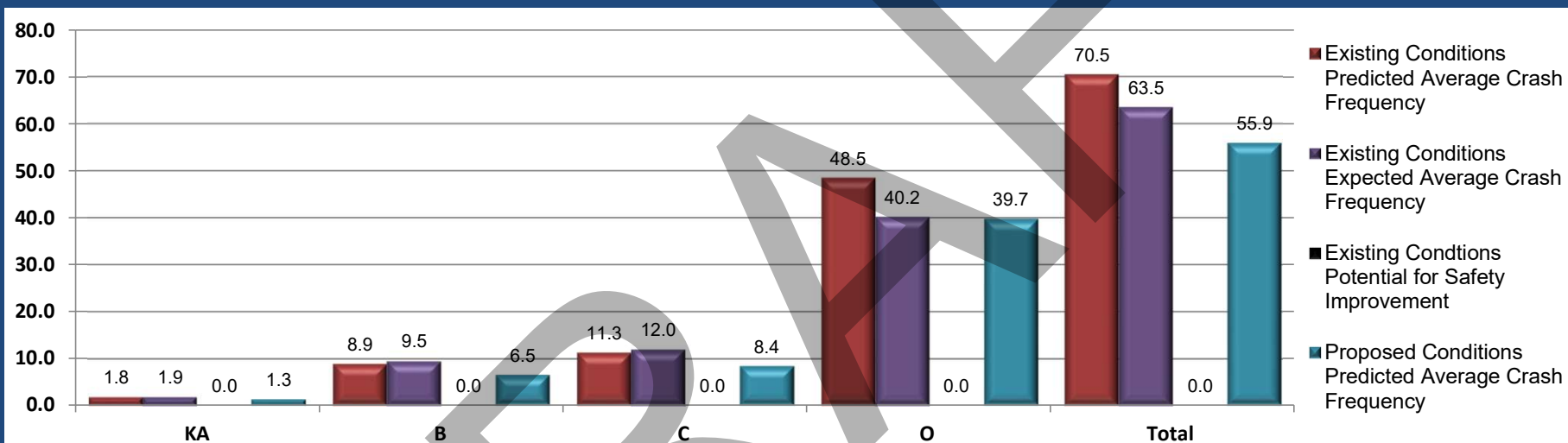


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.7793	8.9296	11.3298	48.4790	70.5177
N_{expected} - Existing Conditions	1.9153	9.4702	11.9710	40.1924	63.5489
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	1.2547	6.5448	8.4236	39.7148	55.9379



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23: 5.12-5.39	S of Hyatts/Shanahan	0.0259	0.1797	0.1673	1.0344	1.4073	
US23: 5.39-5.865	Hyatts/Shanahan - Walnut	0.0457	0.3162	0.2948	1.8206	2.4773	
US23: 5.865-6.3	Greif - Conner	0.0417	0.2889	0.2686	1.6646	2.2638	
US23: 6.3-6.48	Conner - Glenn	0.0173	0.1197	0.1114	0.6894	0.9378	
US23: 6.48-6.925	Glenn - OhioHealth	0.0358	0.2451	0.2244	1.3826	1.8879	
US23: 6.925-7.296	OhioHealth - Cheshire Realigned	0.0298	0.2042	0.1868	1.1523	1.5731	
US23: 7.6-7.87	Cheshire - Crystal Petal	0.0217	0.1486	0.136	0.8386	1.1449	
US23: 7.87-8.12	Crystal Petal - Chapman	0.0201	0.1376	0.1259	0.7766	1.0602	
US23: 8.12-8.41	Chapman - Perkins	0.0233	0.1598	0.1463	0.9012	1.2306	
US23: 8.41-8.55	Perkins - Methodist School	0.0189	0.093	0.0925	0.5255	0.7299	
US23: 8.55-8.62	Methodist School - Pollack	0.0095	0.0465	0.0463	0.2628	0.3651	
US23: 5.39	Hyatts/Shanahan	0.3335	1.5915	2.3912	9.3376	13.6538	
US23: 5.865	Walnut	0.0644	0.2408	0.2749	1.3076	1.8877	
US23: 5.96	Greif	0.1351	0.7677	0.9942	2.7446	4.6416	
US23: 6.3	Conner	0.032	0.1209	0.1391	0.5745	0.8665	
US23: 6.48	Glenn	0.2816	1.3415	2.013	7.6751	11.3112	
US23: 6.925	OhioHealth	0.2008	0.9372	1.385	5.2522	7.7752	
US23: 7.6	Cheshire	0.1371	0.5026	0.5663	3.2373	4.4433	
US23: 7.87	Crystal Petal	0.0084	0.0486	0.0552	0.3702	0.4824	
US23: 8.12	Chapman	0.0084	0.0486	0.0552	0.3702	0.4824	
US23: 8.41	Perkins	0.032	0.1209	0.1391	0.5745	0.8665	
US23: 8.55	Methodist School	0.0275	0.104	0.1196	0.4941	0.7452	
US23: 8.67	Pollack	0.0813	0.2985	0.3366	1.9004	2.6168	
US23: 7.296	Cheshire Realigned	0.1231	0.7001	0.907	2.6478	4.378	
US23: 7.296-7.6	Cheshire Realigned - Cheshire	0.0244	0.1674	0.1531	0.9443	1.2892	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 5.12-5.39	S of Hyatts/Shanahan	0.0362	0.273	0.264	1.2085	1.7817
US23: 5.39-5.865	Hyatts/Shanahan - Walnut	0.0481	0.3418	0.3235	2.0984	2.8118
US23: 5.865-6.3	Greif - Conner	0.0409	0.2738	0.2459	2.1613	2.7219
US23: 6.3-6.48	Conner - Glenn	0.0157	0.1033	0.0926	0.4013	0.6129
US23: 6.48-6.925	Glenn - OhioHealth	0.0355	0.2395	0.2161	1.4474	1.9385
US23: 6.925-7.296	OhioHealth - Cheshire Realigned	0.0247	0.1579	0.1386	0.5325	0.8537
US23: 7.6-7.87	Cheshire - Crystal Petal	0.0188	0.1221	0.1083	0.7364	0.9856
US23: 7.87-8.12	Crystal Petal - Chapman	0.0212	0.1487	0.1381	0.7042	1.0122
US23: 8.12-8.41	Chapman - Perkins	0.0282	0.2066	0.1964	0.4706	0.9018
US23: 8.41-8.55	Perkins - Methodist School	0.0174	0.0844	0.0836	0.3782	0.5636
US23: 8.55-8.62	Methodist School - Pollack	0.0091	0.0442	0.044	0.2196	0.3169
US23: 5.39	Hyatts/Shanahan	0.444	2.1679	3.3087	7.0019	12.9225
US23: 5.865	Walnut	0.0981	0.3627	0.4076	1.2447	2.1131
US23: 5.96	Greif	0.1314	0.7517	0.9814	3.115	4.9795
US23: 6.3	Conner	0.0273	0.1019	0.1166	0.635	0.8808
US23: 6.48	Glenn	0.2258	1.0705	1.6013	4.4036	7.3012
US23: 6.925	OhioHealth	0.1379	0.6306	0.9183	4.3886	6.0754
US23: 7.6	Cheshire	0.247	0.9391	1.0774	3.1976	5.4611
US23: 7.87	Crystal Petal	0.0109	0.0631	0.073	0.5426	0.6896
US23: 8.12	Chapman	0.0071	0.0414	0.0463	0.6345	0.7293
US23: 8.41	Perkins	0.0273	0.1019	0.1166	0.4365	0.6823
US23: 8.55	Methodist School	0.0339	0.1304	0.1512	0.6398	0.9553
US23: 8.67	Pollack	0.1	0.3651	0.4081	1.5173	2.3905
US23: 7.296	Cheshire Realigned	0.108	0.614	0.7944	1.5949	3.1113
US23: 7.296-7.6	Cheshire Realigned - Cheshire	0.0208	0.1346	0.119	0.482	0.7564



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23: 5.12-5.39	S of Hyatts/Shanahan	0.0103	0.0933	0.0967	0.1741	0.3744	
US23: 5.39-5.865	Hyatts/Shanahan - Walnut	0.0024	0.0256	0.0287	0.2778	0.3345	
US23: 5.865-6.3	Greif - Conner	-0.0008	-0.0151	-0.0227	0.4967	0.4581	
US23: 6.3-6.48	Conner - Glenn	-0.0016	-0.0164	-0.0188	-0.2881	-0.3249	
US23: 6.48-6.925	Glenn - OhioHealth	-0.0003	-0.0056	-0.0083	0.0648	0.0506	
US23: 6.925-7.296	OhioHealth - Cheshire Realigned	-0.0051	-0.0463	-0.0482	-0.6198	-0.7194	
US23: 7.6-7.87	Cheshire - Crystal Petal	-0.0029	-0.0265	-0.0277	-0.1022	-0.1593	
US23: 7.87-8.12	Crystal Petal - Chapman	0.0011	0.0111	0.0122	-0.0724	-0.048	
US23: 8.12-8.41	Chapman - Perkins	0.0049	0.0468	0.0501	-0.4306	-0.3288	
US23: 8.41-8.55	Perkins - Methodist School	-0.0015	-0.0086	-0.0089	-0.1473	-0.1663	
US23: 8.55-8.62	Methodist School - Pollack	-0.0004	-0.0023	-0.0023	-0.0432	-0.0482	
US23: 5.39	Hyatts/Shanahan	0.1105	0.5764	0.9175	-2.3357	-0.7313	
US23: 5.865	Walnut	0.0337	0.1219	0.1327	-0.0629	0.2254	
US23: 5.96	Greif	-0.0037	-0.016	-0.0128	0.3704	0.3379	
US23: 6.3	Conner	-0.0047	-0.019	-0.0225	0.0605	0.0143	
US23: 6.48	Glenn	-0.0558	-0.271	-0.4117	-3.2715	-4.01	
US23: 6.925	OhioHealth	-0.0629	-0.3066	-0.4667	-0.8636	-1.6998	
US23: 7.6	Cheshire	0.1099	0.4365	0.5111	-0.0397	1.0178	
US23: 7.87	Crystal Petal	0.0025	0.0145	0.0178	0.1724	0.2072	
US23: 8.12	Chapman	-0.0013	-0.0072	-0.0089	0.2643	0.2469	
US23: 8.41	Perkins	-0.0047	-0.019	-0.0225	-0.138	-0.1842	
US23: 8.55	Methodist School	0.0064	0.0264	0.0316	0.1457	0.2101	
US23: 8.67	Pollack	0.0187	0.0666	0.0715	-0.3831	-0.2263	
US23: 7.296	Cheshire Realigned	-0.0151	-0.0861	-0.1126	-1.0529	-1.2667	
US23: 7.296-7.6	Cheshire Realigned - Cheshire	-0.0036	-0.0328	-0.0341	-0.4623	-0.5328	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 5.12-5.39	S of Hyatts/Shanahan	0.0223	0.1522	0.1398	0.8577	1.172
US23; 5.39-5.865	Hyatts/Shanahan - Walnut	0.0384	0.2625	0.2413	1.4794	2.0216
US23; 5.865-6.3	Greif - Conner	0.035	0.2398	0.2199	1.3526	1.8473
US23; 6.3-6.48	Conner - Glenn	0.0148	0.1014	0.0931	0.5716	0.7809
US23; 6.48-6.925	Glenn - OhioHealth	0.0358	0.2451	0.2244	1.3826	1.8879
US23; 6.925-7.296	OhioHealth - Cheshire Realigned	0.0298	0.2044	0.1872	1.1531	1.5745
US23; 7.296-7.87	Realigned Cheshire - Crystal Petal	0.0461	0.316	0.289	1.7829	2.434
US23; 7.87-8.12	Crystal Petal - Chapman	0.0201	0.1376	0.1259	0.7766	1.0602
US23; 8.12-8.41	Chapman - Perkins	0.0233	0.1598	0.1463	0.9012	1.2306
US23; 8.41-8.55	Perkins - Methodist School	0.0115	0.0786	0.072	0.4437	0.6058
US23; 8.55-8.62	Methodist School - Pollack	0.0057	0.0393	0.036	0.2219	0.3029
US23; 5.39	Hyatts/Shanahan	0.28	1.3358	2.007	7.655	11.2778
US23; 5.865	Walnut	0.0119	0.0446	0.0511	1.1562	1.2638
US23; 5.959	Greif	0.1869	0.922	1.4437	6.1439	8.6965
US23; 6.3	Conner	0.0082	0.031	0.0358	0.7375	0.8125
US23; 6.479	Glenn	0.1241	0.7062	0.9157	2.6758	4.4218
US23; 6.926	OhioHealth/Lazarus	0.0629	0.1604	0.1487	0.554	0.926
US23; 7.296	Cheshire Realigned	0.2584	1.2284	1.8406	7.0155	10.3429
US23; 7.87	Crystal Petal	0.0084	0.0486	0.0552	0.3702	0.4824
US23; 8.12	Chapman	0.0068	0.0394	0.0454	0.226	0.3176
US23; 8.41	Perkins	0.0082	0.031	0.0358	0.7375	0.8125
US23; 8.55	Methodist School	0.0082	0.031	0.0358	0.7375	0.8125
US23; 8.67	Pollack	0.0079	0.0297	0.0339	0.7824	0.8539



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.1020	0.1165		0.0870
Head On	0.9900	0.9720		0.6851
Rear End	33.5465	29.0392		27.0809
Backing	1.3066	1.0526		1.0439
Sideswipe - Meeting	0.2246	0.2083		0.1729
Sideswipe - Passing	8.0415	6.8402		6.5905
Angle	9.9470	9.2413		7.5728
Parked Vehicle	0.5329	0.6058		0.4351
Pedestrian	0.2663	0.2663		0.2036
Animal	3.1028	4.0428		3.0919
Train	0.0262	0.0241		0.0143
Pedalcycles	0.1450	0.1450		0.1342
Other Non-Vehicle	0.0004	0.0005		0.0000
Fixed Object	6.2006	6.7254		4.7908
Other Object	0.3140	0.3639		0.2618
Overtuning	0.2984	0.3138		0.2513
Other Non-Collision	0.5767	0.6403		0.4488
Left Turn	5.6363	5.0523		4.3071
Right Turn	2.3611	1.9419		2.0225



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-7.621	\$1,795,452
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-2.203	\$1,479,115
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-3.140	\$2,935,400
CMF 3 - Install RIRO at stop controlled intersection	20	\$1.00			\$1.00	\$1.00	-1.616	\$2,703,828
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$7.00	\$0.00	\$0.00	\$7.00	\$7.00	-14.580	\$8,913,795



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator

Expected Annual Crash Adjustment

Comments:

Net Present Value of Project **\$7.00**

Net Present Value of Safety Benefits **\$8,913,794.85**

Net Benefit **\$8,913,787.85**

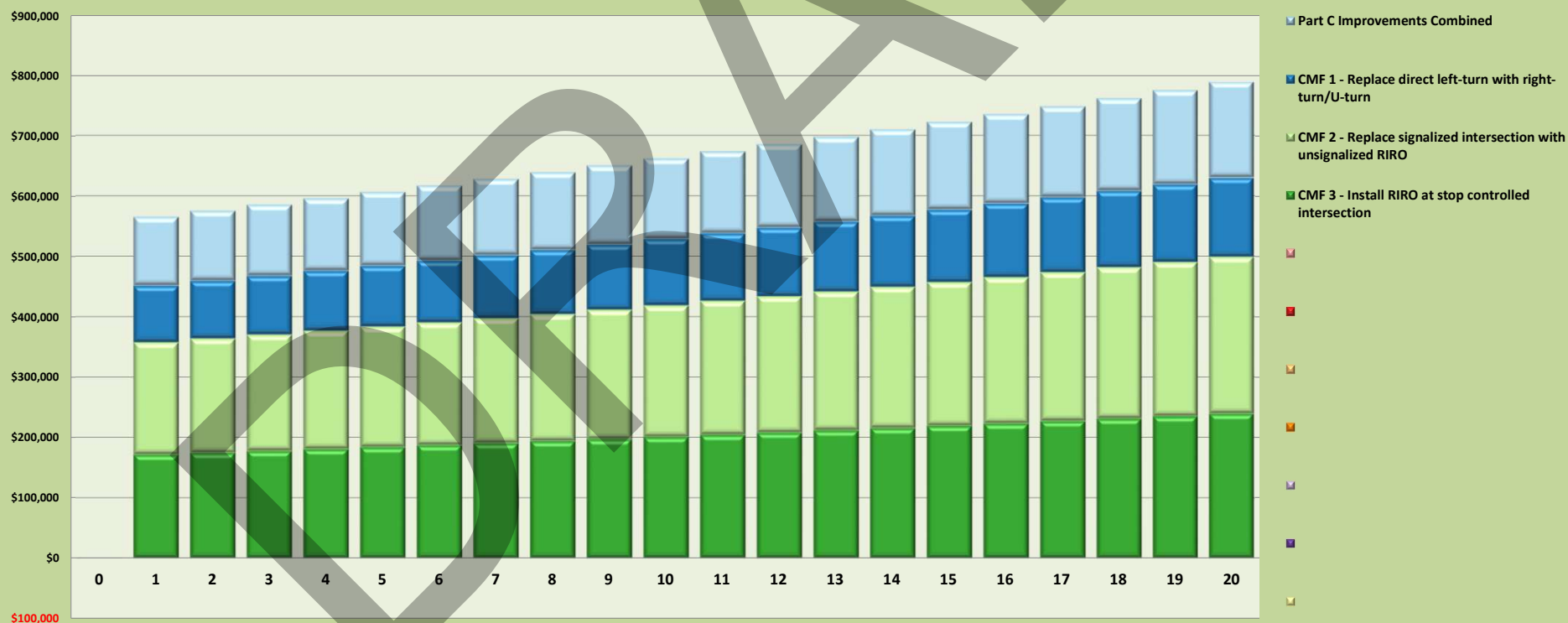
Benefit / Cost Ratio **1273399.26**

Number of Fatal & Incapacitating Injury Crashes **-0.525**

Number of Injury Crashes **-5.816**

Number of Total Crashes **-14.580**

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year





Safety Benefit - Cost Analysis

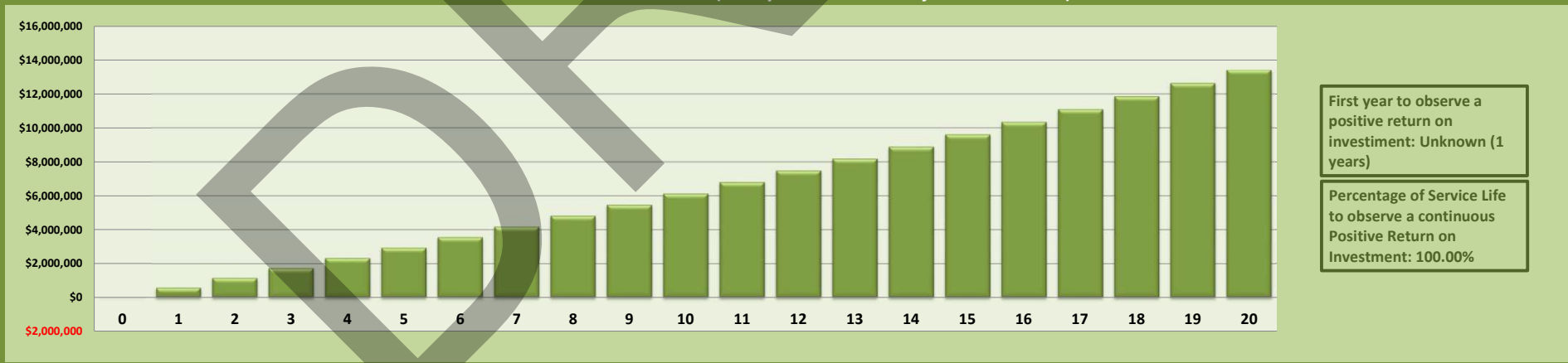
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 4	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



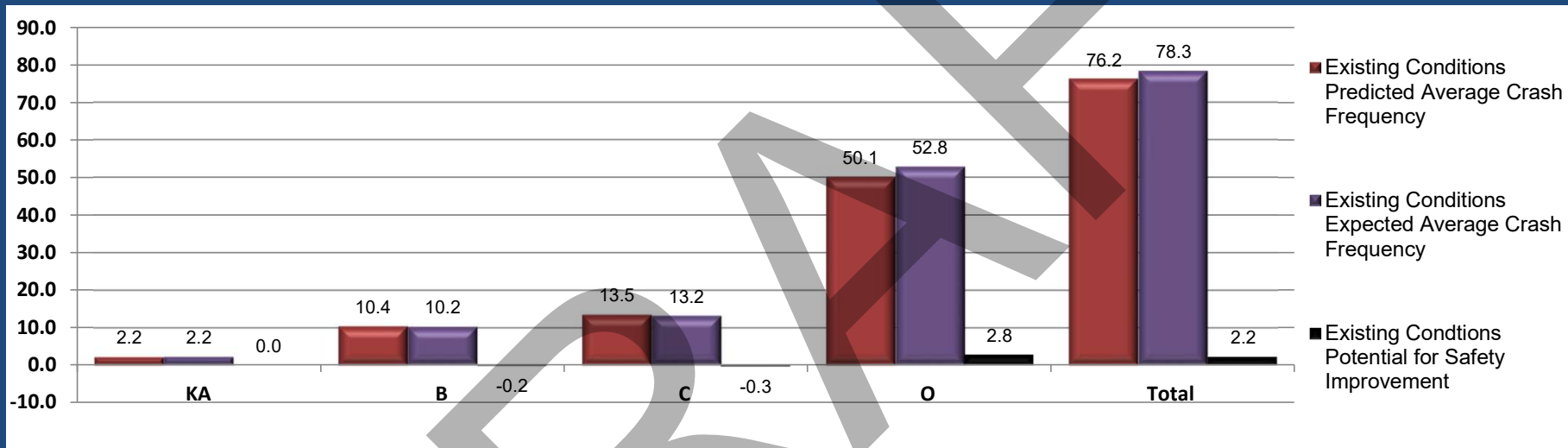


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}} - \text{Existing Conditions}$	2.1840	10.4279	13.4912	50.0642	76.1673
$N_{\text{expected}} - \text{Existing Conditions}$	2.1601	10.1844	13.1736	52.8285	78.3466
$N_{\text{potential for improvement}} - \text{Existing Conditions}$	-0.0239	-0.2435	-0.3176	2.7643	2.1793



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.72-8.854	S of SR 315	0.0181	0.089	0.0886	0.503	0.6987
US23: 8.854-9.089	Meeker - Stratford	0.0351	0.1741	0.1735	0.9891	1.3718
US23: 9.089-9.318	Hawthorn - Meeker	0.034	0.1683	0.1681	0.9592	1.3296
US23: 9.318-9.495	Del Plaza S/Penny - Hawthorn	0.0263	0.1301	0.1299	0.7414	1.0277
US23: 9.495-9.754	Hull - Del Plaza N	0.0385	0.1904	0.1901	1.0848	1.5038
US23: 9.754-9.993	Cottswold - Hull	0.036	0.1788	0.1779	1.0129	1.4056
US23: 9.993-10.391	Sandusky - Cottswold	0.0598	0.2965	0.2952	1.682	2.3335
US23: 10.391-10.633	US 42 - Sandusky	0.0311	0.1522	0.1513	0.8564	1.191
US23: 10.633-10.87	N of US 42	0.0382	0.1907	0.1908	1.0938	1.5135
US23: 8.782	SR 315	0.1408	0.8079	1.059	3.0848	5.0925
US23: 8.854	Stratford	0.1036	0.3777	0.4239	2.5426	3.4478
US23: 9.089	Meeker	0.1181	0.6675	0.8573	2.3983	4.0412
US23: 9.318	Hawthorn	0.2406	1.1325	1.6845	6.604	9.6616
US23: 9.495	Del Plaza S/Penny	0.2678	1.2609	1.8761	7.2269	10.6317
US23: 9.594	Del Plaza N	0.1501	0.8573	1.1175	3.1815	5.3064
US23: 9.754	Hull	0.2587	0.6517	0.6052	1.763	3.2786
US23: 9.993	Cottswold	0.2676	1.2659	1.8899	7.2905	10.7139
US23: 10.391	Sandusky	0.1557	0.8929	1.1699	3.4364	5.6549
US23: 10.633	US 42	0.1639	0.9435	1.2425	3.6136	5.9635



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 8.72-8.854	S of SR 315	0.0167	0.0812	0.0805	0.3662	0.5446
US23: 8.854-9.089	Meeker - Stratford	0.0349	0.173	0.1725	1.3178	1.6982
US23: 9.089-9.318	Hawthorn - Meeker	0.0346	0.1699	0.169	0.5623	0.9358
US23: 9.318-9.495	Del Plaza S/Penny - Hawthorn	0.0234	0.1139	0.113	0.8551	1.1054
US23: 9.495-9.754	Hull - Del Plaza N	0.0326	0.1577	0.1562	0.787	1.1335
US23: 9.754-9.993	Cottswold - Hull	0.0357	0.1773	0.1764	1.6613	2.0507
US23: 9.993-10.391	Sandusky - Cottswold	0.0485	0.2294	0.2244	1.6355	2.1378
US23: 10.391-10.633	US 42 - Sandusky	0.0273	0.1309	0.1292	0.5385	0.8259
US23: 10.633-10.87	N of US 42	0.0375	0.1863	0.1863	0.9455	1.3556
US23: 8.782	SR 315	0.1552	0.899	1.1934	5.6665	7.9141
US23: 8.854	Stratford	0.0706	0.2485	0.2742	1.4584	2.0517
US23: 9.089	Meeker	0.109	0.6182	0.7979	2.3888	3.9139
US23: 9.318	Hawthorn	0.1861	0.8696	1.2871	3.9614	6.3042
US23: 9.495	Del Plaza S/Penny	0.2329	1.1005	1.642	4.782	7.7574
US23: 9.594	Del Plaza N	0.1379	0.7896	1.0324	3.7015	5.6614
US23: 9.754	Hull	0.3386	0.875	0.8114	4.2265	6.2515
US23: 9.993	Cottswold	0.3238	1.5469	2.3255	7.4713	11.6675
US23: 10.391	Sandusky	0.1624	0.9388	1.2426	4.8471	7.1909
US23: 10.633	US 42	0.1524	0.8787	1.1596	5.6558	7.8465



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23: 8.72-8.854	S of SR 315	-0.0014	-0.0078	-0.0081	-0.1368	-0.1541	
US23: 8.854-9.089	Meeker - Stratford	-0.0002	-0.0011	-0.001	0.3287	0.3264	
US23: 9.089-9.318	Hawthorn - Meeker	0.0006	0.0016	0.0009	-0.3969	-0.3938	
US23: 9.318-9.495	Del Plaza S/Penny - Hawthorn	-0.0029	-0.0162	-0.0169	0.1137	0.0777	
US23: 9.495-9.754	Hull - Del Plaza N	-0.0059	-0.0327	-0.0339	-0.2978	-0.3703	
US23: 9.754-9.993	Cottswold - Hull	-0.0003	-0.0015	-0.0015	0.6484	0.6451	
US23: 9.993-10.391	Sandusky - Cottswold	-0.0113	-0.0671	-0.0708	-0.0465	-0.1957	
US23: 10.391-10.633	US 42 - Sandusky	-0.0038	-0.0213	-0.0221	-0.3179	-0.3651	
US23: 10.633-10.87	N of US 42	-0.0007	-0.0044	-0.0045	-0.1483	-0.1579	
US23: 8.782	SR 315	0.0144	0.0911	0.1344	2.5817	2.8216	
US23: 8.854	Stratford	-0.033	-0.1292	-0.1497	-1.0842	-1.3961	
US23: 9.089	Meeker	-0.0091	-0.0493	-0.0594	-0.0095	-0.1273	
US23: 9.318	Hawthorn	-0.0545	-0.2629	-0.3974	-2.6426	-3.3574	
US23: 9.495	Del Plaza S/Penny	-0.0349	-0.1604	-0.2341	-2.4449	-2.8743	
US23: 9.594	Del Plaza N	-0.0122	-0.0677	-0.0851	0.52	0.355	
US23: 9.754	Hull	0.0799	0.2233	0.2062	2.4635	2.9729	
US23: 9.993	Cottswold	0.0562	0.281	0.4356	0.1808	0.9536	
US23: 10.391	Sandusky	0.0067	0.0459	0.0727	1.4107	1.536	
US23: 10.633	US 42	-0.0115	-0.0648	-0.0829	2.0422	1.883	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

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Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.0969	0.1132	0.0163	
Head On	1.0572	1.0848	0.0275	
Rear End	33.2962	34.2271	0.9309	
Backing	1.3540	1.4762	0.1223	
Sideswipe - Meeting	0.3334	0.3619	0.0285	
Sideswipe - Passing	7.9010	8.5932	0.6922	
Angle	10.6897	11.4387	0.7490	
Parked Vehicle	0.5420	0.6145	0.0725	
Pedestrian	0.1709	0.1709	0.0000	
Animal	1.2577	1.4463	0.1885	
Train	0.0576	0.0557	-0.0018	
Pedalcycles	0.0742	0.0742	0.0000	
Other Non-Vehicle	0.0001	0.0001	0.0000	
Fixed Object	5.4519	5.8439	0.3920	
Other Object	0.2767	0.3113	0.0346	
Overturning	0.1904	0.1993	0.0089	
Other Non-Collision	0.5749	0.6278	0.0530	
Left Turn	6.5055	6.4935	-0.0120	
Right Turn	2.5094	2.5187	0.0093	

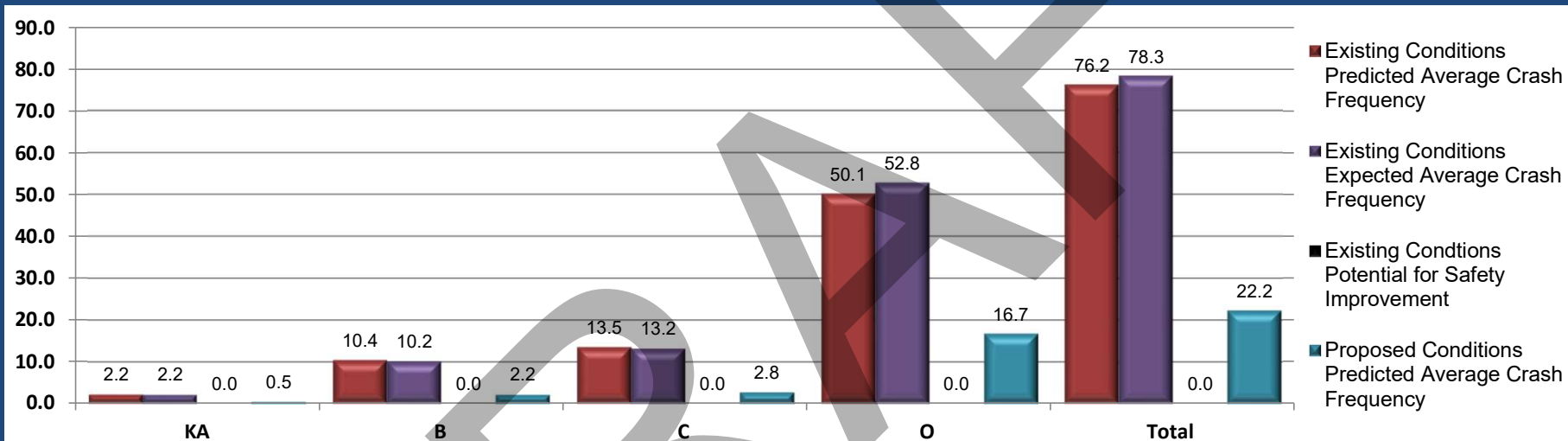


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.1840	10.4279	13.4912	50.0642	76.1673
N_{expected} - Existing Conditions	2.1601	10.1844	13.1736	52.8285	78.3466
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	0.4911	2.1756	2.8384	16.6790	22.1841



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.583-8.983	S of SR 315	0.0181	0.089	0.0886	0.503	0.6987
US23: 8.582-8.982	Meeker - Stratford	0.0351	0.1741	0.1735	0.9891	1.3718
US23: 8.984-10.433	Hawthorn - Meeker	0.034	0.1683	0.1681	0.9592	1.3296
US23: 8.983-10.432	Del Plaza S/Penny - Hawthorn	0.0263	0.1301	0.1299	0.7414	1.0277
US23: 10.434-10.834	Hull - Del Plaza N	0.0385	0.1904	0.1901	1.0848	1.5038
US23: 10.433-10.833	Cottswold - Hull	0.036	0.1788	0.1779	1.0129	1.4056
US23: 8.383-8.583	Sandusky - Cottswold	0.0598	0.2965	0.2952	1.682	2.3335
US23: 8.382-8.582	US 42 - Sandusky	0.0311	0.1522	0.1513	0.8564	1.191
US23: 10.834-11.034	N of US 42	0.0382	0.1907	0.1908	1.0938	1.5135
US23: 10.833-11.033	SR 315	0.1408	0.8079	1.059	3.0848	5.0925



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.583-8.983	S of SR 315	0.0167	0.0812	0.0805	0.3662	0.5446
US23: 8.582-8.982	Meeker - Stratford	0.0349	0.173	0.1725	1.3178	1.6982
US23: 8.984-10.433	Hawthorn - Meeker	0.0346	0.1699	0.169	0.5623	0.9358
US23: 8.983-10.432	Del Plaza S/Penny - Hawthorn	0.0234	0.1139	0.113	0.8551	1.1054
US23: 10.434-10.834	Hull - Del Plaza N	0.0326	0.1577	0.1562	0.787	1.1335
US23: 10.433-10.833	Cottswold - Hull	0.0357	0.1773	0.1764	1.6613	2.0507
US23: 8.383-8.583	Sandusky - Cottswold	0.0485	0.2294	0.2244	1.6355	2.1378
US23: 8.382-8.582	US 42 - Sandusky	0.0273	0.1309	0.1292	0.5385	0.8259
US23: 10.834-11.034	N of US 42	0.0375	0.1863	0.1863	0.9455	1.3556
US23: 10.833-11.033	SR 315	0.1552	0.899	1.1934	5.6665	7.9141



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 8.583-8.983	S of SR 315	-0.0014	-0.0078	-0.0081	-0.1368	-0.1541
US23: 8.582-8.982	Meeker - Stratford	-0.0002	-0.0011	-0.001	0.3287	0.3264
US23: 8.984-10.433	Hawthorn - Meeker	0.0006	0.0016	0.0009	-0.3969	-0.3938
US23: 8.983-10.432	Del Plaza S/Penny - Hawthorn	-0.0029	-0.0162	-0.0169	0.1137	0.0777
US23: 10.434-10.834	Hull - Del Plaza N	-0.0059	-0.0327	-0.0339	-0.2978	-0.3703
US23: 10.433-10.833	Cottswold - Hull	-0.0003	-0.0015	-0.0015	0.6484	0.6451
US23: 8.383-8.583	Sandusky - Cottswold	-0.0113	-0.0671	-0.0708	-0.0465	-0.1957
US23: 8.382-8.582	US 42 - Sandusky	-0.0038	-0.0213	-0.0221	-0.3179	-0.3651
US23: 10.834-11.034	N of US 42	-0.0007	-0.0044	-0.0045	-0.1483	-0.1579
US23: 10.833-11.033	SR 315	0.0144	0.0911	0.1344	2.5817	2.8216



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.583-8.983	SR 315 NB	0.0297	0.1264	0.1758	1.0599	1.3918
US23: 8.582-8.982	SR 315 SB	0.0297	0.1264	0.1758	1.0599	1.3918
US23: 8.984-10.433	SR 315 - US 42 NB	0.1312	0.5777	0.76	4.53	5.9989
US23: 8.983-10.432	SR 315 - US 42 SB	0.134	0.5914	0.7754	4.5462	6.047
US23: 10.434-10.834	US 42 NB	0.0356	0.1519	0.2111	1.2336	1.6322
US23: 10.433-10.833	US 42 SB	0.0356	0.1519	0.2111	1.2336	1.6322
US23: 8.383-8.583	S of 315 NB	0.0156	0.072	0.0887	0.6091	0.7854
US23: 8.382-8.582	S of 315 SB	0.0273	0.1313	0.1505	0.7763	1.0854
US23: 10.834-11.034	N of 42 NB	0.033	0.1571	0.1798	0.9007	1.2706
US23: 10.833-11.033	N of 42 SB	0.0194	0.0895	0.1102	0.7297	0.9488



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.0819	0.0817		0.0636
Head On	0.0860	0.0859		0.0092
Rear End	6.1114	5.8107		0.0000
Backing	0.5134	0.5113		2.0674
Sideswipe - Meeting	0.1399	0.1397		0.0000
Sideswipe - Passing	4.8038	4.5655		0.0008
Angle	0.1002	0.1001		0.0000
Parked Vehicle	0.0117	0.0117		5.7074
Pedestrian	0.0303	0.0303		1.2086
Animal	2.1934	2.0872		0.1012
Train	0.0000	0.0000		0.8207
Pedalcycles	0.0036	0.0036		0.0211
Other Non-Vehicle	0.0000	0.0000		0.0000
Fixed Object	7.8624	7.1534		18.7464
Other Object	1.2540	1.2183		3.7492
Overturning	0.2263	0.2261		16.6790
Other Non-Collision	0.9207	0.9037		18.7464
Left Turn	0.0387	0.0387		0.0000
Right Turn	0.0000	0.0000		0.0000



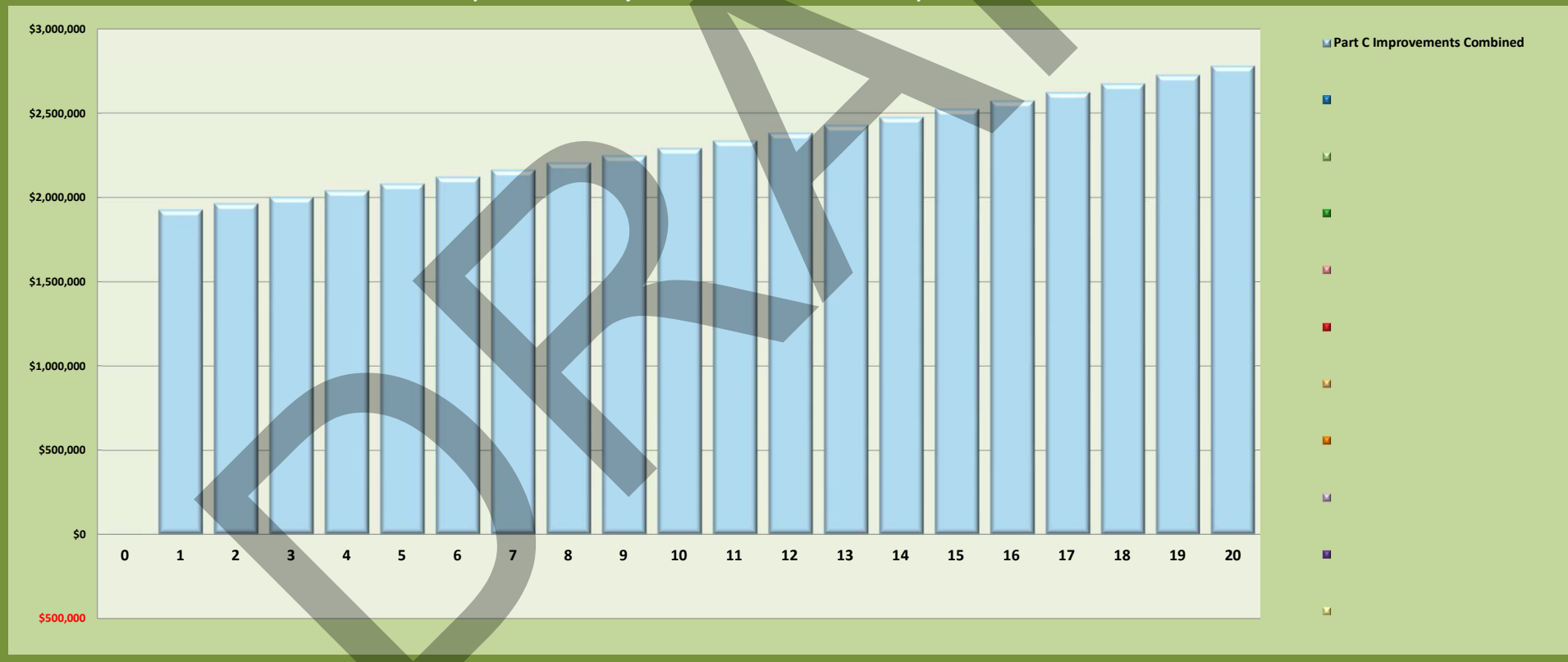
Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	Expected Annual Crash Adjustment	Comments:
<p>Net Present Value of Project \$4.00</p> <p>Net Present Value of Safety Benefits \$30,868,541.10</p> <p>Net Benefit \$30,868,537.10</p> <p>Benefit / Cost Ratio 7717135.27</p>	<p>Number of Fatal & Incapacitating Injury Crashes -1.692</p> <p>Number of Injury Crashes -20.598</p> <p>Number of Total Crashes -53.983</p>	

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year





Safety Benefit - Cost Analysis

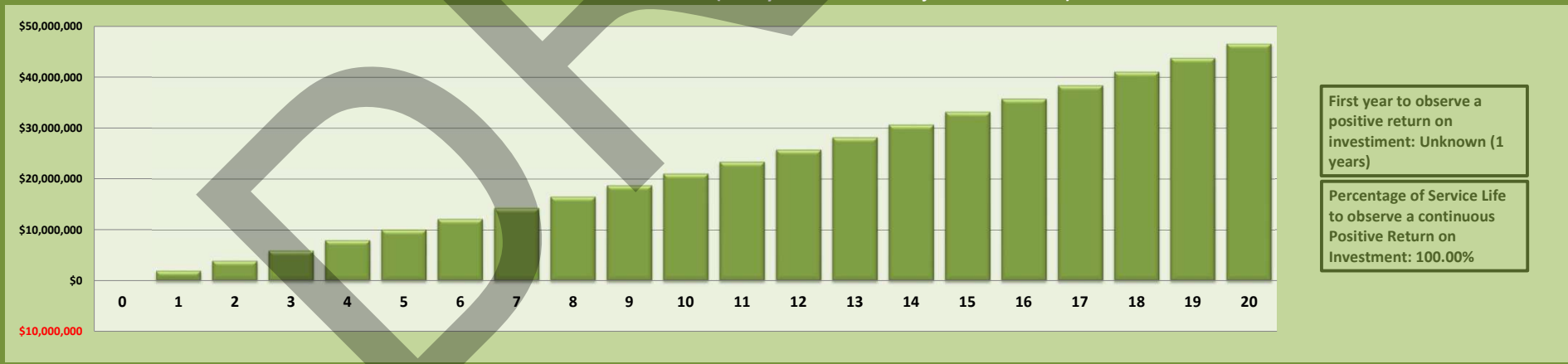
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



First year to observe a positive return on investment: Unknown (1 years)

Percentage of Service Life to observe a continuous Positive Return on Investment: 100.00%

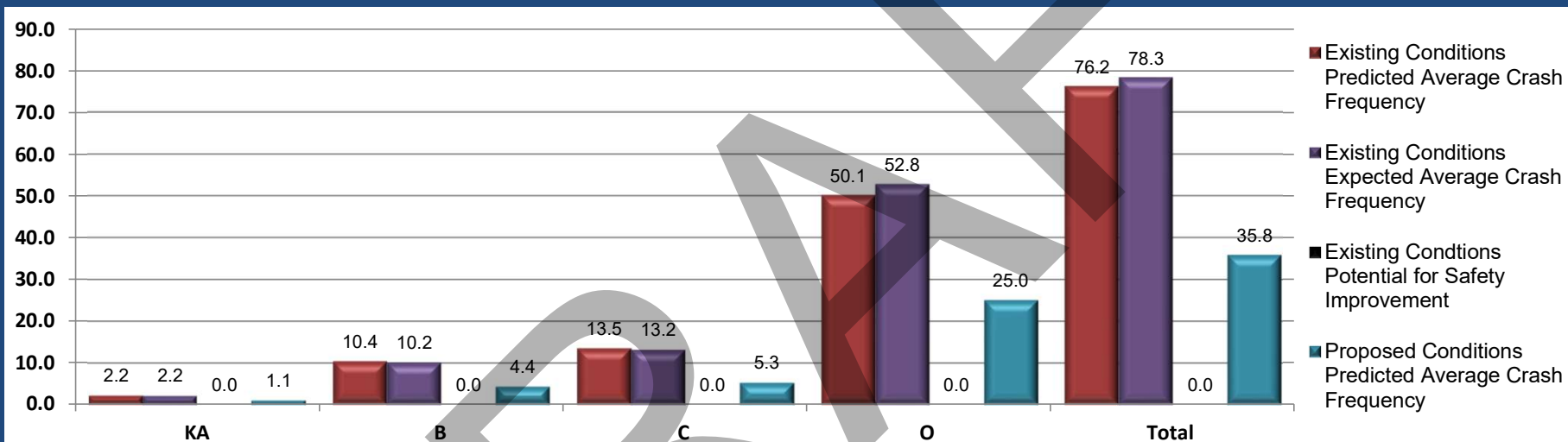


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.1840	10.4279	13.4912	50.0642	76.1673
N_{expected} - Existing Conditions	2.1601	10.1844	13.1736	52.8285	78.3466
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	1.1050	4.3727	5.2742	25.0034	35.7553



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.72-9.089	S of SR 315	0.0181	0.089	0.0886	0.503	0.6987
US23: 9.089-9.318	Meeker - Stratford	0.0351	0.1741	0.1735	0.9891	1.3718
US23: 9.318-9.494	Hawthorn - Meeker	0.034	0.1683	0.1681	0.9592	1.3296
US23: 9.496-9.754	Del Plaza S/Penny - Hawthorn	0.0263	0.1301	0.1299	0.7414	1.0277
US23: 9.755-10.433	Hull - Del Plaza N	0.0385	0.1904	0.1901	1.0848	1.5038
US23: 9.754-10.432	Cottswold - Hull	0.036	0.1788	0.1779	1.0129	1.4056
US23: 10.434-10.834	Sandusky - Cottswold	0.0598	0.2965	0.2952	1.682	2.3335
US23: 10.433-10.833	US 42 - Sandusky	0.0311	0.1522	0.1513	0.8564	1.191
US23: 9.089	N of US 42	0.0382	0.1907	0.1908	1.0938	1.5135
US23: 9.318	SR 315	0.1408	0.8079	1.059	3.0848	5.0925
US23: 9.494	Stratford	0.1036	0.3777	0.4239	2.5426	3.4478
US23: 9.754	Meeker	0.1181	0.6675	0.8573	2.3983	4.0412
US23: 10.834-11.034	Hawthorn	0.2406	1.1325	1.6845	6.604	9.6616
US23: 10.833-11.033	Del Plaza S/Penny	0.2678	1.2609	1.8761	7.2269	10.6317



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.72-9.089	S of SR 315	0.0167	0.0812	0.0805	0.3662	0.5446
US23: 9.089-9.318	Meeker - Stratford	0.0349	0.173	0.1725	1.3178	1.6982
US23: 9.318-9.494	Hawthorn - Meeker	0.0346	0.1699	0.169	0.5623	0.9358
US23: 9.496-9.754	Del Plaza S/Penny - Hawthorn	0.0234	0.1139	0.113	0.8551	1.1054
US23: 9.755-10.433	Hull - Del Plaza N	0.0326	0.1577	0.1562	0.787	1.1335
US23: 9.754-10.432	Cottswold - Hull	0.0357	0.1773	0.1764	1.6613	2.0507
US23: 10.434-10.834	Sandusky - Cottswold	0.0485	0.2294	0.2244	1.6355	2.1378
US23: 10.433-10.833	US 42 - Sandusky	0.0273	0.1309	0.1292	0.5385	0.8259
US23: 9.089	N of US 42	0.0375	0.1863	0.1863	0.9455	1.3556
US23: 9.318	SR 315	0.1552	0.899	1.1934	5.6665	7.9141
US23: 9.494	Stratford	0.0706	0.2485	0.2742	1.4584	2.0517
US23: 9.754	Meeker	0.109	0.6182	0.7979	2.3888	3.9139
US23: 10.834-11.034	Hawthorn	0.1861	0.8696	1.2871	3.9614	6.3042
US23: 10.833-11.033	Del Plaza S/Penny	0.2329	1.1005	1.642	4.782	7.7574



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 8.72-9.089	S of SR 315	-0.0014	-0.0078	-0.0081	-0.1368	-0.1541
US23: 9.089-9.318	Meeker - Stratford	-0.0002	-0.0011	-0.001	0.3287	0.3264
US23: 9.318-9.494	Hawthorn - Meeker	0.0006	0.0016	0.0009	-0.3969	-0.3938
US23: 9.496-9.754	Del Plaza S/Penny - Hawthorn	-0.0029	-0.0162	-0.0169	0.1137	0.0777
US23: 9.755-10.433	Hull - Del Plaza N	-0.0059	-0.0327	-0.0339	-0.2978	-0.3703
US23: 9.754-10.432	Cottswold - Hull	-0.0003	-0.0015	-0.0015	0.6484	0.6451
US23: 10.434-10.834	Sandusky - Cottswold	-0.0113	-0.0671	-0.0708	-0.0465	-0.1957
US23: 10.433-10.833	US 42 - Sandusky	-0.0038	-0.0213	-0.0221	-0.3179	-0.3651
US23: 9.089	N of US 42	-0.0007	-0.0044	-0.0045	-0.1483	-0.1579
US23: 9.318	SR 315	0.0144	0.0911	0.1344	2.5817	2.8216
US23: 9.494	Stratford	-0.033	-0.1292	-0.1497	-1.0842	-1.3961
US23: 9.754	Meeker	-0.0091	-0.0493	-0.0594	-0.0095	-0.1273
US23: 10.834-11.034	Hawthorn	-0.0545	-0.2629	-0.3974	-2.6426	-3.3574
US23: 10.833-11.033	Del Plaza S/Penny	-0.0349	-0.1604	-0.2341	-2.4449	-2.8743



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23: 8.72-9.089	S of Meeker	0.0299	0.2052	0.1877	1.1578	1.5806	
US23: 9.089-9.318	Meeker - Hawthorn	0.0206	0.142	0.1309	0.8112	1.1047	
US23: 9.318-9.494	Hawthorn - Del Plaza S/Penny	0.0158	0.1092	0.1006	0.6235	0.8491	
US23: 9.496-9.754	Del Plaza S - Hull	0.0232	0.16	0.1475	0.9139	1.2446	
US23: 9.755-10.433	Hull - 42 NB	0.0595	0.2599	0.3491	2.0737	2.7422	
US23: 9.754-10.432	Hull - 42 SB	0.0681	0.3026	0.3914	2.2416	3.0037	
US23: 10.434-10.834	US 42 NB	0.0347	0.1484	0.2066	1.17	1.5597	
US23: 10.433-10.833	US 42 SB	0.0347	0.1484	0.2066	1.17	1.5597	
US23: 9.089	Meeker CR	0.087	0.332	0.3887	2.5316	3.3393	
US23: 9.318	Hawthorn	0.2662	1.2526	1.8631	7.3044	10.6863	
US23: 9.494	Del Plaza S/Penny	0.0913	0.2333	0.2162	0.7238	1.2646	
US23: 9.754	Hull	0.3216	0.8325	0.7958	2.6515	4.6014	
US23: 10.834-11.034	N of 42 NB	0.033	0.1571	0.1798	0.9007	1.2706	
US23: 10.833-11.033	N of 42 SB	0.0194	0.0895	0.1102	0.7297	0.9488	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.0861	0.0733		0.0641
Head On	0.5093	0.2169		0.3566
Rear End	15.3818	7.5167		10.8431
Backing	0.8736	0.4326		1.6059
Sideswipe - Meeting	0.1366	0.1030		0.0636
Sideswipe - Passing	5.4285	3.2802		2.6349
Angle	7.5189	2.5668		4.5261
Parked Vehicle	0.1947	0.1418		3.2054
Pedestrian	0.1386	0.1386		0.7339
Animal	2.1120	1.8180		0.9962
Train	0.0018	0.0013		0.4397
Pedalcycles	0.0379	0.0379		0.0464
Other Non-Vehicle	0.0002	0.0001		0.0001
Fixed Object	6.9971	5.8278		11.5686
Other Object	0.7884	0.7345		1.9776
Overturning	0.2801	0.2414		8.4076
Other Non-Collision	0.7070	0.6336		9.5651
Left Turn	2.3020	0.8454		1.7795
Right Turn	1.0824	0.3346		1.0672



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-33.702	\$14,725,171
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-2.400	\$2,603,765
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-4.309	\$4,336,416
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-40.412	\$21,665,352



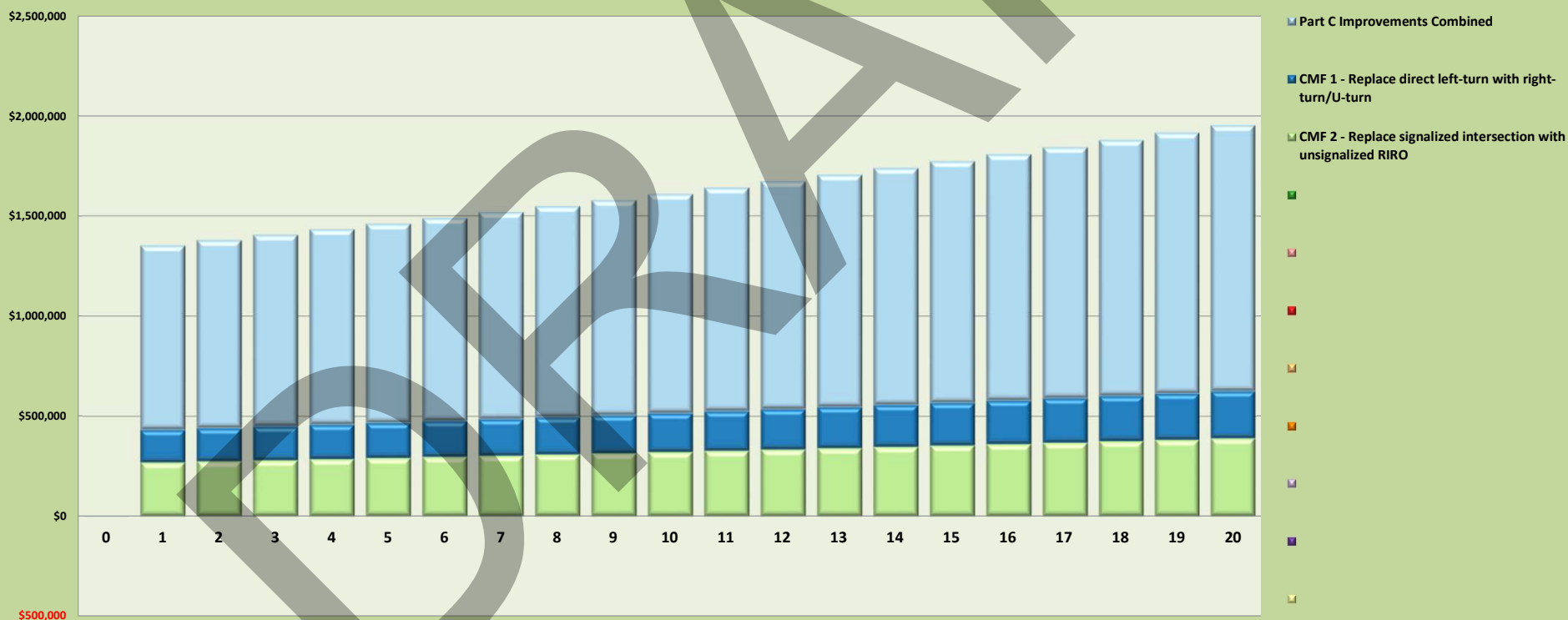
Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	Expected Annual Crash Adjustment	Comments:
<p>Net Present Value of Project \$6.00</p> <p>Net Present Value of Safety Benefits \$21,665,352.40</p> <p>Net Benefit \$21,665,346.40</p> <p>Benefit / Cost Ratio 3610892.07</p>	<p>Number of Fatal & Incapacitating Injury Crashes -1.079</p> <p>Number of Injury Crashes -15.351</p> <p>Number of Total Crashes -40.412</p>	

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



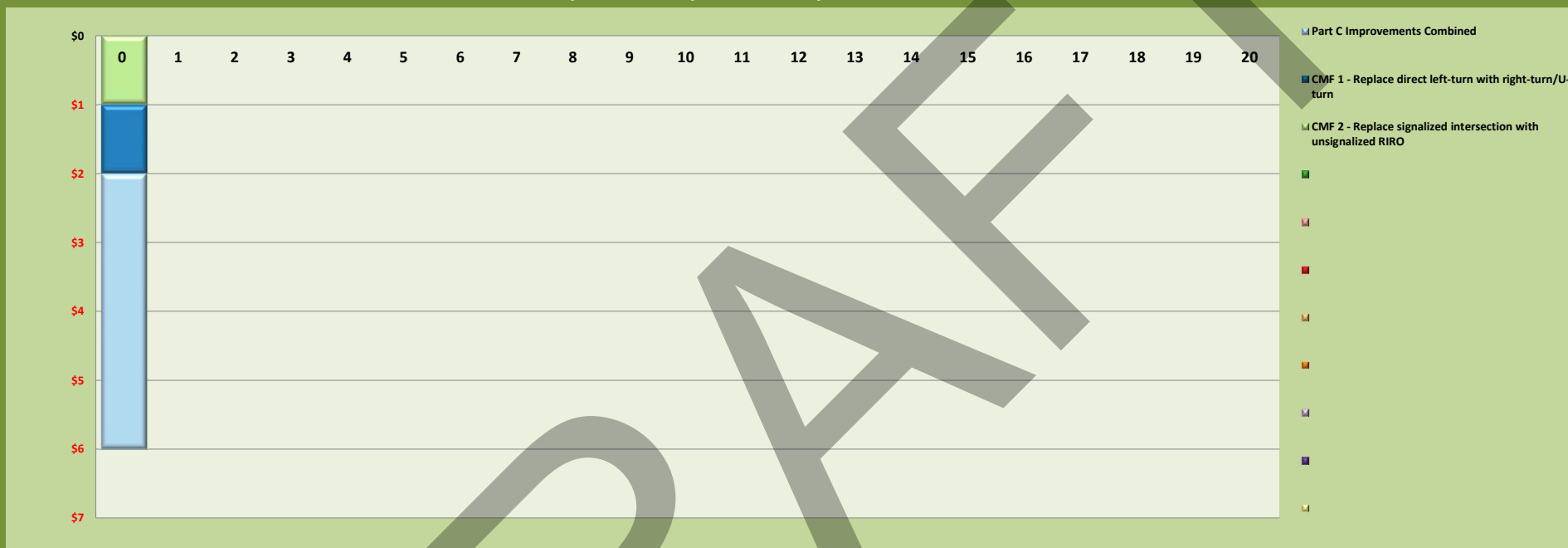


Safety Benefit - Cost Analysis

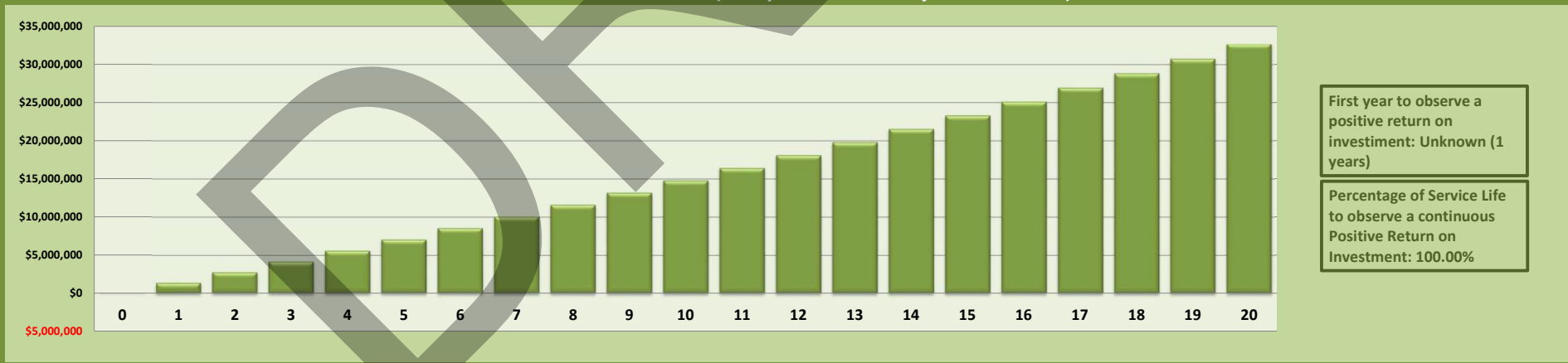
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



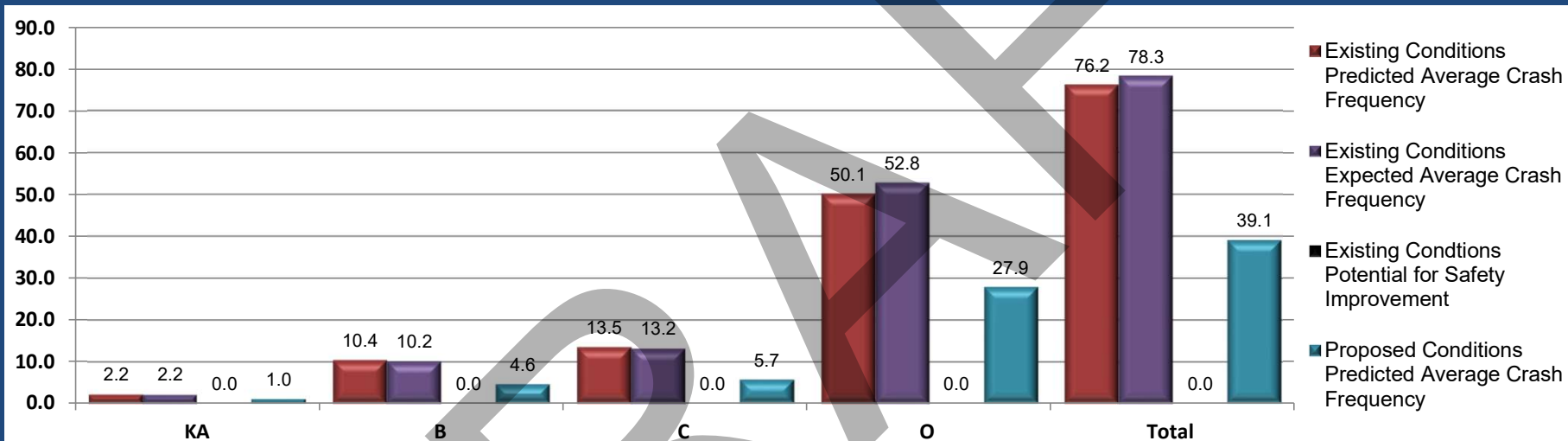


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.1840	10.4279	13.4912	50.0642	76.1673
N_{expected} - Existing Conditions	2.1601	10.1844	13.1736	52.8285	78.3466
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	1.0002	4.5508	5.6998	27.8671	39.1179



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.72-8.782	S of SR 315	0.0181	0.089	0.0886	0.503	0.6987
US23: 8.782-9.089	Meeker - Stratford	0.0351	0.1741	0.1735	0.9891	1.3718
US23: 9.089-9.318	Hawthorn - Meeker	0.034	0.1683	0.1681	0.9592	1.3296
US23: 9.318-9.494	Del Plaza S/Penny - Hawthorn	0.0263	0.1301	0.1299	0.7414	1.0277
US23: 9.496-9.754	Hull - Del Plaza N	0.0385	0.1904	0.1901	1.0848	1.5038
US23: 9.754-9.993	Cottswold - Hull	0.036	0.1788	0.1779	1.0129	1.4056
US23: 9.993-10.391	Sandusky - Cottswold	0.0598	0.2965	0.2952	1.682	2.3335
US23: 10.391-10.633	US 42 - Sandusky	0.0311	0.1522	0.1513	0.8564	1.191
US23: 10.633-10.87	N of US 42	0.0382	0.1907	0.1908	1.0938	1.5135
US23: 8.782	SR 315	0.1408	0.8079	1.059	3.0848	5.0925
US23: 9.089	Stratford	0.1036	0.3777	0.4239	2.5426	3.4478
US23: 9.318	Meeker	0.1181	0.6675	0.8573	2.3983	4.0412
US23: 9.494	Hawthorn	0.2406	1.1325	1.6845	6.604	9.6616
US23: 9.754	Del Plaza S/Penny	0.2678	1.2609	1.8761	7.2269	10.6317
US23: 9.993	Del Plaza N	0.1501	0.8573	1.1175	3.1815	5.3064
US23: 10.632	Hull	0.2587	0.6517	0.6052	1.763	3.2786



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.72-8.782	S of SR 315	0.0167	0.0812	0.0805	0.3662	0.5446
US23: 8.782-9.089	Meeker - Stratford	0.0349	0.173	0.1725	1.3178	1.6982
US23: 9.089-9.318	Hawthorn - Meeker	0.0346	0.1699	0.169	0.5623	0.9358
US23: 9.318-9.494	Del Plaza S/Penny - Hawthorn	0.0234	0.1139	0.113	0.8551	1.1054
US23: 9.496-9.754	Hull - Del Plaza N	0.0326	0.1577	0.1562	0.787	1.1335
US23: 9.754-9.993	Cottswold - Hull	0.0357	0.1773	0.1764	1.6613	2.0507
US23: 9.993-10.391	Sandusky - Cottswold	0.0485	0.2294	0.2244	1.6355	2.1378
US23: 10.391-10.633	US 42 - Sandusky	0.0273	0.1309	0.1292	0.5385	0.8259
US23: 10.633-10.87	N of US 42	0.0375	0.1863	0.1863	0.9455	1.3556
US23: 8.782	SR 315	0.1552	0.899	1.1934	5.6665	7.9141
US23: 9.089	Stratford	0.0706	0.2485	0.2742	1.4584	2.0517
US23: 9.318	Meeker	0.109	0.6182	0.7979	2.3888	3.9139
US23: 9.494	Hawthorn	0.1861	0.8696	1.2871	3.9614	6.3042
US23: 9.754	Del Plaza S/Penny	0.2329	1.1005	1.642	4.782	7.7574
US23: 9.993	Del Plaza N	0.1379	0.7896	1.0324	3.7015	5.6614
US23: 10.632	Hull	0.3386	0.875	0.8114	4.2265	6.2515



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 8.72-8.782	S of SR 315	-0.0014	-0.0078	-0.0081	-0.1368	-0.1541
US23: 8.782-9.089	Meeker - Stratford	-0.0002	-0.0011	-0.001	0.3287	0.3264
US23: 9.089-9.318	Hawthorn - Meeker	0.0006	0.0016	0.0009	-0.3969	-0.3938
US23: 9.318-9.494	Del Plaza S/Penny - Hawthorn	-0.0029	-0.0162	-0.0169	0.1137	0.0777
US23: 9.496-9.754	Hull - Del Plaza N	-0.0059	-0.0327	-0.0339	-0.2978	-0.3703
US23: 9.754-9.993	Cottswold - Hull	-0.0003	-0.0015	-0.0015	0.6484	0.6451
US23: 9.993-10.391	Sandusky - Cottswold	-0.0113	-0.0671	-0.0708	-0.0465	-0.1957
US23: 10.391-10.633	US 42 - Sandusky	-0.0038	-0.0213	-0.0221	-0.3179	-0.3651
US23: 10.633-10.87	N of US 42	-0.0007	-0.0044	-0.0045	-0.1483	-0.1579
US23: 8.782	SR 315	0.0144	0.0911	0.1344	2.5817	2.8216
US23: 9.089	Stratford	-0.033	-0.1292	-0.1497	-1.0842	-1.3961
US23: 9.318	Meeker	-0.0091	-0.0493	-0.0594	-0.0095	-0.1273
US23: 9.494	Hawthorn	-0.0545	-0.2629	-0.3974	-2.6426	-3.3574
US23: 9.754	Del Plaza S/Penny	-0.0349	-0.1604	-0.2341	-2.4449	-2.8743
US23: 9.993	Del Plaza N	-0.0122	-0.0677	-0.0851	0.52	0.355
US23: 10.632	Hull	0.0799	0.2233	0.2062	2.4635	2.9729



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.72-8.782	S of SR 315	0.0051	0.0348	0.0319	0.1965	0.2683
US23: 8.782-9.089	Meeker - Stratford	0.0279	0.1926	0.178	1.0997	1.4982
US23: 9.089-9.318	Hawthorn - Meeker	0.0208	0.1435	0.1323	0.8194	1.116
US23: 9.318-9.494	Del Plaza S/Penny - Hawthorn	0.016	0.1102	0.1017	0.6297	0.8576
US23: 9.496-9.754	Hull - Del Plaza N	0.0234	0.1617	0.1491	0.9231	1.2573
US23: 9.754-9.993	Cottswold - Hull	0.0217	0.1497	0.138	0.8552	1.1646
US23: 9.993-10.391	Sandusky - Cottswold	0.0363	0.2502	0.2318	1.4278	1.9461
US23: 10.391-10.633	US 42 - Sandusky	0.0188	0.1282	0.1168	0.7188	0.9826
US23: 10.633-10.87	N of US 42	0.0235	0.1635	0.1519	0.9446	1.2835
US23: 8.782	SR 315 CR	0.0449	0.1658	0.2031	1.4684	1.8822
US23: 9.089	Meeker	0.0253	0.0954	0.1188	0.7166	0.9561
US23: 9.318	Hawthorn	0.2227	1.0943	1.7083	7.4897	10.515
US23: 9.494	Del Plaza S/Penny	0.0913	0.2333	0.2162	0.7238	1.2646
US23: 9.754	Hull	0.1704	0.4412	0.4218	1.4053	2.4387
US23: 9.993	Cottswold	0.2062	1.0181	1.595	6.8758	9.6951
US23: 10.632	US 42 CR	0.0459	0.1683	0.2051	1.5727	1.992



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.0879	0.0595		0.0558
Head On	1.0474	0.3667		0.4832
Rear End	28.8870	9.8933		18.8408
Backing	1.3478	0.3534		0.7646
Sideswipe - Meeting	0.1671	0.0795		0.1233
Sideswipe - Passing	6.8166	2.2109		4.4881
Angle	11.9292	3.9975		5.3056
Parked Vehicle	0.4382	0.3007		0.2635
Pedestrian	0.2536	0.2536		0.1370
Animal	2.0026	1.4891		2.0026
Train	0.0053	0.0035		0.0027
Pedalcycles	0.0800	0.0800		0.0741
Other Non-Vehicle	0.0008	0.0005		0.0002
Fixed Object	5.9874	4.0877		3.0069
Other Object	0.2485	0.1684		0.1566
Overturning	0.3126	0.2326		0.1801
Other Non-Collision	0.4700	0.3160		0.2607
Left Turn	4.9091	1.6309		2.5583
Right Turn	2.3644	0.6325		2.4165



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-10.813	\$6,137,840
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-5.953	\$4,530,698
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-20.283	\$11,301,609
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-37.049	\$21,970,147



Safety Benefit - Cost Analysis

General Information

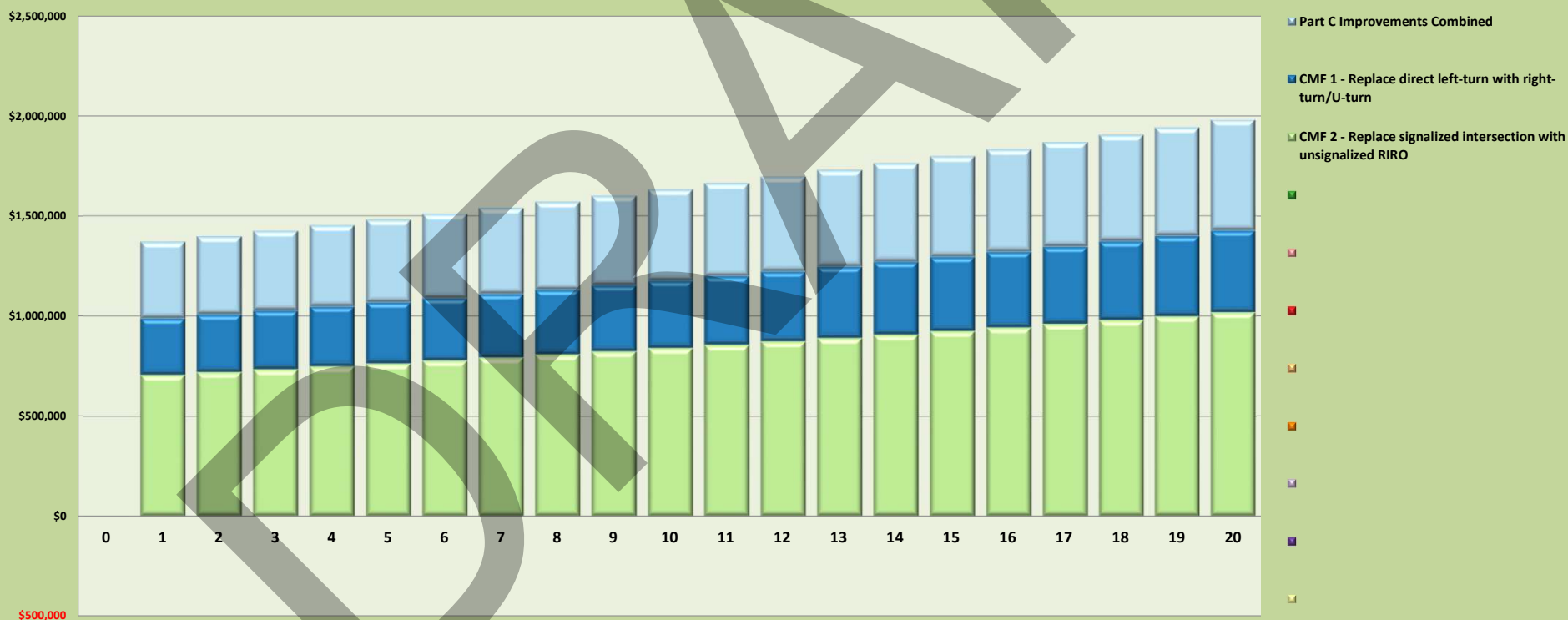
Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	
Net Present Value of Project	\$6.00
Net Present Value of Safety Benefits	\$21,970,146.86
Net Benefit	\$21,970,140.86
Benefit / Cost Ratio	3661691.14

Expected Annual Crash Adjustment	
Number of Fatal & Incapacitating Injury Crashes	-1.184
Number of Injury Crashes	-14.852
Number of Total Crashes	-37.049

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



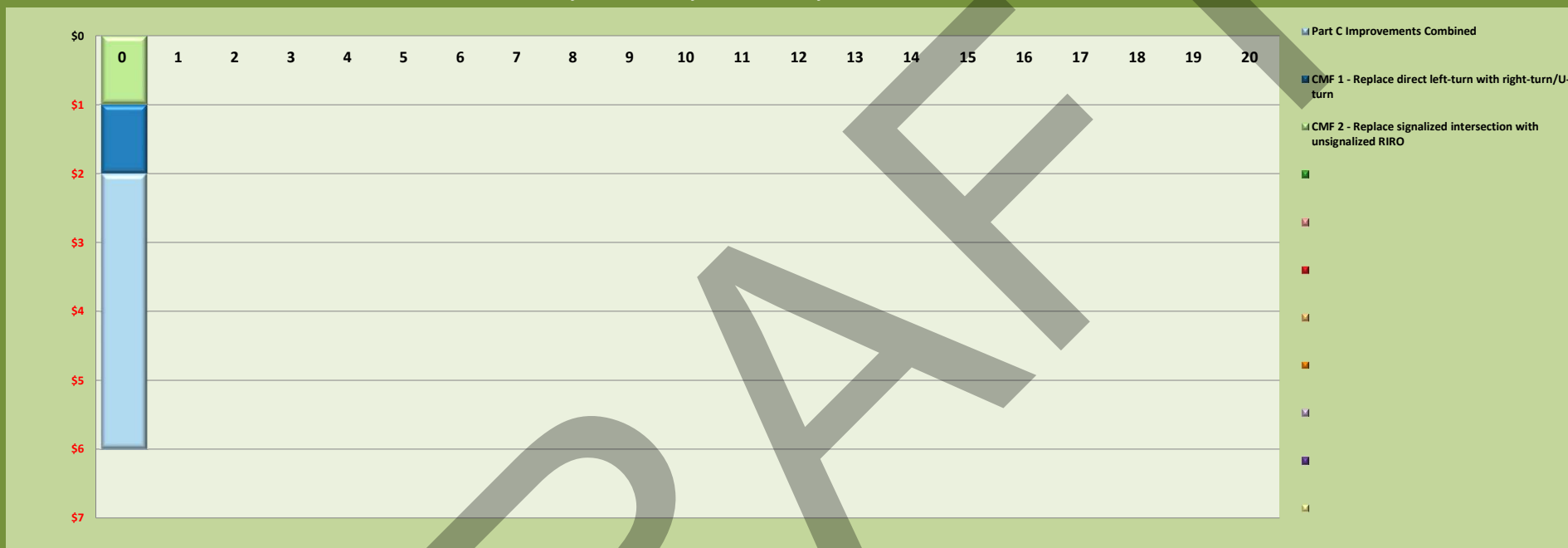


Safety Benefit - Cost Analysis

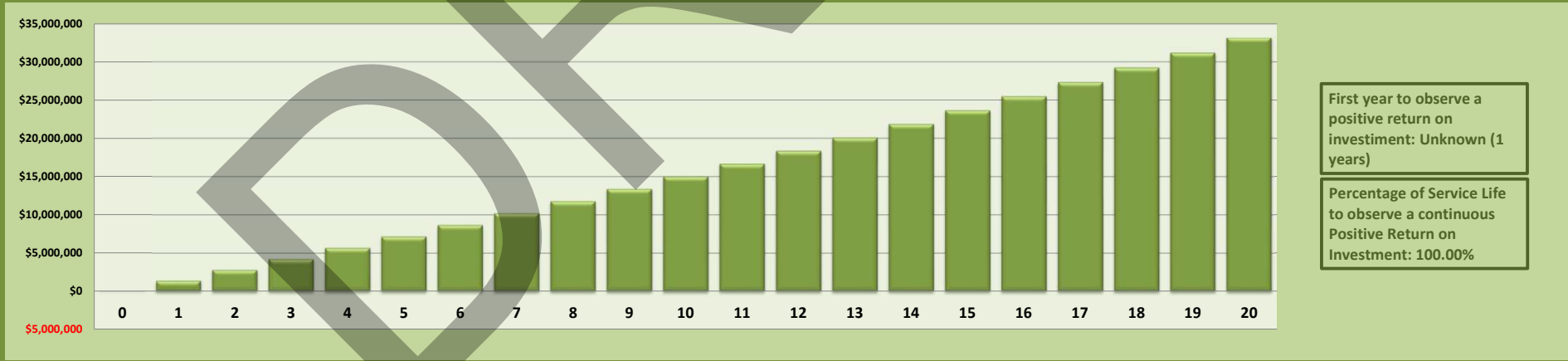
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



First year to observe a positive return on investment: Unknown (1 years)

Percentage of Service Life to observe a continuous Positive Return on Investment: 100.00%

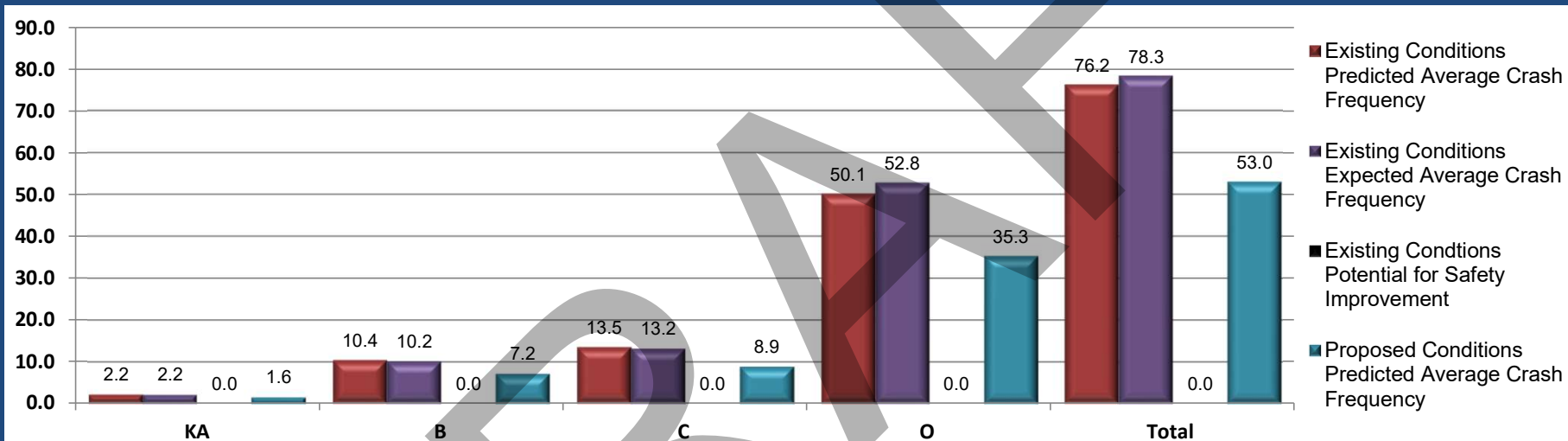


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.1840	10.4279	13.4912	50.0642	76.1673
N_{expected} - Existing Conditions	2.1601	10.1844	13.1736	52.8285	78.3466
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	1.5744	7.2138	8.8633	35.3327	52.9842



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.72-8.854	S of SR 315	0.0181	0.089	0.0886	0.503	0.6987
US23: 8.854-9.089	Meeker - Stratford	0.0351	0.1741	0.1735	0.9891	1.3718
US23: 9.089-9.318	Hawthorn - Meeker	0.034	0.1683	0.1681	0.9592	1.3296
US23: 9.318-9.495	Del Plaza S/Penny - Hawthorn	0.0263	0.1301	0.1299	0.7414	1.0277
US23: 9.495-9.754	Hull - Del Plaza N	0.0385	0.1904	0.1901	1.0848	1.5038
US23: 9.754-9.993	Cottswold - Hull	0.036	0.1788	0.1779	1.0129	1.4056
US23: 9.993-10.391	Sandusky - Cottswold	0.0598	0.2965	0.2952	1.682	2.3335
US23: 10.391-10.633	US 42 - Sandusky	0.0311	0.1522	0.1513	0.8564	1.191
US23: 10.633-10.87	N of US 42	0.0382	0.1907	0.1908	1.0938	1.5135
US23: 8.782	SR 315	0.1408	0.8079	1.059	3.0848	5.0925
US23: 8.854	Stratford	0.1036	0.3777	0.4239	2.5426	3.4478
US23: 9.089	Meeker	0.1181	0.6675	0.8573	2.3983	4.0412
US23: 9.318	Hawthorn	0.2406	1.1325	1.6845	6.604	9.6616
US23: 9.495	Del Plaza S/Penny	0.2678	1.2609	1.8761	7.2269	10.6317
US23: 9.594	Del Plaza N	0.1501	0.8573	1.1175	3.1815	5.3064
US23: 9.754	Hull	0.2587	0.6517	0.6052	1.763	3.2786
US23: 9.993	Cottswold	0.2676	1.2659	1.8899	7.2905	10.7139
US23: 10.391	Sandusky	0.1557	0.8929	1.1699	3.4364	5.6549
US23: 10.633	US 42	0.1639	0.9435	1.2425	3.6136	5.9635



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.72-8.854	S of SR 315	0.0167	0.0812	0.0805	0.3662	0.5446
US23: 8.854-9.089	Meeker - Stratford	0.0349	0.173	0.1725	1.3178	1.6982
US23: 9.089-9.318	Hawthorn - Meeker	0.0346	0.1699	0.169	0.5623	0.9358
US23: 9.318-9.495	Del Plaza S/Penny - Hawthorn	0.0234	0.1139	0.113	0.8551	1.1054
US23: 9.495-9.754	Hull - Del Plaza N	0.0326	0.1577	0.1562	0.787	1.1335
US23: 9.754-9.993	Cottswold - Hull	0.0357	0.1773	0.1764	1.6613	2.0507
US23: 9.993-10.391	Sandusky - Cottswold	0.0485	0.2294	0.2244	1.6355	2.1378
US23: 10.391-10.633	US 42 - Sandusky	0.0273	0.1309	0.1292	0.5385	0.8259
US23: 10.633-10.87	N of US 42	0.0375	0.1863	0.1863	0.9455	1.3556
US23: 8.782	SR 315	0.1552	0.899	1.1934	5.6665	7.9141
US23: 8.854	Stratford	0.0706	0.2485	0.2742	1.4584	2.0517
US23: 9.089	Meeker	0.109	0.6182	0.7979	2.3888	3.9139
US23: 9.318	Hawthorn	0.1861	0.8696	1.2871	3.9614	6.3042
US23: 9.495	Del Plaza S/Penny	0.2329	1.1005	1.642	4.782	7.7574
US23: 9.594	Del Plaza N	0.1379	0.7896	1.0324	3.7015	5.6614
US23: 9.754	Hull	0.3386	0.875	0.8114	4.2265	6.2515
US23: 9.993	Cottswold	0.3238	1.5469	2.3255	7.4713	11.6675
US23: 10.391	Sandusky	0.1624	0.9388	1.2426	4.8471	7.1909
US23: 10.633	US 42	0.1524	0.8787	1.1596	5.6558	7.8465



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 8.72-8.854	S of SR 315	-0.0014	-0.0078	-0.0081	-0.1368	-0.1541
US23: 8.854-9.089	Meeker - Stratford	-0.0002	-0.0011	-0.001	0.3287	0.3264
US23: 9.089-9.318	Hawthorn - Meeker	0.0006	0.0016	0.0009	-0.3969	-0.3938
US23: 9.318-9.495	Del Plaza S/Penny - Hawthorn	-0.0029	-0.0162	-0.0169	0.1137	0.0777
US23: 9.495-9.754	Hull - Del Plaza N	-0.0059	-0.0327	-0.0339	-0.2978	-0.3703
US23: 9.754-9.993	Cottswold - Hull	-0.0003	-0.0015	-0.0015	0.6484	0.6451
US23: 9.993-10.391	Sandusky - Cottswold	-0.0113	-0.0671	-0.0708	-0.0465	-0.1957
US23: 10.391-10.633	US 42 - Sandusky	-0.0038	-0.0213	-0.0221	-0.3179	-0.3651
US23: 10.633-10.87	N of US 42	-0.0007	-0.0044	-0.0045	-0.1483	-0.1579
US23: 8.782	SR 315	0.0144	0.0911	0.1344	2.5817	2.8216
US23: 8.854	Stratford	-0.033	-0.1292	-0.1497	-1.0842	-1.3961
US23: 9.089	Meeker	-0.0091	-0.0493	-0.0594	-0.0095	-0.1273
US23: 9.318	Hawthorn	-0.0545	-0.2629	-0.3974	-2.6426	-3.3574
US23: 9.495	Del Plaza S/Penny	-0.0349	-0.1604	-0.2341	-2.4449	-2.8743
US23: 9.594	Del Plaza N	-0.0122	-0.0677	-0.0851	0.52	0.355
US23: 9.754	Hull	0.0799	0.2233	0.2062	2.4635	2.9729
US23: 9.993	Cottswold	0.0562	0.281	0.4356	0.1808	0.9536
US23: 10.391	Sandusky	0.0067	0.0459	0.0727	1.4107	1.536
US23: 10.633	US 42	-0.0115	-0.0648	-0.0829	2.0422	1.883



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.72-8.854	S of SR 315	0.011	0.0753	0.0688	0.4247	0.5798
US23: 8.854-9.089	Meeker - Stratford	0.0214	0.1475	0.1364	0.8421	1.1474
US23: 9.089-9.318	Hawthorn - Meeker	0.0208	0.1435	0.1323	0.8194	1.116
US23: 9.318-9.495	Del Plaza S/Penny - Hawthorn	0.0161	0.1109	0.1023	0.6334	0.8627
US23: 9.495-9.754	Hull - Del Plaza N	0.0235	0.1622	0.1497	0.9268	1.2622
US23: 9.754-9.993	Cottswold - Hull	0.0219	0.1504	0.1396	0.8582	1.1701
US23: 9.993-10.391	Sandusky - Cottswold	0.0363	0.2502	0.2318	1.4278	1.9461
US23: 10.391-10.632	US 42 - Sandusky	0.0187	0.1277	0.1163	0.7158	0.9785
US23: 10.634-10.87	N of US 42	0.0234	0.1628	0.1513	0.9407	1.2782
US23: 8.782	SR 315	0.1408	0.8079	1.059	3.0848	5.0925
US23: 8.854	Stratford	0.1057	0.4017	0.4689	3.1592	4.1355
US23: 9.089	Meeker	0.1181	0.6675	0.8573	2.3983	4.0412
US23: 9.318	Hawthorn	0.1807	0.8876	1.3856	6.0749	8.5288
US23: 9.494	Del Plaza S	0.0913	0.2333	0.2162	0.7238	1.2646
US23: 9.594	Del Plaza N	0.1388	0.7928	1.0334	2.942	4.907
US23: 9.754	Hull	0.1704	0.4412	0.4218	1.4053	2.4387
US23: 9.993	Cottswold	0.2473	1.1696	1.7461	6.7358	9.8988
US23: 10.632	US 42 CRs	0.1882	0.4817	0.4465	1.2197	2.3361



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.0969	0.1132		0.0727
Head On	1.0572	1.0848		0.6863
Rear End	33.2962	34.2271		24.2521
Backing	1.3540	1.4762		1.0509
Sideswipe - Meeting	0.3334	0.3619		0.1375
Sideswipe - Passing	7.9010	8.5932		6.0093
Angle	10.6897	11.4387		7.9659
Parked Vehicle	0.5420	0.6145		0.3451
Pedestrian	0.1709	0.1709		0.1757
Animal	1.2577	1.4463		1.9998
Train	0.0576	0.0557		0.0335
Pedalcycles	0.0742	0.0742		0.0902
Other Non-Vehicle	0.0001	0.0001		0.0001
Fixed Object	5.4519	5.8439		4.7044
Other Object	0.2767	0.3113		0.2440
Overturning	0.1904	0.1993		0.2052
Other Non-Collision	0.5749	0.6278		0.4663
Left Turn	6.5055	6.4935		4.1638
Right Turn	2.5094	2.5187		2.3811



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-6.822	(\$4,507,299)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-4.008	\$3,226,709
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-12.354	\$13,277,376
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-23.183	\$11,996,786



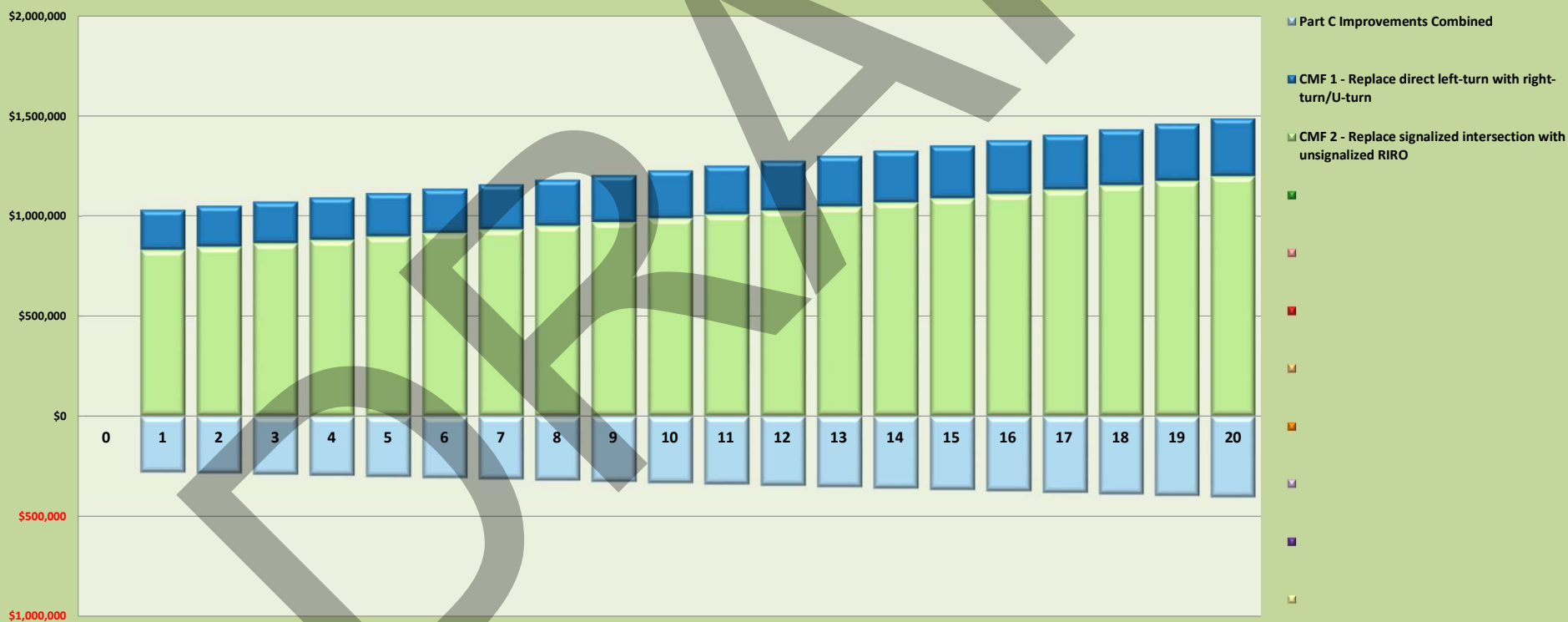
Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	Expected Annual Crash Adjustment	Comments:
<p>Net Present Value of Project \$6.00</p> <p>Net Present Value of Safety Benefits \$11,996,786.11</p> <p>Net Benefit \$11,996,780.11</p> <p>Benefit / Cost Ratio 1999464.35</p>	<p>Number of Fatal & Incapacitating Injury Crashes -0.610</p> <p>Number of Injury Crashes -8.452</p> <p>Number of Total Crashes -23.183</p>	

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



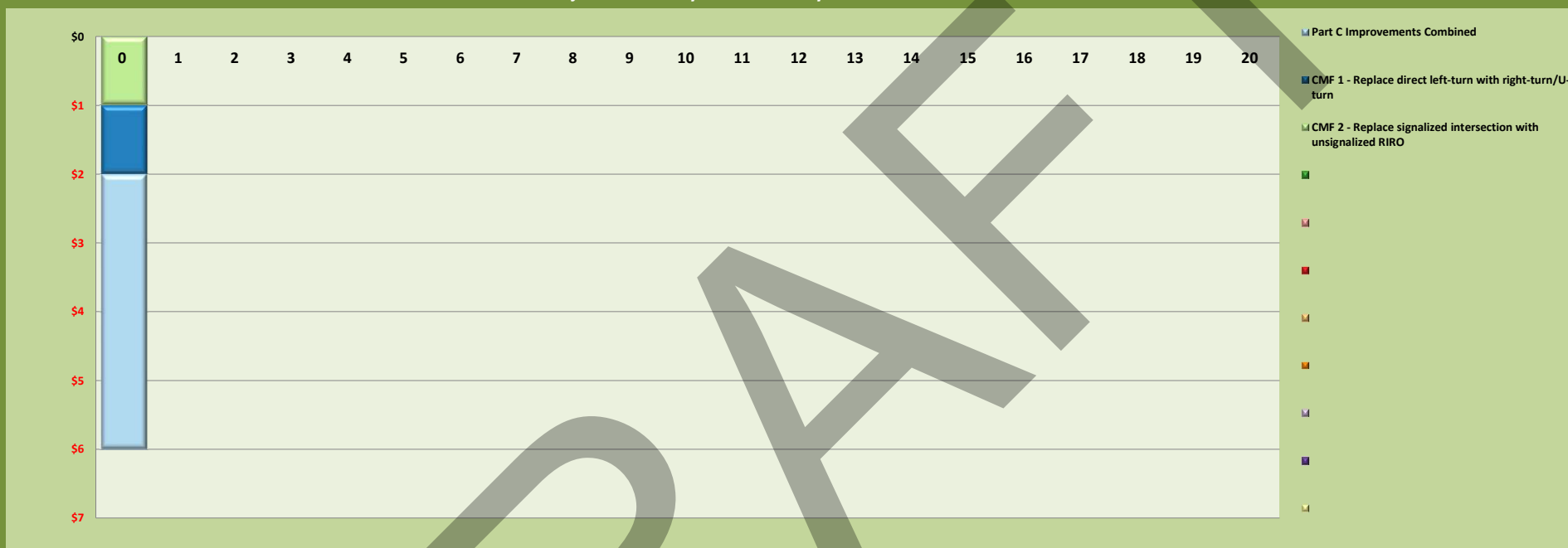


Safety Benefit - Cost Analysis

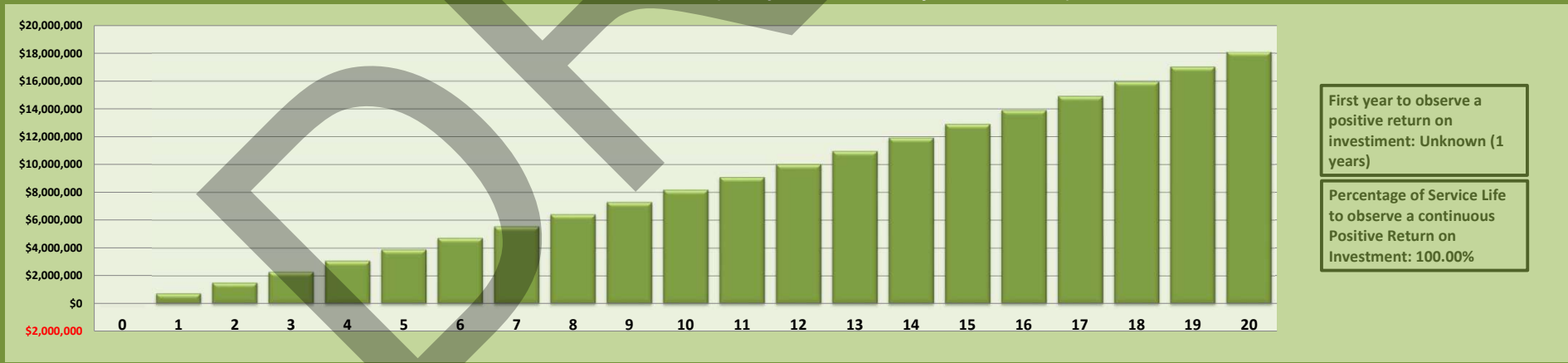
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



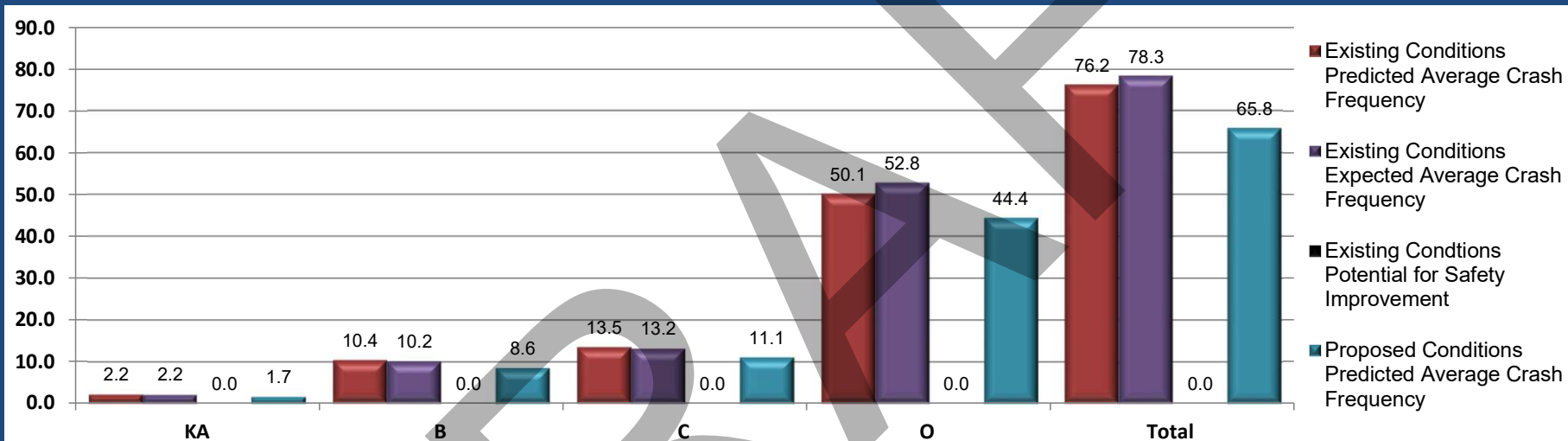


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	2.1840	10.4279	13.4912	50.0642	76.1673
N_{expected} - Existing Conditions	2.1601	10.1844	13.1736	52.8285	78.3466
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	1.7040	8.5709	11.1178	44.3602	65.7529



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 8.72-8.854	S of SR 315	0.0181	0.089	0.0886	0.503	0.6987
US23: 8.854-9.089	Meeker - Stratford	0.0351	0.1741	0.1735	0.9891	1.3718
US23: 9.089-9.318	Hawthorn - Meeker	0.034	0.1683	0.1681	0.9592	1.3296
US23: 9.318-9.495	Del Plaza S/Penny - Hawthorn	0.0263	0.1301	0.1299	0.7414	1.0277
US23: 9.495-9.754	Hull - Del Plaza N	0.0385	0.1904	0.1901	1.0848	1.5038
US23: 9.754-9.993	Cottswold - Hull	0.036	0.1788	0.1779	1.0129	1.4056
US23: 9.993-10.391	Sandusky - Cottswold	0.0598	0.2965	0.2952	1.682	2.3335
US23: 10.391-10.633	US 42 - Sandusky	0.0311	0.1522	0.1513	0.8564	1.191
US23: 10.633-10.87	N of US 42	0.0382	0.1907	0.1908	1.0938	1.5135
US23: 8.782	SR 315	0.1408	0.8079	1.059	3.0848	5.0925
US23: 8.854	Stratford	0.1036	0.3777	0.4239	2.5426	3.4478
US23: 9.089	Meeker	0.1181	0.6675	0.8573	2.3983	4.0412
US23: 9.318	Hawthorn	0.2406	1.1325	1.6845	6.604	9.6616
US23: 9.495	Del Plaza S/Penny	0.2678	1.2609	1.8761	7.2269	10.6317
US23: 9.594	Del Plaza N	0.1501	0.8573	1.1175	3.1815	5.3064
US23: 9.754	Hull	0.2587	0.6517	0.6052	1.763	3.2786
US23: 9.993	Cottswold	0.2676	1.2659	1.8899	7.2905	10.7139
US23: 10.391	Sandusky	0.1557	0.8929	1.1699	3.4364	5.6549
US23: 10.633	US 42	0.1639	0.9435	1.2425	3.6136	5.9635



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.72-8.854	S of SR 315	0.0167	0.0812	0.0805	0.3662	0.5446
US23: 8.854-9.089	Meeker - Stratford	0.0349	0.173	0.1725	1.3178	1.6982
US23: 9.089-9.318	Hawthorn - Meeker	0.0346	0.1699	0.169	0.5623	0.9358
US23: 9.318-9.495	Del Plaza S/Penny - Hawthorn	0.0234	0.1139	0.113	0.8551	1.1054
US23: 9.495-9.754	Hull - Del Plaza N	0.0326	0.1577	0.1562	0.787	1.1335
US23: 9.754-9.993	Cottswold - Hull	0.0357	0.1773	0.1764	1.6613	2.0507
US23: 9.993-10.391	Sandusky - Cottswold	0.0485	0.2294	0.2244	1.6355	2.1378
US23: 10.391-10.633	US 42 - Sandusky	0.0273	0.1309	0.1292	0.5385	0.8259
US23: 10.633-10.87	N of US 42	0.0375	0.1863	0.1863	0.9455	1.3556
US23: 8.782	SR 315	0.1552	0.899	1.1934	5.6665	7.9141
US23: 8.854	Stratford	0.0706	0.2485	0.2742	1.4584	2.0517
US23: 9.089	Meeker	0.109	0.6182	0.7979	2.3888	3.9139
US23: 9.318	Hawthorn	0.1861	0.8696	1.2871	3.9614	6.3042
US23: 9.495	Del Plaza S/Penny	0.2329	1.1005	1.642	4.782	7.7574
US23: 9.594	Del Plaza N	0.1379	0.7896	1.0324	3.7015	5.6614
US23: 9.754	Hull	0.3386	0.875	0.8114	4.2265	6.2515
US23: 9.993	Cottswold	0.3238	1.5469	2.3255	7.4713	11.6675
US23: 10.391	Sandusky	0.1624	0.9388	1.2426	4.8471	7.1909
US23: 10.633	US 42	0.1524	0.8787	1.1596	5.6558	7.8465



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23: 8.72-8.854	S of SR 315	-0.0014	-0.0078	-0.0081	-0.1368	-0.1541	
US23: 8.854-9.089	Meeker - Stratford	-0.0002	-0.0011	-0.001	0.3287	0.3264	
US23: 9.089-9.318	Hawthorn - Meeker	0.0006	0.0016	0.0009	-0.3969	-0.3938	
US23: 9.318-9.495	Del Plaza S/Penny - Hawthorn	-0.0029	-0.0162	-0.0169	0.1137	0.0777	
US23: 9.495-9.754	Hull - Del Plaza N	-0.0059	-0.0327	-0.0339	-0.2978	-0.3703	
US23: 9.754-9.993	Cottswold - Hull	-0.0003	-0.0015	-0.0015	0.6484	0.6451	
US23: 9.993-10.391	Sandusky - Cottswold	-0.0113	-0.0671	-0.0708	-0.0465	-0.1957	
US23: 10.391-10.633	US 42 - Sandusky	-0.0038	-0.0213	-0.0221	-0.3179	-0.3651	
US23: 10.633-10.87	N of US 42	-0.0007	-0.0044	-0.0045	-0.1483	-0.1579	
US23: 8.782	SR 315	0.0144	0.0911	0.1344	2.5817	2.8216	
US23: 8.854	Stratford	-0.033	-0.1292	-0.1497	-1.0842	-1.3961	
US23: 9.089	Meeker	-0.0091	-0.0493	-0.0594	-0.0095	-0.1273	
US23: 9.318	Hawthorn	-0.0545	-0.2629	-0.3974	-2.6426	-3.3574	
US23: 9.495	Del Plaza S/Penny	-0.0349	-0.1604	-0.2341	-2.4449	-2.8743	
US23: 9.594	Del Plaza N	-0.0122	-0.0677	-0.0851	0.52	0.355	
US23: 9.754	Hull	0.0799	0.2233	0.2062	2.4635	2.9729	
US23: 9.993	Cottswold	0.0562	0.281	0.4356	0.1808	0.9536	
US23: 10.391	Sandusky	0.0067	0.0459	0.0727	1.4107	1.536	
US23: 10.633	US 42	-0.0115	-0.0648	-0.0829	2.0422	1.883	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 8.72-8.854	S of SR 315	0.011	0.0753	0.0688	0.4247	0.5798
US23: 8.854-9.089	Meeker - Stratford	0.0214	0.1475	0.1364	0.8421	1.1474
US23: 9.089-9.318	Hawthorn - Meeker	0.0208	0.1435	0.1323	0.8194	1.116
US23: 9.318-9.495	Del Plaza S/Penny - Hawthorn	0.0161	0.1109	0.1023	0.6334	0.8627
US23: 9.495-9.754	Hull - Del Plaza N	0.0235	0.1622	0.1497	0.9268	1.2622
US23: 9.754-9.993	Cottswold - Hull	0.0219	0.1504	0.1396	0.8582	1.1701
US23: 9.993-10.391	Sandusky - Cottswold	0.0363	0.2502	0.2318	1.4278	1.9461
US23: 10.391-10.633	US 42 - Sandusky	0.0188	0.1282	0.1168	0.7188	0.9826
US23: 10.633-10.87	N of US 42	0.0235	0.1635	0.1519	0.9446	1.2835
US23: 8.782	SR 315	0.133	0.7694	0.9954	2.9136	4.8114
US23: 8.854	Stratford	0.1057	0.4017	0.4689	3.1592	4.1355
US23: 9.089	Meeker	0.0253	0.0954	0.1188	0.7166	0.9561
US23: 9.318	Hawthorn	0.2406	1.1325	1.6845	6.604	9.6616
US23: 9.495	Del Plaza S/Penny	0.1818	0.8935	1.3954	6.0127	8.4834
US23: 9.594	Del Plaza N	0.1501	0.8573	1.1175	3.1815	5.3064
US23: 9.754	Hull	0.1704	0.4412	0.4218	1.4053	2.4387
US23: 9.993	Cottswold	0.2473	1.1696	1.7461	6.7358	9.8988
US23: 10.391	Sandusky	0.1018	0.5805	0.7723	2.6239	4.0785
US23: 10.633	US 42	0.1547	0.8981	1.1675	3.4118	5.6321



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.0969	0.1132		0.0905
Head On	1.0572	1.0848		0.9168
Rear End	33.2962	34.2271		30.9074
Backing	1.3540	1.4762		1.3455
Sideswipe - Meeting	0.3334	0.3619		0.1490
Sideswipe - Passing	7.9010	8.5932		7.4322
Angle	10.6897	11.4387		9.0029
Parked Vehicle	0.5420	0.6145		0.4333
Pedestrian	0.1709	0.1709		0.2054
Animal	1.2577	1.4463		2.0016
Train	0.0576	0.0557		0.0446
Pedalcycles	0.0742	0.0742		0.1033
Other Non-Vehicle	0.0001	0.0001		0.0002
Fixed Object	5.4519	5.8439		5.5842
Other Object	0.2767	0.3113		0.2907
Overtuning	0.1904	0.1993		0.2298
Other Non-Collision	0.5749	0.6278		0.5753
Left Turn	6.5055	6.4935		5.8120
Right Turn	2.5094	2.5187		2.6297



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-1.263	\$1,653,893
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-5.100	\$4,064,152
CMF 2 - Signalized in one direction (no signal for through traffic in one direction)	20	\$1.00			\$1.00	\$1.00	-0.852	\$459,979
CMF 3 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-3.199	\$1,534,801
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$7.00	\$0.00	\$0.00	\$7.00	\$7.00	-10.414	\$7,712,825



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator

Net Present Value of Project **\$7.00**

Net Present Value of Safety Benefits **\$7,712,824.91**

Net Benefit **\$7,712,817.91**

Benefit / Cost Ratio **1101832.13**

Expected Annual Crash Adjustment

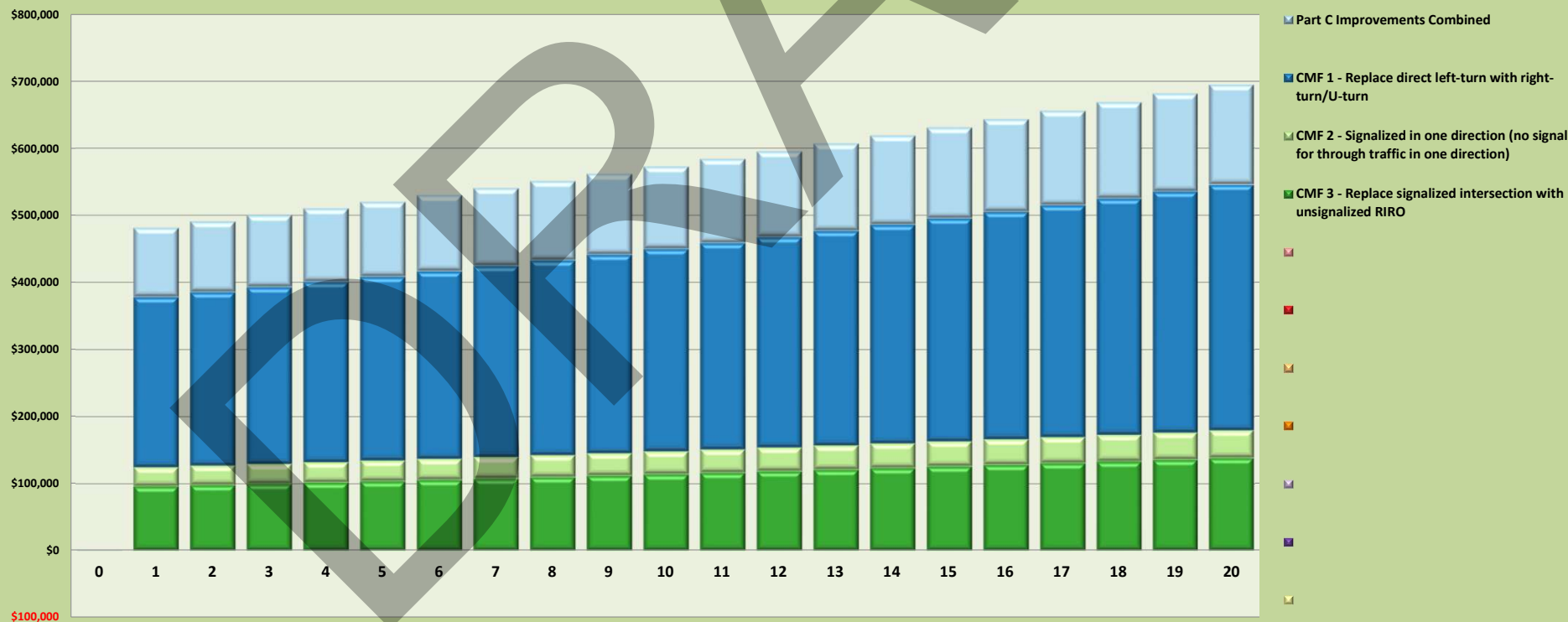
Number of Fatal & Incapacitating Injury Crashes **-0.480**

Number of Injury Crashes **-4.710**

Number of Total Crashes **-10.414**

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year





Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

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Safety Benefit - Cost Analysis

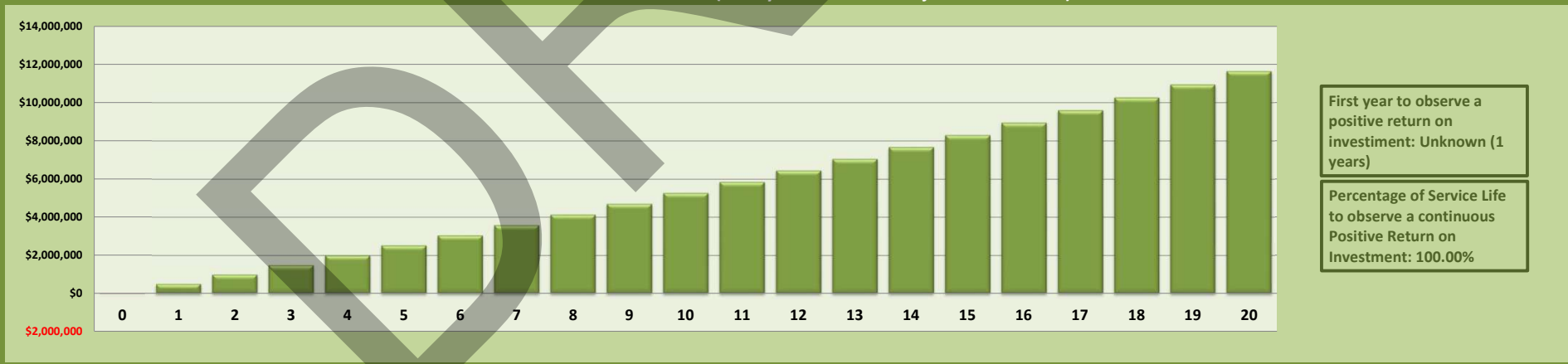
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 5	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



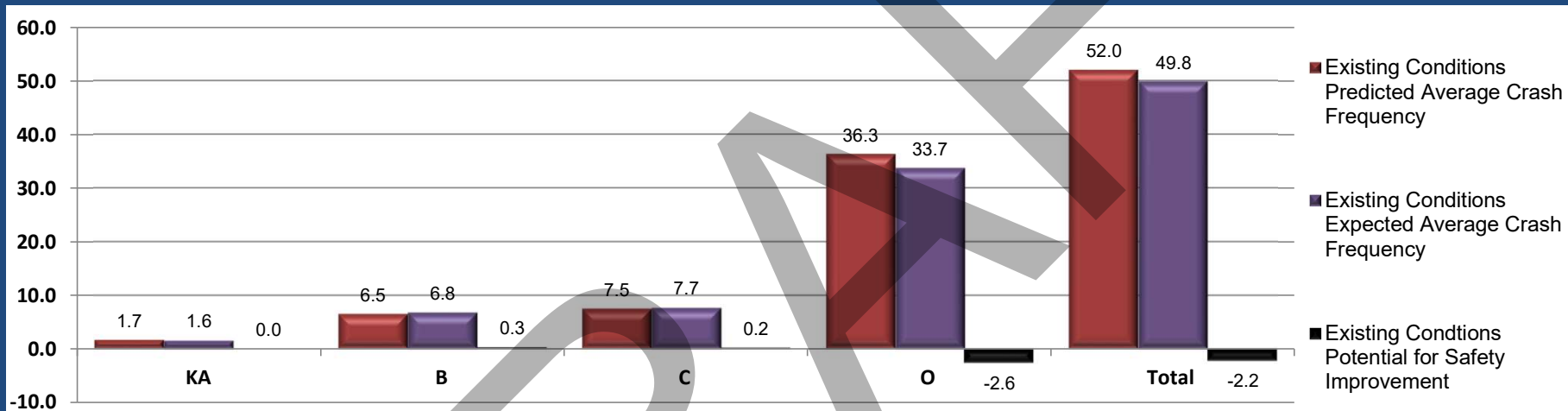


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}} - \text{Existing Conditions}$	1.6633	6.5414	7.5447	36.2841	52.0335
$N_{\text{expected}} - \text{Existing Conditions}$	1.6311	6.8176	7.7185	33.6684	49.8356
$N_{\text{potential for improvement}} - \text{Existing Conditions}$	-0.0322	0.2762	0.1738	-2.6157	-2.1979



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 12.98-13.171	S of Pennsylvania/Sandusky	0.017	0.1176	0.1083	0.6702	0.9131
US23; 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds	0.0414	0.2082	0.2064	1.1757	1.6317
US23; 13.404-13.769	Del Co Fairgrounds - Pinecrest	0.0649	0.326	0.3231	1.8409	2.5549
US23; 13.769-13.88	Pinecrest - Panhandle	0.0201	0.1002	0.1001	0.5738	0.7942
US23; 13.88-14.064	Panhandle - Shroyer Park N	0.0267	0.1325	0.1316	0.7478	1.0386
US23; 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0254	0.1274	0.1251	0.7047	0.9826
US23; 14.215-14.384	Del Co Govt Bldg - Hills Miller	0.0291	0.1454	0.1434	0.8111	1.129
US23; 14.384-14.715	Hills Miller - Monterey	0.0427	0.2099	0.2078	1.1722	1.6326
US23; 14.715-14.996	Kirkwood - Oakhaven	0.0722	0.0722	0.0722	0.8467	1.0633
US23; 14.996-15.254	Oakhaven - Del Water	0.0666	0.0666	0.0666	0.7774	0.9772
US23; 15.254-15.608	Del Water - Coover	0.0913	0.0913	0.0913	1.0667	1.3406
US23; 15.608-15.69	RR Bridge - Coover	0.0209	0.0209	0.0209	0.2458	0.3085
US23; 13.171	Pennsylvania/Sandusky	0.1512	0.8615	1.1191	3.1314	5.2632
US23; 13.404	Del Co Fairgrounds	0.0464	0.1736	0.1984	0.9291	1.3475
US23; 13.769	Pinecrest	0.0762	0.2804	0.3166	1.7602	2.4334
US23; 13.88	Panhandle	0.1561	0.8868	1.1473	3.1405	5.3307
US23; 14.064	Shroyer Park N	0.0742	0.2749	0.3118	1.618	2.2789
US23; 14.215	Del Co Govt Bldg	0.1292	0.7329	0.9465	2.6985	4.5071
US23; 14.384	Hills Miller	0.1329	0.7593	0.9898	2.8542	4.7362
US23; 14.639	Monterey	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 14.715	Clear Run/Stonebrook	0.0734	0.151	0.089	0.9763	1.2897
US23; 14.757	Kirkwood	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 14.996	Oakhaven	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 15.254	Del Water Treatment	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 15.608	Coover	0.1802	0.5088	0.5746	6.1161	7.3797



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 12.98-13.171	S of Pennsylvania/Sandusky	0.0183	0.1303	0.122	0.3957	0.6663
US23; 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds	0.0351	0.1728	0.1695	0.8186	1.196
US23; 13.404-13.769	Del Co Fairgrounds - Pinecrest	0.0509	0.2477	0.2418	1.885	2.4254
US23; 13.769-13.88	Pinecrest - Panhandle	0.0212	0.1067	0.107	0.4019	0.6368
US23; 13.88-14.064	Panhandle - Shroyer Park N	0.0238	0.1163	0.1149	0.6215	0.8765
US23; 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0297	0.152	0.1507	0.8448	1.1772
US23; 14.215-14.384	Del Co Govt Bldg - Hills Miller	0.026	0.1276	0.125	0.9143	1.1929
US23; 14.384-14.715	Hills Miller - Monterey	0.0414	0.2032	0.2009	1.1599	1.6054
US23; 14.715-14.996	Kirkwood - Oakhaven	0.0402	0.1034	0.0559	0.061	0.2605
US23; 14.996-15.254	Oakhaven - Del Water	0.0369	0.0947	0.0514	0.6169	0.7999
US23; 15.254-15.608	Del Water - Coover	0.0505	0.1298	0.0703	0.5255	0.7761
US23; 15.608-15.69	RR Bridge - Coover	0.0118	0.03	0.0162	0.0178	0.0758
US23; 13.171	Pennsylvania/Sandusky	0.1386	0.7924	1.0333	2.5442	4.5085
US23; 13.404	Del Co Fairgrounds	0.0449	0.1684	0.1927	0.6715	1.0775
US23; 13.769	Pinecrest	0.0744	0.264	0.2895	1.4575	2.0854
US23; 13.88	Panhandle	0.1488	0.8505	1.1095	4.2037	6.3125
US23; 14.064	Shroyer Park N	0.0649	0.2392	0.2709	2.052	2.627
US23; 14.215	Del Co Govt Bldg	0.1455	0.8371	1.1019	3.4562	5.5407
US23; 14.384	Hills Miller	0.1355	0.7697	0.9955	3.5423	5.443
US23; 14.639	Monterey	0.03	0.0705	0.0613	0.5252	0.687
US23; 14.715	Clear Run/Stonebrook	0.0646	0.1329	0.0784	0.6826	0.9585
US23; 14.757	Kirkwood	0.03	0.0705	0.0613	0.5919	0.7537
US23; 14.996	Oakhaven	0.03	0.0705	0.0613	0.5252	0.687
US23; 15.254	Del Water Treatment	0.0354	0.0828	0.0719	0.6976	0.8877
US23; 15.608	Coover	0.3027	0.8546	0.9654	4.4556	6.5783



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 12.98-13.171	S of Pennsylvania/Sandusky	0.0013	0.0127	0.0137	-0.2745	-0.2468
US23: 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds	-0.0063	-0.0354	-0.0369	-0.3571	-0.4357
US23: 13.404-13.769	Del Co Fairgrounds - Pinecrest	-0.014	-0.0783	-0.0813	0.0441	-0.1295
US23: 13.769-13.88	Pinecrest - Panhandle	0.0011	0.0065	0.0069	-0.1719	-0.1574
US23: 13.88-14.064	Panhandle - Shroyer Park N	-0.0029	-0.0162	-0.0167	-0.1263	-0.1621
US23: 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0043	0.0246	0.0256	0.1401	0.1946
US23: 14.215-14.384	Del Co Govt Bldg - Hills Miller	-0.0031	-0.0178	-0.0184	0.1032	0.0639
US23: 14.384-14.715	Hills Miller - Monterey	-0.0013	-0.0067	-0.0069	-0.0123	-0.0272
US23: 14.715-14.996	Kirkwood - Oakhaven	-0.032	0.0312	-0.0163	-0.7857	-0.8028
US23: 14.996-15.254	Oakhaven - Del Water	-0.0297	0.0281	-0.0152	-0.1605	-0.1773
US23: 15.254-15.608	Del Water - Coover	-0.0408	0.0385	-0.021	-0.5412	-0.5645
US23: 15.608-15.69	RR Bridge - Coover	-0.0091	0.0091	-0.0047	-0.228	-0.2327
US23: 13.171	Pennsylvania/Sandusky	-0.0126	-0.0691	-0.0858	-0.5872	-0.7547
US23: 13.404	Del Co Fairgrounds	-0.0015	-0.0052	-0.0057	-0.2576	-0.27
US23: 13.769	Pinecrest	-0.0018	-0.0164	-0.0271	-0.3027	-0.348
US23: 13.88	Panhandle	-0.0073	-0.0363	-0.0378	1.0632	0.9818
US23: 14.064	Shroyer Park N	-0.0093	-0.0357	-0.0409	0.434	0.3481
US23: 14.215	Del Co Govt Bldg	0.0163	0.1042	0.1554	0.7577	1.0336
US23: 14.384	Hills Miller	0.0026	0.0104	0.0057	0.6881	0.7068
US23: 14.639	Monterey	-0.0013	-0.003	-0.0024	-0.0815	-0.0882
US23: 14.715	Clear Run/Stonebrook	-0.0088	-0.0181	-0.0106	-0.2937	-0.3312
US23: 14.757	Kirkwood	-0.0013	-0.003	-0.0024	-0.0148	-0.0215
US23: 14.996	Oakhaven	-0.0013	-0.003	-0.0024	-0.0815	-0.0882
US23: 15.254	Del Water Treatment	0.0041	0.0093	0.0082	0.0909	0.1125
US23: 15.608	Coover	0.1225	0.3458	0.3908	-1.6605	-0.8014



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

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Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.1253	0.0902	-0.0351	
Head On	0.6801	0.6902	0.0101	
Rear End	21.1561	20.9391	-0.2171	
Backing	1.7634	1.5729	-0.1905	
Sideswipe - Meeting	0.3359	0.2769	-0.0590	
Sideswipe - Passing	6.0714	5.8371	-0.2343	
Angle	7.3431	7.2746	-0.0685	
Parked Vehicle	0.8111	0.7011	-0.1100	
Pedestrian	0.1905	0.2139	0.0234	
Animal	5.6501	3.1588	-2.4914	
Train	0.0500	0.0454	-0.0046	
Pedalcycles	0.0717	0.0681	-0.0036	
Other Non-Vehicle	0.0002	0.0002	0.0000	
Fixed Object	6.5263	5.4842	-1.0421	
Other Object	0.5060	0.3729	-0.1331	
Overturning	0.2885	0.2211	-0.0674	
Other Non-Collision	0.7974	0.6371	-0.1604	
Left Turn	3.9209	3.9823	0.0614	
Right Turn	1.3959	1.4288	0.0329	

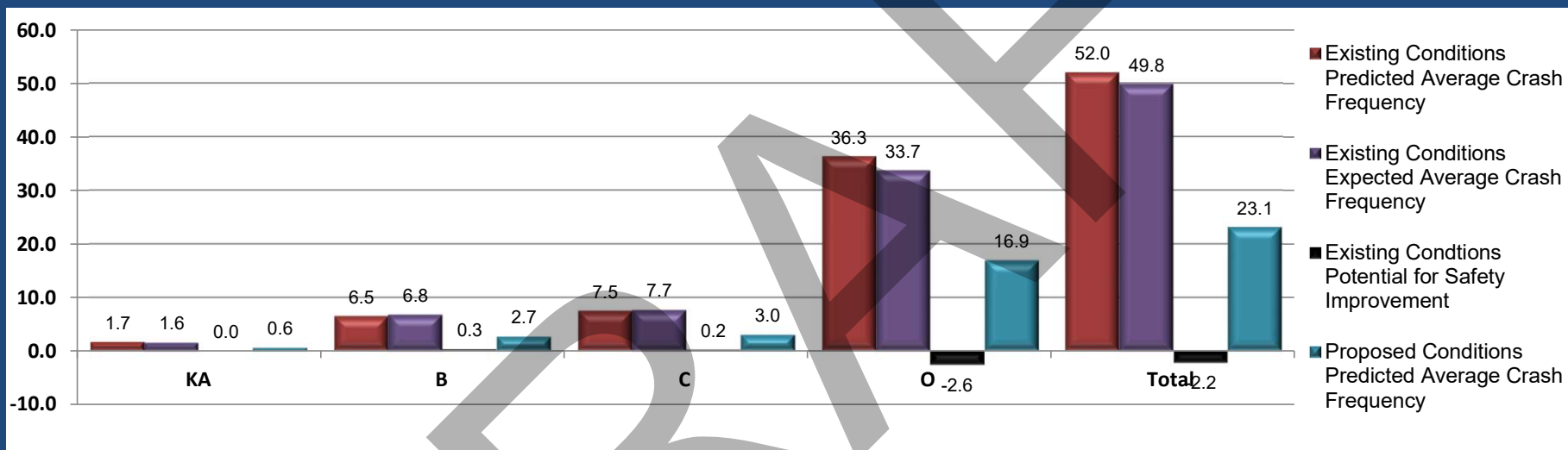


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.6633	6.5414	7.5447	36.2841	52.0335
N_{expected} - Existing Conditions	1.6311	6.8176	7.7185	33.6684	49.8356
$N_{\text{potential for improvement}}$ - Existing Conditions	-0.0322	0.2762	0.1738	-2.6157	-2.1979
$N_{\text{predicted}}$ - Proposed Conditions	0.6198	2.6559	2.9733	16.8775	23.1265



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 12.98-13.171	S of Pennsylvania/Sandusky	0.017	0.1176	0.1083	0.6702	0.9131
US23; 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds	0.0414	0.2082	0.2064	1.1757	1.6317
US23; 13.404-13.769	Del Co Fairgrounds - Pinecrest	0.0649	0.326	0.3231	1.8409	2.5549
US23; 13.769-13.88	Pinecrest - Panhandle	0.0201	0.1002	0.1001	0.5738	0.7942
US23; 13.88-14.064	Panhandle - Shroyer Park N	0.0267	0.1325	0.1316	0.7478	1.0386
US23; 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0254	0.1274	0.1251	0.7047	0.9826
US23; 14.215-14.384	Del Co Govt Bldg - Hills Miller	0.0291	0.1454	0.1434	0.8111	1.129
US23; 14.384-14.715	Hills Miller - Monterey	0.0427	0.2099	0.2078	1.1722	1.6326
US23; 14.715-14.996	Kirkwood - Oakhaven	0.0722	0.0722	0.0722	0.8467	1.0633
US23; 14.996-15.254	Oakhaven - Del Water	0.0666	0.0666	0.0666	0.7774	0.9772
US23; 15.254-15.608	Del Water - Coover	0.0913	0.0913	0.0913	1.0667	1.3406
US23; 15.608-15.69	RR Bridge - Coover	0.0209	0.0209	0.0209	0.2458	0.3085
US23; 13.171	Pennsylvania/Sandusky	0.1512	0.8615	1.1191	3.1314	5.2632
US23; 13.404	Del Co Fairgrounds	0.0464	0.1736	0.1984	0.9291	1.3475
US23; 13.769	Pinecrest	0.0762	0.2804	0.3166	1.7602	2.4334
US23; 13.88	Panhandle	0.1561	0.8868	1.1473	3.1405	5.3307
US23; 14.064	Shroyer Park N	0.0742	0.2749	0.3118	1.618	2.2789
US23; 14.215	Del Co Govt Bldg	0.1292	0.7329	0.9465	2.6985	4.5071
US23; 14.384	Hills Miller	0.1329	0.7593	0.9898	2.8542	4.7362
US23; 14.639	Monterey	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 14.715	Clear Run/Stonebrook	0.0734	0.151	0.089	0.9763	1.2897
US23; 14.757	Kirkwood	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 14.996	Oakhaven	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 15.254	Del Water Treatment	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 15.608	Coover	0.1802	0.5088	0.5746	6.1161	7.3797



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 12.98-13.171	S of Pennsylvania/Sandusky	0.0183	0.1303	0.122	0.3957	0.6663
US23; 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds	0.0351	0.1728	0.1695	0.8186	1.196
US23; 13.404-13.769	Del Co Fairgrounds - Pinecrest	0.0509	0.2477	0.2418	1.885	2.4254
US23; 13.769-13.88	Pinecrest - Panhandle	0.0212	0.1067	0.107	0.4019	0.6368
US23; 13.88-14.064	Panhandle - Shroyer Park N	0.0238	0.1163	0.1149	0.6215	0.8765
US23; 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0297	0.152	0.1507	0.8448	1.1772
US23; 14.215-14.384	Del Co Govt Bldg - Hills Miller	0.026	0.1276	0.125	0.9143	1.1929
US23; 14.384-14.715	Hills Miller - Monterey	0.0414	0.2032	0.2009	1.1599	1.6054
US23; 14.715-14.996	Kirkwood - Oakhaven	0.0402	0.1034	0.0559	0.061	0.2605
US23; 14.996-15.254	Oakhaven - Del Water	0.0369	0.0947	0.0514	0.6169	0.7999
US23; 15.254-15.608	Del Water - Coover	0.0505	0.1298	0.0703	0.5255	0.7761
US23; 15.608-15.69	RR Bridge - Coover	0.0118	0.03	0.0162	0.0178	0.0758
US23; 13.171	Pennsylvania/Sandusky	0.1386	0.7924	1.0333	2.5442	4.5085
US23; 13.404	Del Co Fairgrounds	0.0449	0.1684	0.1927	0.6715	1.0775
US23; 13.769	Pinecrest	0.0744	0.264	0.2895	1.4575	2.0854
US23; 13.88	Panhandle	0.1488	0.8505	1.1095	4.2037	6.3125
US23; 14.064	Shroyer Park N	0.0649	0.2392	0.2709	2.052	2.627
US23; 14.215	Del Co Govt Bldg	0.1455	0.8371	1.1019	3.4562	5.5407
US23; 14.384	Hills Miller	0.1355	0.7697	0.9955	3.5423	5.443
US23; 14.639	Monterey	0.03	0.0705	0.0613	0.5252	0.687
US23; 14.715	Clear Run/Stonebrook	0.0646	0.1329	0.0784	0.6826	0.9585
US23; 14.757	Kirkwood	0.03	0.0705	0.0613	0.5919	0.7537
US23; 14.996	Oakhaven	0.03	0.0705	0.0613	0.5252	0.687
US23; 15.254	Del Water Treatment	0.0354	0.0828	0.0719	0.6976	0.8877
US23; 15.608	Coover	0.3027	0.8546	0.9654	4.4556	6.5783



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 12.98-13.171	S of Pennsylvania/Sandusky	0.0013	0.0127	0.0137	-0.2745	-0.2468
US23: 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds	-0.0063	-0.0354	-0.0369	-0.3571	-0.4357
US23: 13.404-13.769	Del Co Fairgrounds - Pinecrest	-0.014	-0.0783	-0.0813	0.0441	-0.1295
US23: 13.769-13.88	Pinecrest - Panhandle	0.0011	0.0065	0.0069	-0.1719	-0.1574
US23: 13.88-14.064	Panhandle - Shroyer Park N	-0.0029	-0.0162	-0.0167	-0.1263	-0.1621
US23: 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0043	0.0246	0.0256	0.1401	0.1946
US23: 14.215-14.384	Del Co Govt Bldg - Hills Miller	-0.0031	-0.0178	-0.0184	0.1032	0.0639
US23: 14.384-14.715	Hills Miller - Monterey	-0.0013	-0.0067	-0.0069	-0.0123	-0.0272
US23: 14.715-14.996	Kirkwood - Oakhaven	-0.032	0.0312	-0.0163	-0.7857	-0.8028
US23: 14.996-15.254	Oakhaven - Del Water	-0.0297	0.0281	-0.0152	-0.1605	-0.1773
US23: 15.254-15.608	Del Water - Coover	-0.0408	0.0385	-0.021	-0.5412	-0.5645
US23: 15.608-15.69	RR Bridge - Coover	-0.0091	0.0091	-0.0047	-0.228	-0.2327
US23: 13.171	Pennsylvania/Sandusky	-0.0126	-0.0691	-0.0858	-0.5872	-0.7547
US23: 13.404	Del Co Fairgrounds	-0.0015	-0.0052	-0.0057	-0.2576	-0.27
US23: 13.769	Pinecrest	-0.0018	-0.0164	-0.0271	-0.3027	-0.348
US23: 13.88	Panhandle	-0.0073	-0.0363	-0.0378	1.0632	0.9818
US23: 14.064	Shroyer Park N	-0.0093	-0.0357	-0.0409	0.434	0.3481
US23: 14.215	Del Co Govt Bldg	0.0163	0.1042	0.1554	0.7577	1.0336
US23: 14.384	Hills Miller	0.0026	0.0104	0.0057	0.6881	0.7068
US23: 14.639	Monterey	-0.0013	-0.003	-0.0024	-0.0815	-0.0882
US23: 14.715	Clear Run/Stonebrook	-0.0088	-0.0181	-0.0106	-0.2937	-0.3312
US23: 14.757	Kirkwood	-0.0013	-0.003	-0.0024	-0.0148	-0.0215
US23: 14.996	Oakhaven	-0.0013	-0.003	-0.0024	-0.0815	-0.0882
US23: 15.254	Del Water Treatment	0.0041	0.0093	0.0082	0.0909	0.1125
US23: 15.608	Coover	0.1225	0.3458	0.3908	-1.6605	-0.8014



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 12.769-12.969	S - Penn/Sand SB	0.0306	0.1449	0.1661	0.9017	1.2433
US23; 12.77-12.97	S - Penn/Sand NB	0.0194	0.0887	0.1091	0.7292	0.9464
US23; 12.97-13.37	Penn/Sand SB	0.0366	0.1566	0.218	1.2673	1.6785
US23; 12.971-13.371	Penn/Sand NB	0.0366	0.1566	0.218	1.2673	1.6785
US23; 13.371-13.679	Penn/Sand - Panhandle SB	0.0456	0.2173	0.2476	1.3691	1.8796
US23; 13.372-13.68	Penn/Sand - Panhandle NB	0.0435	0.2084	0.2377	1.3682	1.8578
US23; 13.68-14.08	Panhandle SB	0.0366	0.1566	0.218	1.2673	1.6785
US23; 13.681-14.081	Panhandle NB	0.0366	0.1566	0.218	1.2673	1.6785
US23; 14.081-14.382	Panhandle - Hills Miller CR SB	0.029	0.1296	0.1662	1.0575	1.3823
US23; 14.082-14.383	Panhandle - Hills Miller CR NB	0.0395	0.1827	0.2193	1.2196	1.6611
US23; 14.385-15.607	Hills Miller CR - Coover CR	0.0951	0.6475	0.5899	3.6199	4.9524
US23; 15.609-15.691	Coover CR - North	0.0073	0.0073	0.0073	0.1283	0.1502
US23; 14.384	Hills Miller CRs	0.1303	0.3332	0.3087	0.9361	1.7083
US23; 15.608	Coover CRs	0.0331	0.0699	0.0494	0.4787	0.6311



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
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Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.1253	0.0902	-0.0351	0.0619
Head On	0.6801	0.6902	0.0101	0.0349
Rear End	21.1561	20.9391	-0.2171	3.2802
Backing	1.7634	1.5729	-0.1905	1.3374
Sideswipe - Meeting	0.3359	0.2769	-0.0590	0.0494
Sideswipe - Passing	6.0714	5.8371	-0.2343	0.9824
Angle	7.3431	7.2746	-0.0685	1.1291
Parked Vehicle	0.8111	0.7011	-0.1100	3.5585
Pedestrian	0.1905	0.2139	0.0234	0.7658
Animal	5.6501	3.1588	-2.4914	1.3419
Train	0.0500	0.0454	-0.0046	0.4876
Pedalcycles	0.0717	0.0681	-0.0036	0.0492
Other Non-Vehicle	0.0002	0.0002	0.0000	0.0000
Fixed Object	6.5263	5.4842	-1.0421	13.7943
Other Object	0.5060	0.3729	-0.1331	2.6492
Overturning	0.2885	0.2211	-0.0674	11.7754
Other Non-Collision	0.7974	0.6371	-0.1604	13.0191
Left Turn	3.9209	3.9823	0.0614	0.1620
Right Turn	1.3959	1.4288	0.0329	0.4383



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-20.889	\$8,401,237
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-8.017	\$7,758,860
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$5.00	\$0.00	\$0.00	\$5.00	\$5.00	-28.905	\$16,160,097



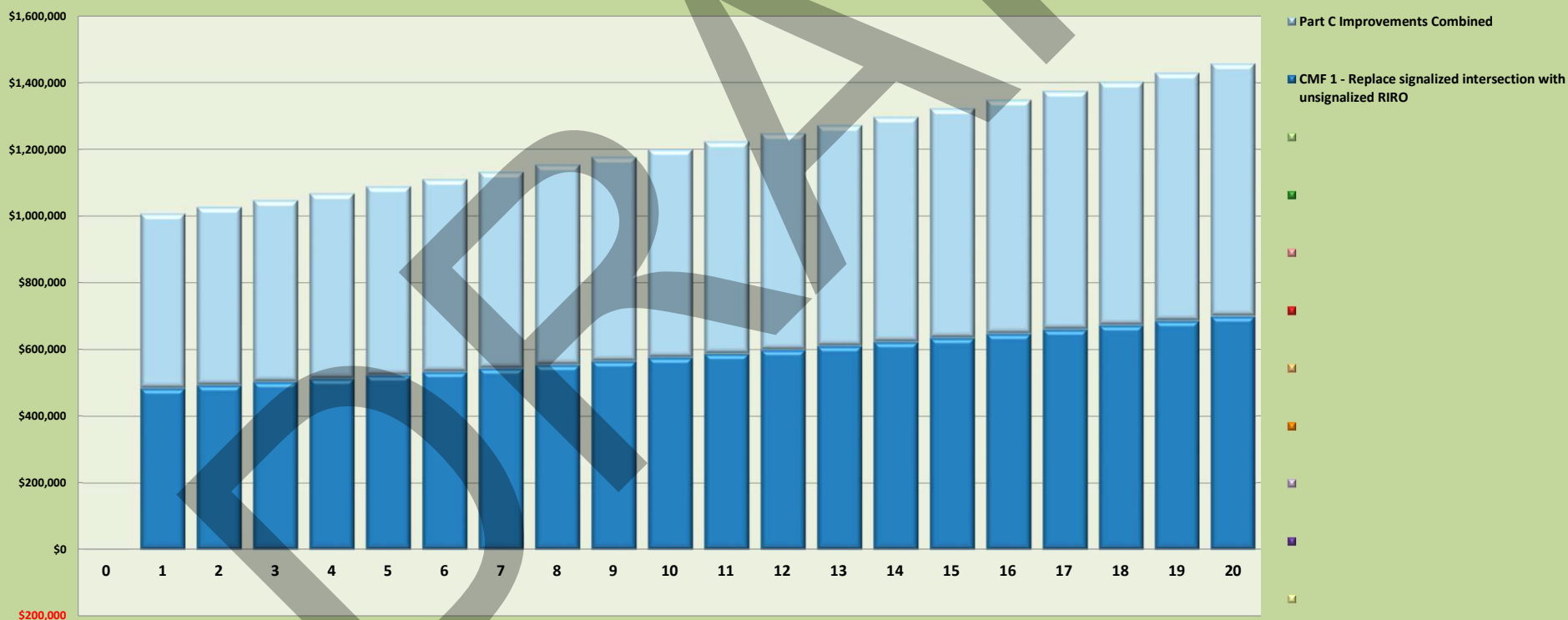
Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	Expected Annual Crash Adjustment	Comments:
<p>Net Present Value of Project \$5.00</p> <p>Net Present Value of Safety Benefits \$16,160,097.16</p> <p>Net Benefit \$16,160,092.16</p> <p>Benefit / Cost Ratio 3232019.43</p>	<p>Number of Fatal & Incapacitating Injury Crashes -1.043</p> <p>Number of Injury Crashes -9.500</p> <p>Number of Total Crashes -28.905</p>	

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



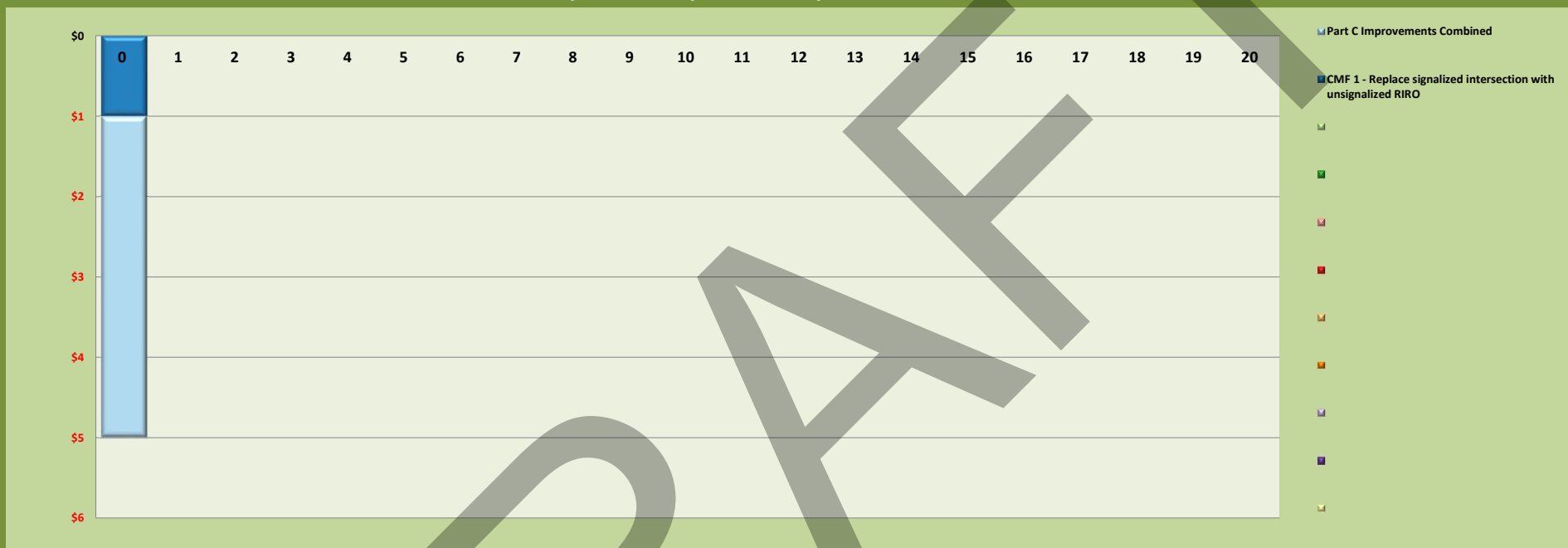


Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



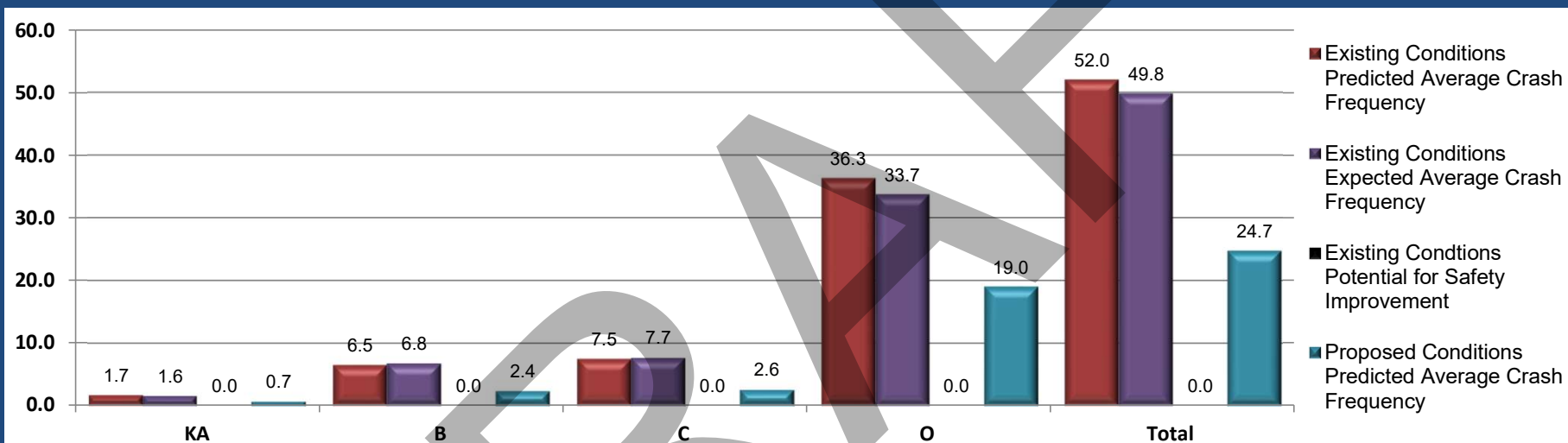


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.6633	6.5414	7.5447	36.2841	52.0335
N_{expected} - Existing Conditions	1.6311	6.8176	7.7185	33.6684	49.8356
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	0.7214	2.4485	2.6206	18.9551	24.7456



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 12.769-12.969	S of Pennsylvania/Sandusky	0.017	0.1176	0.1083	0.6702	0.9131
US23; 12.77-12.97	Penn/Sandusky - Del Co Fairgrounds	0.0414	0.2082	0.2064	1.1757	1.6317
US23; 12.97-13.37	Del Co Fairgrounds - Pinecrest	0.0649	0.326	0.3231	1.8409	2.5549
US23; 12.971-13.371	Pinecrest - Panhandle	0.0201	0.1002	0.1001	0.5738	0.7942
US23; 13.371-13.889	Panhandle - Shroyer Park N	0.0267	0.1325	0.1316	0.7478	1.0386
US23; 13.372-13.889	Shroyer Park N - Del Co Govt Bldg	0.0254	0.1274	0.1251	0.7047	0.9826
US23; 13.891-14.382	Del Co Govt Bldg - Hills Miller	0.0291	0.1454	0.1434	0.8111	1.129
US23; 14.384-14.715	Hills Miller - Monterey	0.0427	0.2099	0.2078	1.1722	1.6326
US23; 14.715-14.996	Kirkwood - Oakhaven	0.0722	0.0722	0.0722	0.8467	1.0633
US23; 14.996-15.254	Oakhaven - Del Water	0.0666	0.0666	0.0666	0.7774	0.9772
US23; 15.254-15.608	Del Water - Coover	0.0913	0.0913	0.0913	1.0667	1.3406
US23; 15.608-15.69	RR Bridge - Coover	0.0209	0.0209	0.0209	0.2458	0.3085
US23; 13.89	Pennsylvania/Sandusky	0.1512	0.8615	1.1191	3.1314	5.2632
US23; 14.383	Del Co Fairgrounds	0.0464	0.1736	0.1984	0.9291	1.3475
US23; 14.639	Pinecrest	0.0762	0.2804	0.3166	1.7602	2.4334
US23; 14.715	Panhandle	0.1561	0.8868	1.1473	3.1405	5.3307
US23; 14.757	Shroyer Park N	0.0742	0.2749	0.3118	1.618	2.2789
US23; 14.996	Del Co Govt Bldg	0.1292	0.7329	0.9465	2.6985	4.5071
US23; 15.254	Hills Miller	0.1329	0.7593	0.9898	2.8542	4.7362
US23; 15.608	Monterey	0.0313	0.0735	0.0637	0.6067	0.7752



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
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Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 12.769-12.969	S of Pennsylvania/Sandusky	0.0183	0.1303	0.122	0.3957	0.6663
US23; 12.77-12.97	Penn/Sandusky - Del Co Fairgrounds	0.0351	0.1728	0.1695	0.8186	1.196
US23; 12.97-13.37	Del Co Fairgrounds - Pinecrest	0.0509	0.2477	0.2418	1.885	2.4254
US23; 12.971-13.371	Pinecrest - Panhandle	0.0212	0.1067	0.107	0.4019	0.6368
US23; 13.371-13.889	Panhandle - Shroyer Park N	0.0238	0.1163	0.1149	0.6215	0.8765
US23; 13.372-13.889	Shroyer Park N - Del Co Govt Bldg	0.0297	0.152	0.1507	0.8448	1.1772
US23; 13.891-14.382	Del Co Govt Bldg - Hills Miller	0.026	0.1276	0.125	0.9143	1.1929
US23; 14.384-14.715	Hills Miller - Monterey	0.0414	0.2032	0.2009	1.1599	1.6054
US23; 14.715-14.996	Kirkwood - Oakhaven	0.0402	0.1034	0.0559	0.061	0.2605
US23; 14.996-15.254	Oakhaven - Del Water	0.0369	0.0947	0.0514	0.6169	0.7999
US23; 15.254-15.608	Del Water - Coover	0.0505	0.1298	0.0703	0.5255	0.7761
US23; 15.608-15.69	RR Bridge - Coover	0.0118	0.03	0.0162	0.0178	0.0758
US23; 13.89	Pennsylvania/Sandusky	0.1386	0.7924	1.0333	2.5442	4.5085
US23; 14.383	Del Co Fairgrounds	0.0449	0.1684	0.1927	0.6715	1.0775
US23; 14.639	Pinecrest	0.0744	0.264	0.2895	1.4575	2.0854
US23; 14.715	Panhandle	0.1488	0.8505	1.1095	4.2037	6.3125
US23; 14.757	Shroyer Park N	0.0649	0.2392	0.2709	2.052	2.627
US23; 14.996	Del Co Govt Bldg	0.1455	0.8371	1.1019	3.4562	5.5407
US23; 15.254	Hills Miller	0.1355	0.7697	0.9955	3.5423	5.443
US23; 15.608	Monterey	0.03	0.0705	0.0613	0.5252	0.687



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 12.769-12.969	S of Pennsylvania/Sandusky	0.0013	0.0127	0.0137	-0.2745	-0.2468
US23; 12.77-12.97	Penn/Sandusky - Del Co Fairgrounds	-0.0063	-0.0354	-0.0369	-0.3571	-0.4357
US23; 12.97-13.37	Del Co Fairgrounds - Pinecrest	-0.014	-0.0783	-0.0813	0.0441	-0.1295
US23; 12.971-13.371	Pinecrest - Panhandle	0.0011	0.0065	0.0069	-0.1719	-0.1574
US23; 13.371-13.889	Panhandle - Shroyer Park N	-0.0029	-0.0162	-0.0167	-0.1263	-0.1621
US23; 13.372-13.889	Shroyer Park N - Del Co Govt Bldg	0.0043	0.0246	0.0256	0.1401	0.1946
US23; 13.891-14.382	Del Co Govt Bldg - Hills Miller	-0.0031	-0.0178	-0.0184	0.1032	0.0639
US23; 14.384-14.715	Hills Miller - Monterey	-0.0013	-0.0067	-0.0069	-0.0123	-0.0272
US23; 14.715-14.996	Kirkwood - Oakhaven	-0.032	0.0312	-0.0163	-0.7857	-0.8028
US23; 14.996-15.254	Oakhaven - Del Water	-0.0297	0.0281	-0.0152	-0.1605	-0.1773
US23; 15.254-15.608	Del Water - Coover	-0.0408	0.0385	-0.021	-0.5412	-0.5645
US23; 15.608-15.69	RR Bridge - Coover	-0.0091	0.0091	-0.0047	-0.228	-0.2327
US23; 13.89	Pennsylvania/Sandusky	-0.0126	-0.0691	-0.0858	-0.5872	-0.7547
US23; 14.383	Del Co Fairgrounds	-0.0015	-0.0052	-0.0057	-0.2576	-0.27
US23; 14.639	Pinecrest	-0.0018	-0.0164	-0.0271	-0.3027	-0.348
US23; 14.715	Panhandle	-0.0073	-0.0363	-0.0378	1.0632	0.9818
US23; 14.757	Shroyer Park N	-0.0093	-0.0357	-0.0409	0.434	0.3481
US23; 14.996	Del Co Govt Bldg	0.0163	0.1042	0.1554	0.7577	1.0336
US23; 15.254	Hills Miller	0.0026	0.0104	0.0057	0.6881	0.7068
US23; 15.608	Monterey	-0.0013	-0.003	-0.0024	-0.0815	-0.0882



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 12.769-12.969	S - Penn/Sand SB	0.0306	0.1449	0.1661	0.9017	1.2433
US23; 12.77-12.97	S - Penn/Sand NB	0.0194	0.0887	0.1091	0.7292	0.9464
US23; 12.97-13.37	Penn/Sand SB	0.0366	0.1566	0.218	1.2673	1.6785
US23; 12.971-13.371	Penn/Sand NB	0.0366	0.1566	0.218	1.2673	1.6785
US23; 13.371-13.889	Penn/Sand - Merrick CR SB	0.0488	0.2142	0.2838	1.7421	2.2889
US23; 13.372-13.889	Penn/Sand - Merrick CR NB	0.0612	0.2766	0.3474	1.9166	2.6018
US23; 13.891-14.382	Merrick CR - Hills Miller CR	0.051	0.3475	0.316	1.9434	2.6579
US23; 14.384-14.715	Hills Miller - Monterey	0.026	0.1761	0.1614	0.9835	1.347
US23; 14.715-14.996	Kirkwood - Oakhaven	0.0249	0.0249	0.0249	0.4416	0.5163
US23; 14.996-15.254	Oakhaven - Del Water	0.0229	0.0229	0.0229	0.4055	0.4742
US23; 15.254-15.608	Del Water - Coover	0.0316	0.0316	0.0316	0.5563	0.6511
US23; 15.608-15.69	N of Coover	0.0073	0.0073	0.0073	0.1289	0.1508
US23; 13.89	Merrick CR	0.1178	0.3011	0.279	0.9078	1.6057
US23; 14.383	Hills Miller CRs	0.1212	0.3095	0.2868	0.8904	1.6079
US23; 14.639	Monterey	0.0107	0.0251	0.0218	0.9022	0.9598
US23; 14.715	Clear Run/Stonebrook	0.0096	0.0197	0.0117	0.786	0.827
US23; 14.757	Kirkwood	0.0107	0.0251	0.0218	0.9022	0.9598
US23; 14.996	Oakhaven	0.0107	0.0251	0.0218	0.9022	0.9598
US23; 15.254	Del Water Treatment	0.0107	0.0251	0.0218	0.9022	0.9598
US23; 15.608	Coover CRs	0.0331	0.0699	0.0494	0.4787	0.6311



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.1004	0.0661		0.0819
Head On	0.3843	0.1816		0.1211
Rear End	10.9670	6.0996		4.4577
Backing	1.1124	0.6303		1.3686
Sideswipe - Meeting	0.1501	0.1047		0.0697
Sideswipe - Passing	5.4665	3.5261		1.8188
Angle	8.3127	3.1351		2.5579
Parked Vehicle	0.4028	0.2452		2.7302
Pedestrian	0.1410	0.1327		0.5786
Animal	4.1667	2.0432		3.2670
Train	0.0000	0.0000		0.3542
Pedalcycles	0.0416	0.0392		0.0399
Other Non-Vehicle	0.0000	0.0000		0.0000
Fixed Object	7.5593	5.6275		11.1625
Other Object	0.8440	0.6794		1.9922
Overturning	0.3490	0.2721		7.9698
Other Non-Collision	0.8241	0.6131		9.0018
Left Turn	1.5472	0.6220		0.3994
Right Turn	0.7797	0.3053		0.8906



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-13.050	\$427,305
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	0.000	\$0
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-13.149	\$12,923,392
CMF 3 - Change in median density openings (close all)	20	\$1.00			\$1.00	\$1.00	0.000	\$0
CMF 4 - Install RIRO at stop controlled intersection	20	\$1.00			\$1.00	\$1.00	-1.088	\$2,511,306
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$8.00	\$0.00	\$0.00	\$8.00	\$8.00	-27.287	\$15,862,003



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator

Net Present Value of Project **\$8.00**

Net Present Value of Safety Benefits **\$15,862,002.98**

Net Benefit **\$15,861,994.98**

Benefit / Cost Ratio **1982750.37**

Expected Annual Crash Adjustment

Number of Fatal & Incapacitating Injury Crashes **-0.942**

Number of Injury Crashes **-9.959**

Number of Total Crashes **-27.287**

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year





Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

\$200,000

DRAFT



Safety Benefit - Cost Analysis

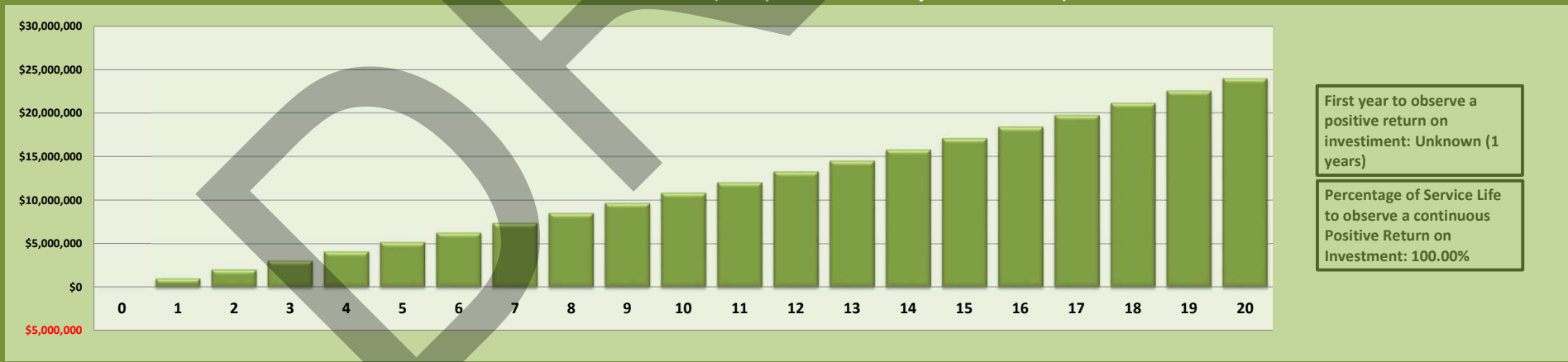
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



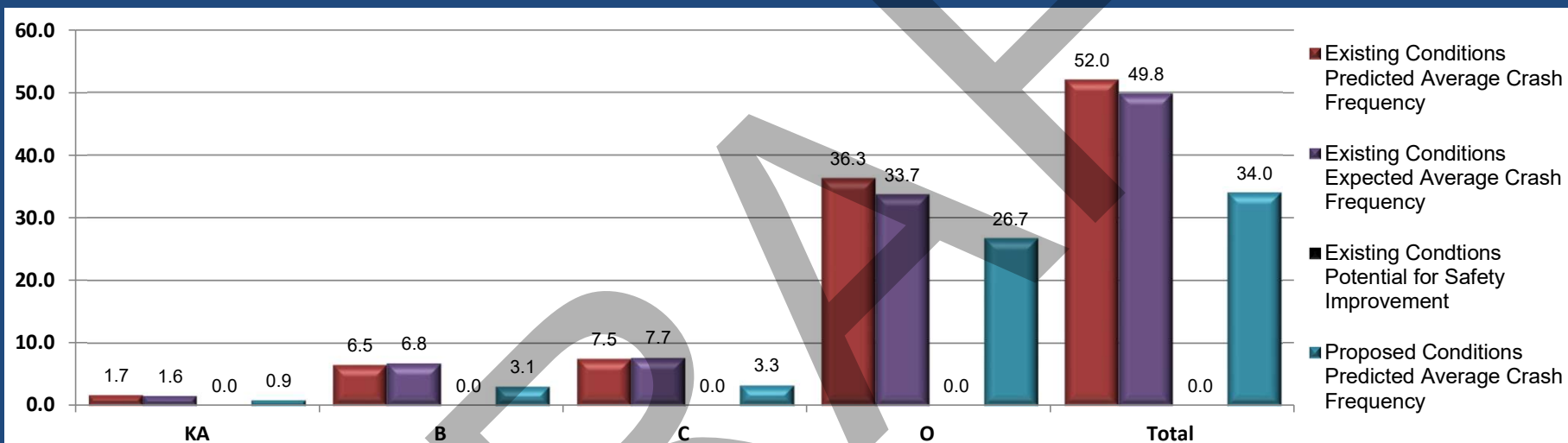


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.6633	6.5414	7.5447	36.2841	52.0335
N_{expected} - Existing Conditions	1.6311	6.8176	7.7185	33.6684	49.8356
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	0.9150	3.1356	3.2546	26.6990	34.0042



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23: 12.98-13.171	S of Pennsylvania/Sandusky	0.017	0.1176	0.1083	0.6702	0.9131
US23: 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds	0.0414	0.2082	0.2064	1.1757	1.6317
US23: 13.404-13.769	Del Co Fairgrounds - Pinecrest	0.0649	0.326	0.3231	1.8409	2.5549
US23: 13.769-13.88	Pinecrest - Panhandle	0.0201	0.1002	0.1001	0.5738	0.7942
US23: 13.88-14.064	Panhandle - Shroyer Park N	0.0267	0.1325	0.1316	0.7478	1.0386
US23: 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0254	0.1274	0.1251	0.7047	0.9826
US23: 14.215-14.384	Del Co Govt Bldg - Hills Miller	0.0291	0.1454	0.1434	0.8111	1.129
US23: 14.384-14.715	Hills Miller - Monterey	0.0427	0.2099	0.2078	1.1722	1.6326
US23: 14.715-14.996	Kirkwood - Oakhaven	0.0722	0.0722	0.0722	0.8467	1.0633
US23: 14.996-15.254	Oakhaven - Del Water	0.0666	0.0666	0.0666	0.7774	0.9772
US23: 15.254-15.608	Del Water - Coover	0.0913	0.0913	0.0913	1.0667	1.3406
US23: 15.608-15.69	RR Bridge - Coover	0.0209	0.0209	0.0209	0.2458	0.3085
US23: 13.171	Pennsylvania/Sandusky	0.1512	0.8615	1.1191	3.1314	5.2632
US23: 13.404	Del Co Fairgrounds	0.0464	0.1736	0.1984	0.9291	1.3475
US23: 13.769	Pinecrest	0.0762	0.2804	0.3166	1.7602	2.4334
US23: 13.88	Panhandle	0.1561	0.8868	1.1473	3.1405	5.3307
US23: 14.064	Shroyer Park N	0.0742	0.2749	0.3118	1.618	2.2789
US23: 14.215	Del Co Govt Bldg	0.1292	0.7329	0.9465	2.6985	4.5071
US23: 14.384	Hills Miller	0.1329	0.7593	0.9898	2.8542	4.7362
US23: 14.639	Monterey	0.0313	0.0735	0.0637	0.6067	0.7752
US23: 14.715	Clear Run/Stonebrook	0.0734	0.151	0.089	0.9763	1.2897
US23: 14.757	Kirkwood	0.0313	0.0735	0.0637	0.6067	0.7752
US23: 14.996	Oakhaven	0.0313	0.0735	0.0637	0.6067	0.7752
US23: 15.254	Del Water Treatment	0.0313	0.0735	0.0637	0.6067	0.7752
US23: 15.608	Coover	0.1802	0.5088	0.5746	6.1161	7.3797



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 12.98-13.171	S of Pennsylvania/Sandusky	0.0183	0.1303	0.122	0.3957	0.6663
US23; 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds	0.0351	0.1728	0.1695	0.8186	1.196
US23; 13.404-13.769	Del Co Fairgrounds - Pinecrest	0.0509	0.2477	0.2418	1.885	2.4254
US23; 13.769-13.88	Pinecrest - Panhandle	0.0212	0.1067	0.107	0.4019	0.6368
US23; 13.88-14.064	Panhandle - Shroyer Park N	0.0238	0.1163	0.1149	0.6215	0.8765
US23; 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0297	0.152	0.1507	0.8448	1.1772
US23; 14.215-14.384	Del Co Govt Bldg - Hills Miller	0.026	0.1276	0.125	0.9143	1.1929
US23; 14.384-14.715	Hills Miller - Monterey	0.0414	0.2032	0.2009	1.1599	1.6054
US23; 14.715-14.996	Kirkwood - Oakhaven	0.0402	0.1034	0.0559	0.061	0.2605
US23; 14.996-15.254	Oakhaven - Del Water	0.0369	0.0947	0.0514	0.6169	0.7999
US23; 15.254-15.608	Del Water - Coover	0.0505	0.1298	0.0703	0.5255	0.7761
US23; 15.608-15.69	RR Bridge - Coover	0.0118	0.03	0.0162	0.0178	0.0758
US23; 13.171	Pennsylvania/Sandusky	0.1386	0.7924	1.0333	2.5442	4.5085
US23; 13.404	Del Co Fairgrounds	0.0449	0.1684	0.1927	0.6715	1.0775
US23; 13.769	Pinecrest	0.0744	0.264	0.2895	1.4575	2.0854
US23; 13.88	Panhandle	0.1488	0.8505	1.1095	4.2037	6.3125
US23; 14.064	Shroyer Park N	0.0649	0.2392	0.2709	2.052	2.627
US23; 14.215	Del Co Govt Bldg	0.1455	0.8371	1.1019	3.4562	5.5407
US23; 14.384	Hills Miller	0.1355	0.7697	0.9955	3.5423	5.443
US23; 14.639	Monterey	0.03	0.0705	0.0613	0.5252	0.687
US23; 14.715	Clear Run/Stonebrook	0.0646	0.1329	0.0784	0.6826	0.9585
US23; 14.757	Kirkwood	0.03	0.0705	0.0613	0.5919	0.7537
US23; 14.996	Oakhaven	0.03	0.0705	0.0613	0.5252	0.687
US23; 15.254	Del Water Treatment	0.0354	0.0828	0.0719	0.6976	0.8877
US23; 15.608	Coover	0.3027	0.8546	0.9654	4.4556	6.5783



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 12.98-13.171	S of Pennsylvania/Sandusky	0.0013	0.0127	0.0137	-0.2745	-0.2468
US23: 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds	-0.0063	-0.0354	-0.0369	-0.3571	-0.4357
US23: 13.404-13.769	Del Co Fairgrounds - Pinecrest	-0.014	-0.0783	-0.0813	0.0441	-0.1295
US23: 13.769-13.88	Pinecrest - Panhandle	0.0011	0.0065	0.0069	-0.1719	-0.1574
US23: 13.88-14.064	Panhandle - Shroyer Park N	-0.0029	-0.0162	-0.0167	-0.1263	-0.1621
US23: 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0043	0.0246	0.0256	0.1401	0.1946
US23: 14.215-14.384	Del Co Govt Bldg - Hills Miller	-0.0031	-0.0178	-0.0184	0.1032	0.0639
US23: 14.384-14.715	Hills Miller - Monterey	-0.0013	-0.0067	-0.0069	-0.0123	-0.0272
US23: 14.715-14.996	Kirkwood - Oakhaven	-0.032	0.0312	-0.0163	-0.7857	-0.8028
US23: 14.996-15.254	Oakhaven - Del Water	-0.0297	0.0281	-0.0152	-0.1605	-0.1773
US23: 15.254-15.608	Del Water - Coover	-0.0408	0.0385	-0.021	-0.5412	-0.5645
US23: 15.608-15.69	RR Bridge - Coover	-0.0091	0.0091	-0.0047	-0.228	-0.2327
US23: 13.171	Pennsylvania/Sandusky	-0.0126	-0.0691	-0.0858	-0.5872	-0.7547
US23: 13.404	Del Co Fairgrounds	-0.0015	-0.0052	-0.0057	-0.2576	-0.27
US23: 13.769	Pinecrest	-0.0018	-0.0164	-0.0271	-0.3027	-0.348
US23: 13.88	Panhandle	-0.0073	-0.0363	-0.0378	1.0632	0.9818
US23: 14.064	Shroyer Park N	-0.0093	-0.0357	-0.0409	0.434	0.3481
US23: 14.215	Del Co Govt Bldg	0.0163	0.1042	0.1554	0.7577	1.0336
US23: 14.384	Hills Miller	0.0026	0.0104	0.0057	0.6881	0.7068
US23: 14.639	Monterey	-0.0013	-0.003	-0.0024	-0.0815	-0.0882
US23: 14.715	Clear Run/Stonebrook	-0.0088	-0.0181	-0.0106	-0.2937	-0.3312
US23: 14.757	Kirkwood	-0.0013	-0.003	-0.0024	-0.0148	-0.0215
US23: 14.996	Oakhaven	-0.0013	-0.003	-0.0024	-0.0815	-0.0882
US23: 15.254	Del Water Treatment	0.0041	0.0093	0.0082	0.0909	0.1125
US23: 15.608	Coover	0.1225	0.3458	0.3908	-1.6605	-0.8014



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23: 12.971-13.371	Pennsylvania NB	0.0366	0.1566	0.218	1.2673	1.6785
US23: 12.771-13.171	S of Pennsylvania/Sandusky SB	0.0176	0.1143	0.0985	0.6012	0.8316
US23: 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds SB	0.0269	0.1846	0.1748	1.0632	1.4495
US23: 13.404-13.769	Del Co Fairgrounds - Pinecrest SB	0.0206	0.1335	0.1188	0.7077	0.9806
US23: 13.769-13.879	Pinecrest - Panhandle	0.0133	0.0877	0.0854	0.5099	0.6963
US23: 13.881-14.064	Panhandle - Shroyer Park N	0.0133	0.0859	0.0819	0.4826	0.6637
US23: 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0142	0.0893	0.0861	0.4977	0.6873
US23: 14.215-14.384	Del Co Govt Bldg - Hills Miller	0.0173	0.1102	0.1057	0.6159	0.8491
US23: 14.384-14.715	Hills Miller - Monterey	0.0246	0.1585	0.151	0.8895	1.2236
US23: 14.715-14.996	Kirkwood - Oakhaven	0.0249	0.0249	0.0249	0.4416	0.5163
US23: 14.996-15.254	Oakhaven - Del Water	0.0229	0.0229	0.0229	0.4055	0.4742
US23: 15.254-15.608	Del Water - Coover	0.0316	0.0316	0.0316	0.5563	0.6511
US23: 15.608-15.69	RR Bridge - Coover	0.0073	0.0073	0.0073	0.1283	0.1502
US23: 13.172	Sandusky SB	0.0127	0.0742	0.081	0.9032	1.0711
US23: 13.405	Del Co Fairgrounds	0.0099	0.0423	0.0582	1.0015	1.1119
US23: 13.769	Pinecrest	0.0228	0.0837	0.0945	2.6271	2.8281
US23: 13.879	Panhandle/Merrick	0.0755	0.1926	0.1784	0.6309	1.0774
US23: 14.064	Shroyer Park N	0.008	0.0301	0.0346	0.6991	0.7718
US23: 14.215	Del Co Govt Bldg	0.0293	0.1104	0.1374	0.8313	1.1084
US23: 14.383	Hills Miller CRs	0.1212	0.3095	0.2868	0.8904	1.6079
US23: 14.639	Monterey	0.0241	0.0566	0.0492	0.537	0.6669
US23: 14.715	Clear Run/Stonebrook	0.0202	0.0415	0.0246	0.4292	0.5155
US23: 14.757	Kirkwood	0.0241	0.0566	0.0492	0.537	0.6669
US23: 14.996	Oakhaven	0.0241	0.0566	0.0492	0.537	0.6669
US23: 15.254	Del Water Treatment	0.0241	0.0566	0.0492	0.537	0.6669
US23: 15.608	Coover	0.1802	0.5088	0.5746	6.1161	7.3797
US23: 12.77-12.97	S of Penn/Sand NB	0.0194	0.0887	0.1091	0.7292	0.9464
US23: 13.371-13.769	Penn/Sand - Pinecrest NB	0.0483	0.2201	0.2717	1.5263	2.0664



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.1253	0.0902		0.0895
Head On	0.6801	0.6902		0.3118
Rear End	21.1561	20.9391		10.7806
Backing	1.7634	1.5729		1.7436
Sideswipe - Meeting	0.3359	0.2769		0.1199
Sideswipe - Passing	6.0714	5.8371		3.6051
Angle	7.3431	7.2746		4.6800
Parked Vehicle	0.8111	0.7011		1.6853
Pedestrian	0.1905	0.2139		0.4087
Animal	5.6501	3.1588		4.1377
Train	0.0500	0.0454		0.1604
Pedalcycles	0.0717	0.0681		0.0970
Other Non-Vehicle	0.0002	0.0002		0.0001
Fixed Object	6.5263	5.4842		7.8349
Other Object	0.5060	0.3729		1.0951
Overturning	0.2885	0.2211		3.7364
Other Non-Collision	0.7974	0.6371		4.3422
Left Turn	3.9209	3.9823		1.2773
Right Turn	1.3959	1.4288		1.3697



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-3.252	(\$733,538)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	0.000	\$0
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-12.861	\$11,120,436
CMF 3 - Change in median density openings (close all)	20	\$1.00			\$1.00	\$1.00	-0.381	\$115,133
CMF 4 - Install RIRO at stop controlled intersection	20	\$1.00			\$1.00	\$1.00	-1.535	\$2,562,866
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$8.00	\$0.00	\$0.00	\$8.00	\$8.00	-18.029	\$13,064,897



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator

Net Present Value of Project **\$8.00**

Net Present Value of Safety Benefits **\$13,064,897.34**

Net Benefit **\$13,064,889.34**

Benefit / Cost Ratio **1633112.17**

Expected Annual Crash Adjustment

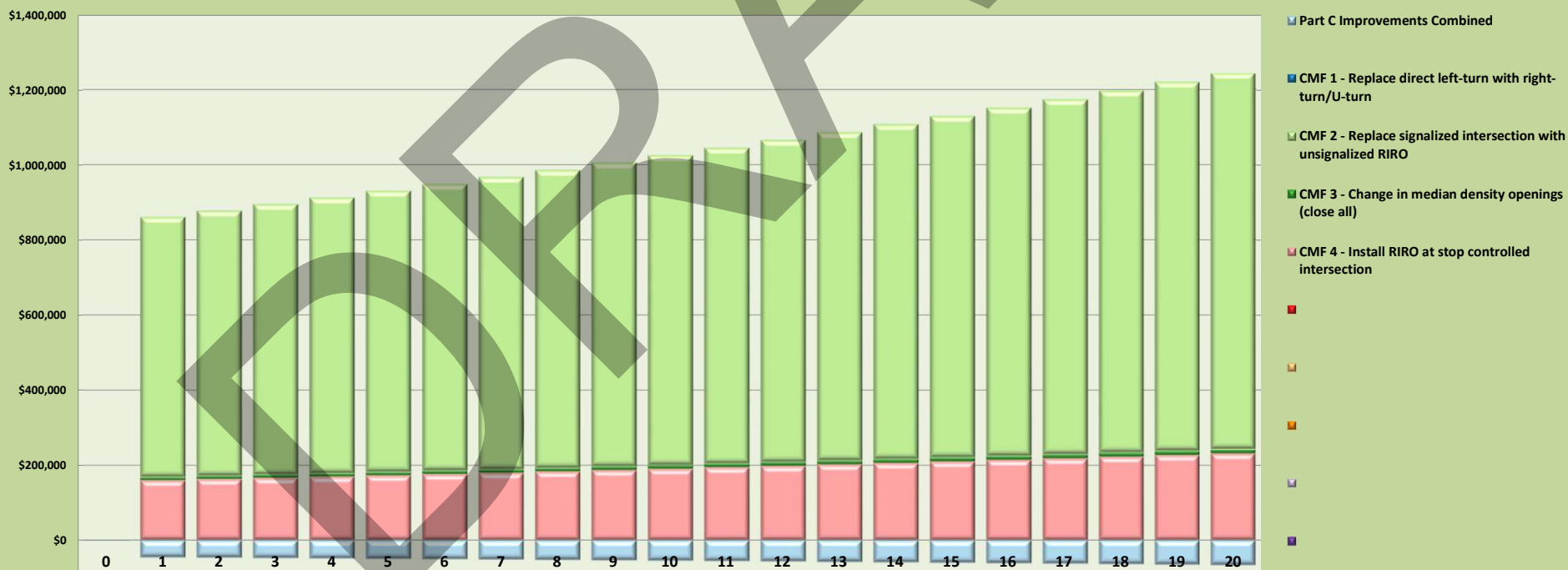
Number of Fatal & Incapacitating Injury Crashes **-0.748**

Number of Injury Crashes **-8.444**

Number of Total Crashes **-18.029**

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year





Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

\$200,000

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Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



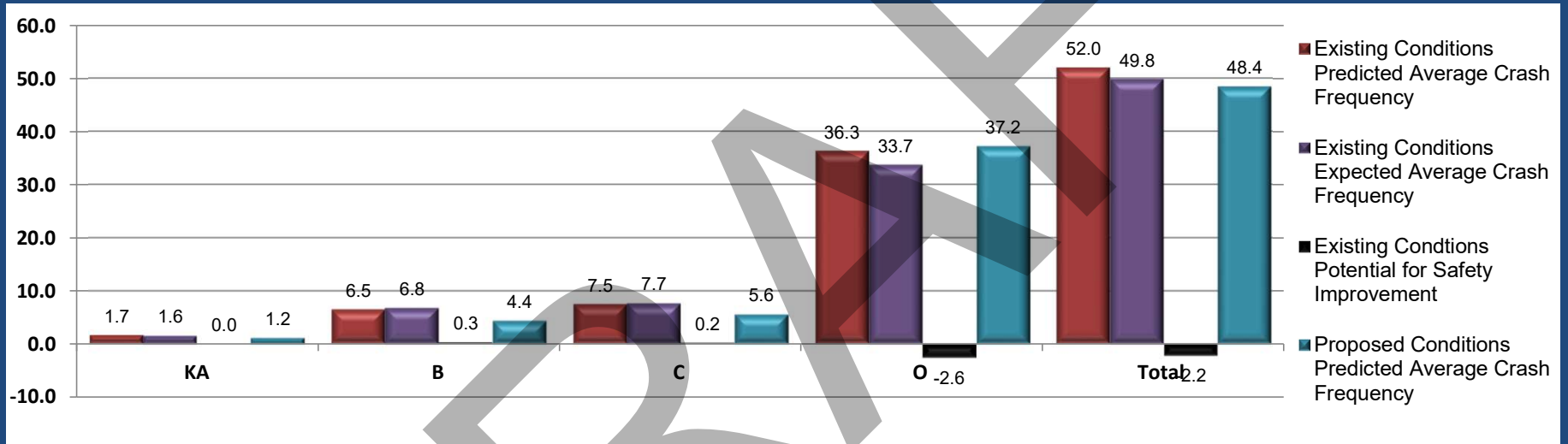


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.6633	6.5414	7.5447	36.2841	52.0335
N_{expected} - Existing Conditions	1.6311	6.8176	7.7185	33.6684	49.8356
$N_{\text{potential for improvement}}$ - Existing Conditions	-0.0322	0.2762	0.1738	-2.6157	-2.1979
$N_{\text{predicted}}$ - Proposed Conditions	1.2242	4.4095	5.5792	37.1716	48.3845



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 12.98-13.171	S of Pennsylvania/Sandusky	0.017	0.1176	0.1083	0.6702	0.9131
US23; 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds	0.0414	0.2082	0.2064	1.1757	1.6317
US23; 13.404-13.769	Del Co Fairgrounds - Pinecrest	0.0649	0.326	0.3231	1.8409	2.5549
US23; 13.769-13.88	Pinecrest - Panhandle	0.0201	0.1002	0.1001	0.5738	0.7942
US23; 13.88-14.064	Panhandle - Shroyer Park N	0.0267	0.1325	0.1316	0.7478	1.0386
US23; 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0254	0.1274	0.1251	0.7047	0.9826
US23; 14.215-14.384	Del Co Govt Bldg - Hills Miller	0.0291	0.1454	0.1434	0.8111	1.129
US23; 14.384-14.715	Hills Miller - Monterey	0.0427	0.2099	0.2078	1.1722	1.6326
US23; 14.715-14.996	Kirkwood - Oakhaven	0.0722	0.0722	0.0722	0.8467	1.0633
US23; 14.996-15.254	Oakhaven - Del Water	0.0666	0.0666	0.0666	0.7774	0.9772
US23; 15.254-15.608	Del Water - Coover	0.0913	0.0913	0.0913	1.0667	1.3406
US23; 15.608-15.69	RR Bridge - Coover	0.0209	0.0209	0.0209	0.2458	0.3085
US23; 13.171	Pennsylvania/Sandusky	0.1512	0.8615	1.1191	3.1314	5.2632
US23; 13.404	Del Co Fairgrounds	0.0464	0.1736	0.1984	0.9291	1.3475
US23; 13.769	Pinecrest	0.0762	0.2804	0.3166	1.7602	2.4334
US23; 13.88	Panhandle	0.1561	0.8868	1.1473	3.1405	5.3307
US23; 14.064	Shroyer Park N	0.0742	0.2749	0.3118	1.618	2.2789
US23; 14.215	Del Co Govt Bldg	0.1292	0.7329	0.9465	2.6985	4.5071
US23; 14.384	Hills Miller	0.1329	0.7593	0.9898	2.8542	4.7362
US23; 14.639	Monterey	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 14.715	Clear Run/Stonebrook	0.0734	0.151	0.089	0.9763	1.2897
US23; 14.757	Kirkwood	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 14.996	Oakhaven	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 15.254	Del Water Treatment	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 15.608	Coover	0.1802	0.5088	0.5746	6.1161	7.3797



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 12.98-13.171	S of Pennsylvania/Sandusky	0.0183	0.1303	0.122	0.3957	0.6663
US23; 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds	0.0351	0.1728	0.1695	0.8186	1.196
US23; 13.404-13.769	Del Co Fairgrounds - Pinecrest	0.0509	0.2477	0.2418	1.885	2.4254
US23; 13.769-13.88	Pinecrest - Panhandle	0.0212	0.1067	0.107	0.4019	0.6368
US23; 13.88-14.064	Panhandle - Shroyer Park N	0.0238	0.1163	0.1149	0.6215	0.8765
US23; 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0297	0.152	0.1507	0.8448	1.1772
US23; 14.215-14.384	Del Co Govt Bldg - Hills Miller	0.026	0.1276	0.125	0.9143	1.1929
US23; 14.384-14.715	Hills Miller - Monterey	0.0414	0.2032	0.2009	1.1599	1.6054
US23; 14.715-14.996	Kirkwood - Oakhaven	0.0402	0.1034	0.0559	0.061	0.2605
US23; 14.996-15.254	Oakhaven - Del Water	0.0369	0.0947	0.0514	0.6169	0.7999
US23; 15.254-15.608	Del Water - Coover	0.0505	0.1298	0.0703	0.5255	0.7761
US23; 15.608-15.69	RR Bridge - Coover	0.0118	0.03	0.0162	0.0178	0.0758
US23; 13.171	Pennsylvania/Sandusky	0.1386	0.7924	1.0333	2.5442	4.5085
US23; 13.404	Del Co Fairgrounds	0.0449	0.1684	0.1927	0.6715	1.0775
US23; 13.769	Pinecrest	0.0744	0.264	0.2895	1.4575	2.0854
US23; 13.88	Panhandle	0.1488	0.8505	1.1095	4.2037	6.3125
US23; 14.064	Shroyer Park N	0.0649	0.2392	0.2709	2.052	2.627
US23; 14.215	Del Co Govt Bldg	0.1455	0.8371	1.1019	3.4562	5.5407
US23; 14.384	Hills Miller	0.1355	0.7697	0.9955	3.5423	5.443
US23; 14.639	Monterey	0.03	0.0705	0.0613	0.5252	0.687
US23; 14.715	Clear Run/Stonebrook	0.0646	0.1329	0.0784	0.6826	0.9585
US23; 14.757	Kirkwood	0.03	0.0705	0.0613	0.5919	0.7537
US23; 14.996	Oakhaven	0.03	0.0705	0.0613	0.5252	0.687
US23; 15.254	Del Water Treatment	0.0354	0.0828	0.0719	0.6976	0.8877
US23; 15.608	Coover	0.3027	0.8546	0.9654	4.4556	6.5783



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 12.98-13.171	S of Pennsylvania/Sandusky	0.0013	0.0127	0.0137	-0.2745	-0.2468
US23; 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds	-0.0063	-0.0354	-0.0369	-0.3571	-0.4357
US23; 13.404-13.769	Del Co Fairgrounds - Pinecrest	-0.014	-0.0783	-0.0813	0.0441	-0.1295
US23; 13.769-13.88	Pinecrest - Panhandle	0.0011	0.0065	0.0069	-0.1719	-0.1574
US23; 13.88-14.064	Panhandle - Shroyer Park N	-0.0029	-0.0162	-0.0167	-0.1263	-0.1621
US23; 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0043	0.0246	0.0256	0.1401	0.1946
US23; 14.215-14.384	Del Co Govt Bldg - Hills Miller	-0.0031	-0.0178	-0.0184	0.1032	0.0639
US23; 14.384-14.715	Hills Miller - Monterey	-0.0013	-0.0067	-0.0069	-0.0123	-0.0272
US23; 14.715-14.996	Kirkwood - Oakhaven	-0.032	0.0312	-0.0163	-0.7857	-0.8028
US23; 14.996-15.254	Oakhaven - Del Water	-0.0297	0.0281	-0.0152	-0.1605	-0.1773
US23; 15.254-15.608	Del Water - Coover	-0.0408	0.0385	-0.021	-0.5412	-0.5645
US23; 15.608-15.69	RR Bridge - Coover	-0.0091	0.0091	-0.0047	-0.228	-0.2327
US23; 13.171	Pennsylvania/Sandusky	-0.0126	-0.0691	-0.0858	-0.5872	-0.7547
US23; 13.404	Del Co Fairgrounds	-0.0015	-0.0052	-0.0057	-0.2576	-0.27
US23; 13.769	Pinecrest	-0.0018	-0.0164	-0.0271	-0.3027	-0.348
US23; 13.88	Panhandle	-0.0073	-0.0363	-0.0378	1.0632	0.9818
US23; 14.064	Shroyer Park N	-0.0093	-0.0357	-0.0409	0.434	0.3481
US23; 14.215	Del Co Govt Bldg	0.0163	0.1042	0.1554	0.7577	1.0336
US23; 14.384	Hills Miller	0.0026	0.0104	0.0057	0.6881	0.7068
US23; 14.639	Monterey	-0.0013	-0.003	-0.0024	-0.0815	-0.0882
US23; 14.715	Clear Run/Stonebrook	-0.0088	-0.0181	-0.0106	-0.2937	-0.3312
US23; 14.757	Kirkwood	-0.0013	-0.003	-0.0024	-0.0148	-0.0215
US23; 14.996	Oakhaven	-0.0013	-0.003	-0.0024	-0.0815	-0.0882
US23; 15.254	Del Water Treatment	0.0041	0.0093	0.0082	0.0909	0.1125
US23; 15.608	Coover	0.1225	0.3458	0.3908	-1.6605	-0.8014



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 12.77-12.97	S of Penn/Sand NB	0.0194	0.0887	0.1091	0.7292	0.9464	
US23; 12.771-13.171	S of Pennsylvania/Sandusky SB	0.0169	0.1051	0.0939	0.5551	0.771	
US23; 12.971-13.371	Pennsylvania NB	0.0366	0.1566	0.218	1.2673	1.6785	
US23; 13.171-13.404	Penn/Sandusky - Del Co Fairgrounds SB	0.0125	0.0771	0.0705	0.4097	0.5698	
US23; 13.371-13.769	Penn/Sand - Pinecrest NB	0.0483	0.2201	0.2717	1.5263	2.0664	
US23; 13.404-13.769	Del Co Fairgrounds - Pinecrest SB	0.0196	0.1207	0.1103	0.6418	0.8924	
US23; 13.769-13.879	Pinecrest - Panhandle	0.0133	0.0877	0.0854	0.5099	0.6963	
US23; 13.881-14.064	Panhandle - Shroyer Park N	0.0133	0.0859	0.0819	0.4826	0.6637	
US23; 14.064-14.215	Shroyer Park N - Del Co Govt Bldg	0.0142	0.0893	0.0861	0.4977	0.6873	
US23; 14.215-14.384	Del Co Govt Bldg - Hills Miller	0.0173	0.1102	0.1057	0.6159	0.8491	
US23; 14.384-14.715	Hills Miller - Monterey	0.0328	0.1696	0.1832	1.0401	1.4257	
US23; 14.715-14.996	Kirkwood - Oakhaven	0.0722	0.0722	0.0722	0.8467	1.0633	
US23; 14.996-15.254	Oakhaven - Del Water	0.0666	0.0666	0.0666	0.7774	0.9772	
US23; 15.254-15.608	Del Water - Coover	0.0913	0.0913	0.0913	1.0667	1.3406	
US23; 15.608-15.69	RR Bridge - Coover	0.0209	0.0209	0.0209	0.2458	0.3085	
US23; 13.172	Sandusky SB	0.0127	0.0742	0.081	0.9032	1.0711	
US23; 13.769	Pinecrest	0.0228	0.0837	0.0945	2.6271	2.8281	
US23; 13.88	Panhandle/Merrick	0.1603	0.7835	1.2193	5.23	7.3931	
US23; 14.064	Shroyer Park N	0.008	0.0301	0.0346	0.6991	0.7718	
US23; 14.215	Del Co Govt Bldg	0.0293	0.1104	0.1374	0.8313	1.1084	
US23; 14.383	Hills Miller	0.1971	0.9776	1.5368	6.478	9.1895	
US23; 14.639	Monterey	0.0241	0.0566	0.0492	0.537	0.6669	
US23; 14.715	Clear Run/Stonebrook	0.0202	0.0415	0.0246	0.4292	0.5155	
US23; 14.757	Kirkwood	0.0241	0.0566	0.0492	0.537	0.6669	
US23; 14.996	Oakhaven	0.0241	0.0566	0.0492	0.537	0.6669	
US23; 15.254	Del Water Treatment	0.0241	0.0566	0.0492	0.537	0.6669	
US23; 15.608	Coover	0.1802	0.5088	0.5746	6.1161	7.3797	
US23; 13.405	Del Co Fairgrounds	0.002	0.0113	0.0128	0.4974	0.5235	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.1253	0.0902	-0.0351	0.1310
Head On	0.6801	0.6902	0.0101	0.4668
Rear End	21.1561	20.9391	-0.2171	15.9718
Backing	1.7634	1.5729	-0.1905	1.9114
Sideswipe - Meeting	0.3359	0.2769	-0.0590	0.1773
Sideswipe - Passing	6.0714	5.8371	-0.2343	4.7575
Angle	7.3431	7.2746	-0.0685	5.0553
Parked Vehicle	0.8111	0.7011	-0.1100	1.7827
Pedestrian	0.1905	0.2139	0.0234	0.4148
Animal	5.6501	3.1588	-2.4914	6.1220
Train	0.0500	0.0454	-0.0046	0.1616
Pedalcycles	0.0717	0.0681	-0.0036	0.0931
Other Non-Vehicle	0.0002	0.0002	0.0000	0.0000
Fixed Object	6.5263	5.4842	-1.0421	8.6068
Other Object	0.5060	0.3729	-0.1331	1.1968
Overturning	0.2885	0.2211	-0.0674	3.8297
Other Non-Collision	0.7974	0.6371	-0.1604	4.4536
Left Turn	3.9209	3.9823	0.0614	2.3987
Right Turn	1.3959	1.4288	0.0329	1.3604



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	6.113	\$419,078
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-4.202	\$2,878,657
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-3.695	\$1,777,634
CMF 3 - Change in median density openings (close all)	20	\$1.00			\$1.00	\$1.00	-0.667	\$284,786
CMF 4 - Install RIRO at stop controlled intersection	20	\$1.00			\$1.00	\$1.00	-1.198	\$2,034,121
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$8.00	\$0.00	\$0.00	\$8.00	\$8.00	-3.649	\$7,394,276



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator

Net Present Value of Project **\$8.00**

Net Present Value of Safety Benefits **\$7,394,276.21**

Net Benefit **\$7,394,268.21**

Benefit / Cost Ratio **924284.53**

Expected Annual Crash Adjustment

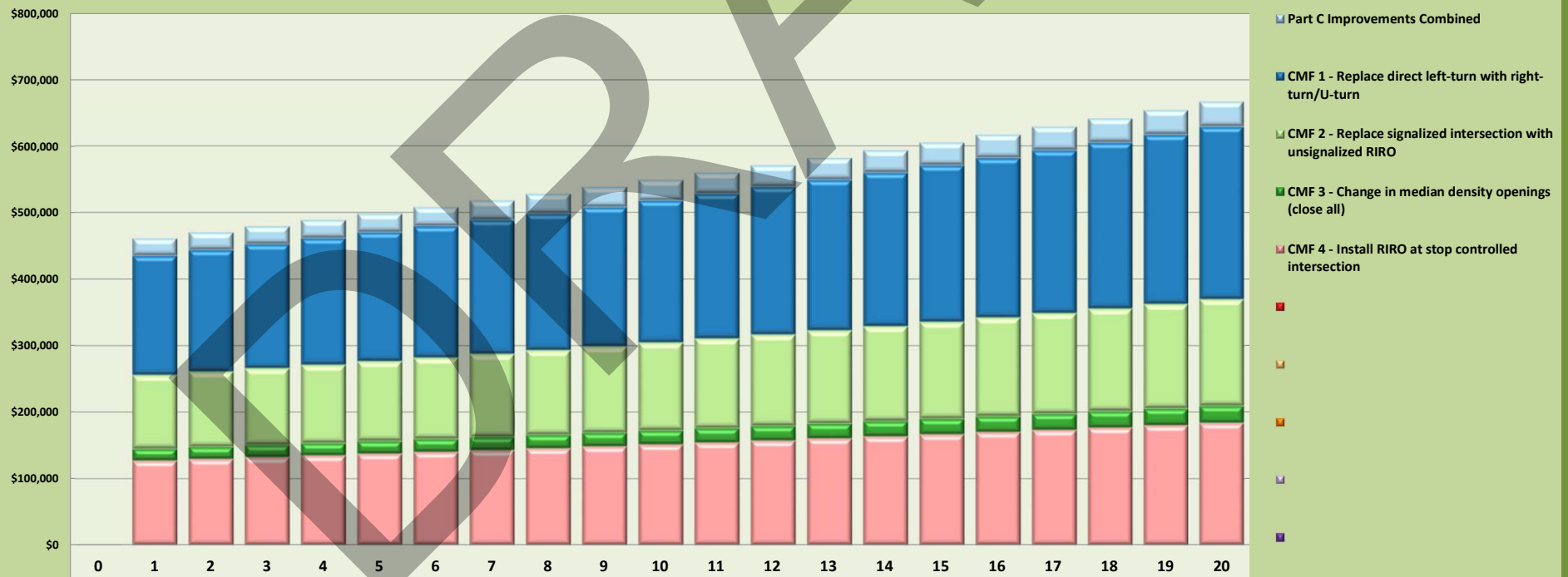
Number of Fatal & Incapacitating Injury Crashes **-0.439**

Number of Injury Crashes **-4.536**

Number of Total Crashes **-3.649**

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year





Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

\$100,000

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Safety Benefit - Cost Analysis

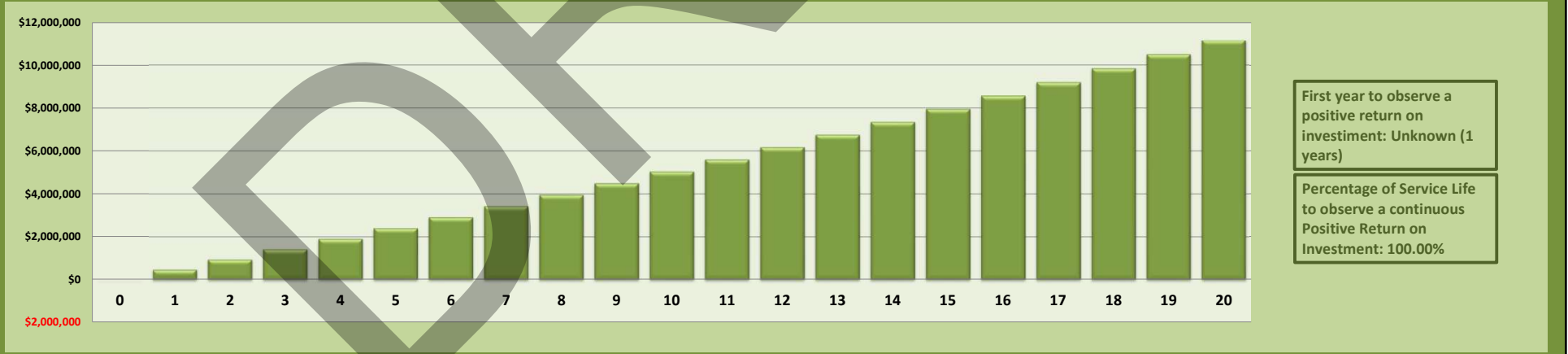
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 6	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



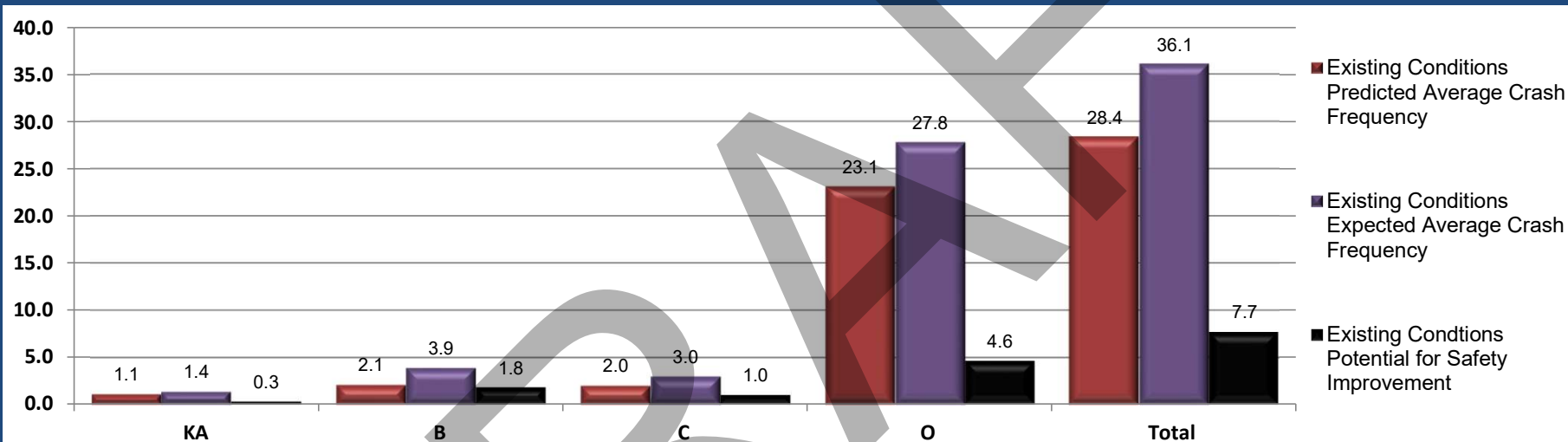


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.1072	2.1060	2.0316	23.1321	28.3769
N_{expected} - Existing Conditions	1.4410	3.8657	3.0322	27.7569	36.0958
$N_{\text{potential for improvement}}$ - Existing Conditions	0.3338	1.7597	1.0006	4.6248	7.7189



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	South of Main	0.0207	0.0207	0.0207	0.2443	0.3064
US23; 16.04-16.259	Main - Del Dam	0.0537	0.0537	0.0537	0.629	0.7901
US23; 16.259-16.619	Del Dam - Penry	0.0287	0.0287	0.0287	0.5055	0.5916
US23; 16.619-16.838	Penry - Downing	0.0188	0.0188	0.0188	0.3288	0.3852
US23; 16.838-17.213	Downing - Willey	0.0318	0.0318	0.0318	0.5607	0.6561
US23; 17.213-17.558	Willey - Del State Park	0.0275	0.0275	0.0275	0.4843	0.5668
US23; 17.558-17.663	Del State Park - Troutman	0.0082	0.0082	0.0082	0.1474	0.172
US23; 17.663-18.336	Troutman - Irwin	0.0535	0.0535	0.0535	0.9448	1.1053
US23; 18.336-18.76	Irwin - Radnor	0.0331	0.0331	0.0331	0.5837	0.683
US23; 18.76-21.434	Radnor - SR 229	0.2089	0.2089	0.2089	3.6807	4.3074
US23; 21.434-21.558	US 23 - North of 229	0.0096	0.0096	0.0096	0.1726	0.2014
US23; 0-0.53	US 23 - Marion Co	0.0418	0.0418	0.0418	0.7378	0.8632
US23; 16.04	Main	0.0586	0.1367	0.1187	0.9443	1.2583
US23; 16.259	Del Dam	0.0241	0.0566	0.0492	0.537	0.6669
US23; 16.619	Penry	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 16.838	Downing	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 17.213	Willey	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 17.558	Del State Park	0.0373	0.2288	0.1915	1.6859	2.1435
US23; 17.663	Troutman	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 18.336	Irwin	0.0241	0.0566	0.0492	0.537	0.6669
US23; 18.76	Radnor	0.0419	0.0983	0.0854	0.8038	1.0294
US23; 21.434	SR 229	0.1892	0.534	0.6034	6.2885	7.6151



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	South of Main	0.0116	0.0297	0.016	0.0172	0.0745
US23; 16.04-16.259	Main - Del Dam	0.0808	0.2074	0.1125	0.2679	0.6686
US23; 16.259-16.619	Del Dam - Penry	0.0246	0.0633	0.0342	0.575	0.6971
US23; 16.619-16.838	Penry - Downing	0.0159	0.0408	0.0222	0.0803	0.1592
US23; 16.838-17.213	Downing - Willey	0.0356	0.092	0.0496	0.5704	0.7476
US23; 17.213-17.558	Willey - Del State Park	0.0318	0.0816	0.0442	0.9949	1.1525
US23; 17.558-17.663	Del State Park - Troutman	0.0073	0.0181	0.01	0.0383	0.0737
US23; 17.663-18.336	Troutman - Irwin	0.0707	0.1815	0.0983	1.0768	1.4273
US23; 18.336-18.76	Irwin - Radnor	0.0446	0.1148	0.0622	0.9993	1.2209
US23; 18.76-21.434	Radnor - SR 229	0.2926	0.752	0.4074	5.4773	6.9293
US23; 21.434-21.558	US 23 - North of 229	0.0166	0.0426	0.0231	0.1153	0.1976
US23; 0-0.53	US 23 - Marion Co	0.0605	0.1553	0.0842	1.1995	1.4995
US23; 16.04	Main	0.0539	0.1263	0.1096	1.5677	1.8575
US23; 16.259	Del Dam	0.0235	0.0549	0.0476	0.5412	0.6672
US23; 16.619	Penry	0.051	0.119	0.1035	0.7761	1.0496
US23; 16.838	Downing	0.0329	0.0766	0.0666	0.7117	0.8878
US23; 17.213	Willey	0.0556	0.1295	0.1126	1.0311	1.3288
US23; 17.558	Del State Park	0.0432	0.2647	0.2216	1.0859	1.6154
US23; 17.663	Troutman	0.0597	0.1398	0.1214	1.3793	1.7002
US23; 18.336	Irwin	0.0235	0.0549	0.0476	0.6004	0.7264
US23; 18.76	Radnor	0.0468	0.1093	0.095	0.9383	1.1894
US23; 21.434	SR 229	0.3583	1.0116	1.1428	7.713	10.2257



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 15.96-16.04	South of Main	-0.0091	0.009	-0.0047	-0.2271	-0.2319	
US23; 16.04-16.259	Main - Del Dam	0.0271	0.1537	0.0588	-0.3611	-0.1215	
US23; 16.259-16.619	Del Dam - Penry	-0.0041	0.0346	0.0055	0.0695	0.1055	
US23; 16.619-16.838	Penry - Downing	-0.0029	0.022	0.0034	-0.2485	-0.226	
US23; 16.838-17.213	Downing - Willey	0.0038	0.0602	0.0178	0.0097	0.0915	
US23; 17.213-17.558	Willey - Del State Park	0.0043	0.0541	0.0167	0.5106	0.5857	
US23; 17.558-17.663	Del State Park - Troutman	-0.0009	0.0099	0.0018	-0.1091	-0.0983	
US23; 17.663-18.336	Troutman - Irwin	0.0172	0.128	0.0448	0.132	0.322	
US23; 18.336-18.76	Irwin - Radnor	0.0115	0.0817	0.0291	0.4156	0.5379	
US23; 18.76-21.434	Radnor - SR 229	0.0837	0.5431	0.1985	1.7966	2.6219	
US23; 21.434-21.558	US 23 - North of 229	0.007	0.033	0.0135	-0.0573	-0.0038	
US23; 0-0.53	US 23 - Marion Co	0.0187	0.1135	0.0424	0.4617	0.6363	
US23; 16.04	Main	-0.0047	-0.0104	-0.0091	0.6234	0.5992	
US23; 16.259	Del Dam	-0.0006	-0.0017	-0.0016	0.0042	0.0003	
US23; 16.619	Penry	-0.0038	-0.0094	-0.0079	-0.127	-0.1481	
US23; 16.838	Downing	0.0016	0.0031	0.0029	0.105	0.1126	
US23; 17.213	Willey	0.0008	0.0011	0.0012	0.128	0.1311	
US23; 17.558	Del State Park	0.0059	0.0359	0.0301	-0.6	-0.5281	
US23; 17.663	Troutman	0.0049	0.0114	0.01	0.4762	0.5025	
US23; 18.336	Irwin	-0.0006	-0.0017	-0.0016	0.0634	0.0595	
US23; 18.76	Radnor	0.0049	0.011	0.0096	0.1345	0.16	
US23; 21.434	SR 229	0.1691	0.4776	0.5394	1.4245	2.6106	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

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Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.1878	0.2315	0.0437	
Head On	0.3082	0.3881	0.0799	
Rear End	7.4383	9.4864	2.0481	
Backing	1.4629	1.7781	0.3152	
Sideswipe - Meeting	0.1869	0.2274	0.0405	
Sideswipe - Passing	3.4570	4.3587	0.9017	
Angle	3.8391	4.8014	0.9623	
Parked Vehicle	0.7270	0.9083	0.1813	
Pedestrian	0.1507	0.2024	0.0517	
Animal	13.8259	17.9292	4.1033	
Train	0.0038	0.0046	0.0008	
Pedalcycles	0.0494	0.0449	-0.0045	
Other Non-Vehicle	0.0000	0.0000	0.0000	
Fixed Object	6.3480	8.3804	2.0324	
Other Object	0.8080	1.0239	0.2159	
Overturning	0.4913	0.6665	0.1752	
Other Non-Collision	0.9490	1.1751	0.2261	
Left Turn	1.3496	1.6930	0.3434	
Right Turn	0.6199	0.7251	0.1052	

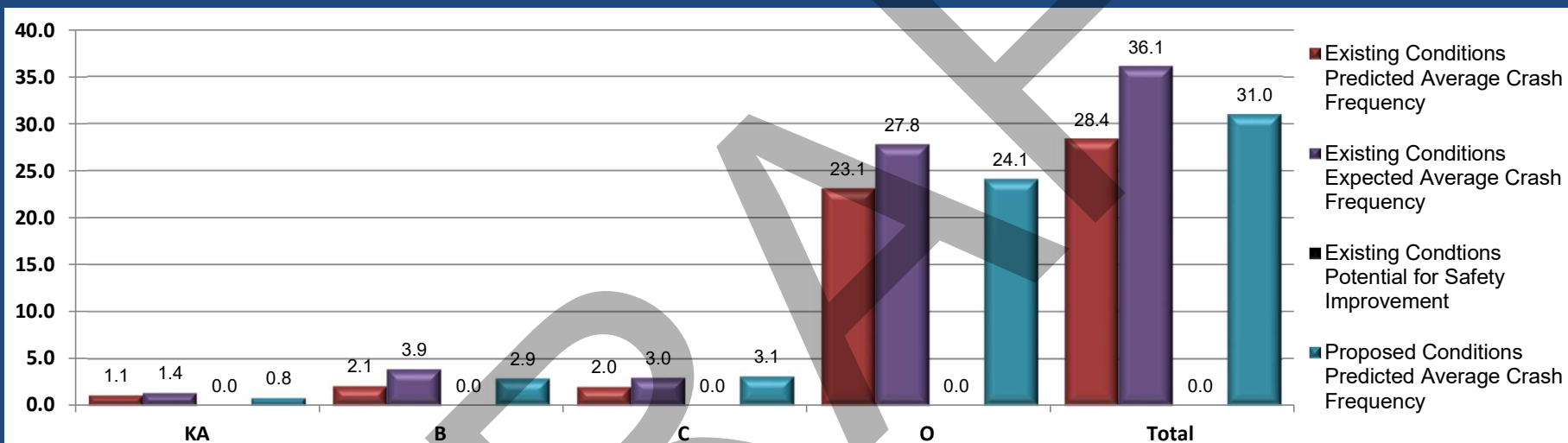


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.1072	2.1060	2.0316	23.1321	28.3769
N_{expected} - Existing Conditions	1.4410	3.8657	3.0322	27.7569	36.0958
$N_{\text{potential for improvement}}$ - Existing Conditions	0.0000	0.0000	0.0000	0.0000	0.0000
N_{expected} - Proposed Conditions	0.8349	2.9464	3.0898	24.1011	30.9722



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	Main - South of Main	0.0207	0.0207	0.0207	0.2443	0.3064
US23; 16.04-16.259	Main - Del Dam	0.0537	0.0537	0.0537	0.629	0.7901
US23; 16.259-16.619	Del Dam - Penry	0.0287	0.0287	0.0287	0.5055	0.5916
US23; 16.619-16.838	Penry - Downing	0.0188	0.0188	0.0188	0.3288	0.3852
US23; 16.838-17.213	Downing - Willey	0.0318	0.0318	0.0318	0.5607	0.6561
US23; 17.213-17.558	Willey - Del State Park	0.0275	0.0275	0.0275	0.4843	0.5668
US23; 17.558-17.663	Del State Park - Troutman	0.0082	0.0082	0.0082	0.1474	0.172
US23; 17.663-18.336	Troutman - Irwin	0.0535	0.0535	0.0535	0.9448	1.1053
US23; 18.336-18.76	Irwin - Radnor	0.0331	0.0331	0.0331	0.5837	0.683
US23; 18.76-21.434	Radnor - SR 229	0.2089	0.2089	0.2089	3.6807	4.3074
US23; 21.434-21.558	US 23 - North of 229	0.0096	0.0096	0.0096	0.1726	0.2014
US23; 0-0.53	US 23 - Marion Co	0.0418	0.0418	0.0418	0.7378	0.8632
US23; 16.04	Main	0.0586	0.1367	0.1187	0.9443	1.2583
US23; 16.259	Del Dam	0.0241	0.0566	0.0492	0.537	0.6669
US23; 16.619	Penry	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 16.838	Downing	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 17.213	Willey	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 17.558	Del State Park	0.0373	0.2288	0.1915	1.6859	2.1435
US23; 17.663	Troutman	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 18.336	Irwin	0.0241	0.0566	0.0492	0.537	0.6669
US23; 18.76	Radnor	0.0419	0.0983	0.0854	0.8038	1.0294
US23; 21.434	SR 229	0.1892	0.534	0.6034	6.2885	7.6151



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	Main - South of Main	0.0116	0.0297	0.016	0.0172	0.0745
US23; 16.04-16.259	Main - Del Dam	0.0808	0.2074	0.1125	0.2679	0.6686
US23; 16.259-16.619	Del Dam - Penry	0.0246	0.0633	0.0342	0.575	0.6971
US23; 16.619-16.838	Penry - Downing	0.0159	0.0408	0.0222	0.0803	0.1592
US23; 16.838-17.213	Downing - Willey	0.0356	0.092	0.0496	0.5704	0.7476
US23; 17.213-17.558	Willey - Del State Park	0.0318	0.0816	0.0442	0.9949	1.1525
US23; 17.558-17.663	Del State Park - Troutman	0.0073	0.0181	0.01	0.0383	0.0737
US23; 17.663-18.336	Troutman - Irwin	0.0707	0.1815	0.0983	1.0768	1.4273
US23; 18.336-18.76	Irwin - Radnor	0.0446	0.1148	0.0622	0.9993	1.2209
US23; 18.76-21.434	Radnor - SR 229	0.2926	0.752	0.4074	5.4773	6.9293
US23; 21.434-21.558	US 23 - North of 229	0.0166	0.0426	0.0231	0.1153	0.1976
US23; 0-0.53	US 23 - Marion Co	0.0605	0.1553	0.0842	1.1995	1.4995
US23; 16.04	Main	0.0539	0.1263	0.1096	1.5677	1.8575
US23; 16.259	Del Dam	0.0235	0.0549	0.0476	0.5412	0.6672
US23; 16.619	Penry	0.051	0.119	0.1035	0.7761	1.0496
US23; 16.838	Downing	0.0329	0.0766	0.0666	0.7117	0.8878
US23; 17.213	Willey	0.0556	0.1295	0.1126	1.0311	1.3288
US23; 17.558	Del State Park	0.0432	0.2647	0.2216	1.0859	1.6154
US23; 17.663	Troutman	0.0597	0.1398	0.1214	1.3793	1.7002
US23; 18.336	Irwin	0.0235	0.0549	0.0476	0.6004	0.7264
US23; 18.76	Radnor	0.0468	0.1093	0.095	0.9383	1.1894
US23; 21.434	SR 229	0.3583	1.0116	1.1428	7.713	10.2257



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 15.96-16.04	Main - South of Main	-0.0091	0.009	-0.0047	-0.2271	-0.2319
US23; 16.04-16.259	Main - Del Dam	0.0271	0.1537	0.0588	-0.3611	-0.1215
US23; 16.259-16.619	Del Dam - Penry	-0.0041	0.0346	0.0055	0.0695	0.1055
US23; 16.619-16.838	Penry - Downing	-0.0029	0.022	0.0034	-0.2485	-0.226
US23; 16.838-17.213	Downing - Willey	0.0038	0.0602	0.0178	0.0097	0.0915
US23; 17.213-17.558	Willey - Del State Park	0.0043	0.0541	0.0167	0.5106	0.5857
US23; 17.558-17.663	Del State Park - Troutman	-0.0009	0.0099	0.0018	-0.1091	-0.0983
US23; 17.663-18.336	Troutman - Irwin	0.0172	0.128	0.0448	0.132	0.322
US23; 18.336-18.76	Irwin - Radnor	0.0115	0.0817	0.0291	0.4156	0.5379
US23; 18.76-21.434	Radnor - SR 229	0.0837	0.5431	0.1985	1.7966	2.6219
US23; 21.434-21.558	US 23 - North of 229	0.007	0.033	0.0135	-0.0573	-0.0038
US23; 0-0.53	US 23 - Marion Co	0.0187	0.1135	0.0424	0.4617	0.6363
US23; 16.04	Main	-0.0047	-0.0104	-0.0091	0.6234	0.5992
US23; 16.259	Del Dam	-0.0006	-0.0017	-0.0016	0.0042	0.0003
US23; 16.619	Penry	-0.0038	-0.0094	-0.0079	-0.127	-0.1481
US23; 16.838	Downing	0.0016	0.0031	0.0029	0.105	0.1126
US23; 17.213	Willey	0.0008	0.0011	0.0012	0.128	0.1311
US23; 17.558	Del State Park	0.0059	0.0359	0.0301	-0.6	-0.5281
US23; 17.663	Troutman	0.0049	0.0114	0.01	0.4762	0.5025
US23; 18.336	Irwin	-0.0006	-0.0017	-0.0016	0.0634	0.0595
US23; 18.76	Radnor	0.0049	0.011	0.0096	0.1345	0.16
US23; 21.434	SR 229	0.1691	0.4776	0.5394	1.4245	2.6106



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 0-0.53	US 23 - Marion Co NB	0.0289	0.1352	0.1486	1.0195	1.3322
US23; 15.96-16.04	Main - South of Main	0.0073	0.0073	0.0073	0.1274	0.1493
US23; 16.04-16.259	Main - Del Dam	0.0187	0.0187	0.0187	0.3275	0.3836
US23; 16.259-16.619	Del Dam - Penry	0.0287	0.0287	0.0287	0.5055	0.5916
US23; 16.619-16.838	Penry - Downing	0.0188	0.0188	0.0188	0.3288	0.3852
US23; 16.838-17.213	Downing - Willey	0.0318	0.0318	0.0318	0.5607	0.6561
US23; 17.213-17.558	Willey - Del State Park	0.0275	0.0275	0.0275	0.4843	0.5668
US23; 17.558-17.663	Del State Park - Troutman	0.0086	0.0086	0.0086	0.1503	0.1761
US23; 16.04	Main	0.0385	0.0946	0.0829	0.7921	1.0081
US23; 16.619	Penry	0.036	0.0889	0.0778	0.7575	0.9602
US23; 16.838	Downing	0.0206	0.0509	0.0445	0.5089	0.6249
US23; 17.213	Willey	0.036	0.0889	0.0778	0.7575	0.9602
US23; 17.558	Del State Park	0.0046	0.0133	0.0113	0.1233	0.1525
US23; 17.663	Troutman	0.036	0.0889	0.0778	0.7575	0.9602
US23; 0-0.54	US 23 - Marion Co SB	0.0294	0.1378	0.1512	1.0388	1.3572
US23; 21.234-21.434	SR 229 NB Exit	0.0111	0.0511	0.056	0.3847	0.5029
US23; 21.434-21.635	SR 229 NB Entrance	0.0111	0.0515	0.0565	0.3865	0.5056
US23; 21.434-21.634	SR 229 SB Exit	0.0111	0.0511	0.056	0.3847	0.5029
US23; 21.233-21.434	SR 229 SB Entrance	0.0111	0.0515	0.0565	0.3865	0.5056
US23; 17.663-21.234	Troutman - 229 NB	0.199	0.9211	1.0019	6.9294	9.0514
US23; 17.663-21.233	Troutman - 229 SB	0.2043	0.941	1.0153	6.9393	9.0999
US23; 16.259	Del Dam	0.0158	0.0392	0.0343	0.4504	0.5397



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing		PSI	Proposed
	Predicted Crash Frequency	Expected Crash Frequency		Predicted Crash Frequency
Unknown	0.1878	0.2315		0.0967
Head On	0.3082	0.3881		0.1343
Rear End	7.4383	9.4864		1.9559
Backing	1.4629	1.7781		5.0025
Sideswipe - Meeting	0.1869	0.2274		0.0480
Sideswipe - Passing	3.4570	4.3587		1.1895
Angle	3.8391	4.8014		1.0011
Parked Vehicle	0.7270	0.9083		7.0670
Pedestrian	0.1507	0.2024		1.9697
Animal	13.8259	17.9292		3.9765
Train	0.0038	0.0046		1.5043
Pedalcycles	0.0494	0.0449		0.0204
Other Non-Vehicle	0.0000	0.0000		0.0000
Fixed Object	6.3480	8.3804		24.3188
Other Object	0.8080	1.0239		4.7037
Overturning	0.4913	0.6665		17.6194
Other Non-Collision	0.9490	1.1751		22.3858
Left Turn	1.3496	1.6930		0.3227
Right Turn	0.6199	0.7251		0.1989



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	4.348	(\$980,586)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-1.240	\$1,153,692
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-0.514	\$240,725
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	2.594	\$413,832



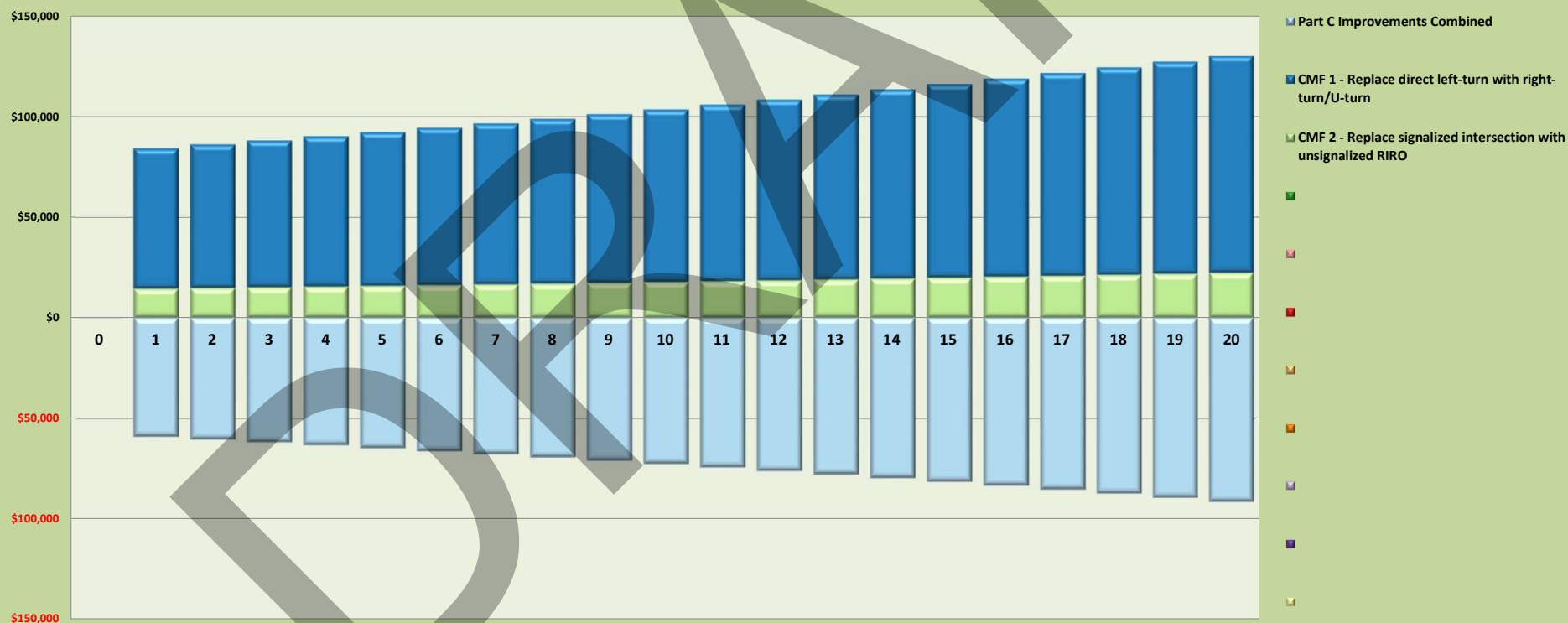
Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator		Expected Annual Crash Adjustment		Comments:
Net Present Value of Project	\$6.00	Number of Fatal & Incapacitating Injury Crashes	-0.273	
Net Present Value of Safety Benefits	\$413,832.31	Number of Injury Crashes	1.625	
Net Benefit	\$413,826.31	Number of Total Crashes	2.594	
Benefit / Cost Ratio	68972.05			

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



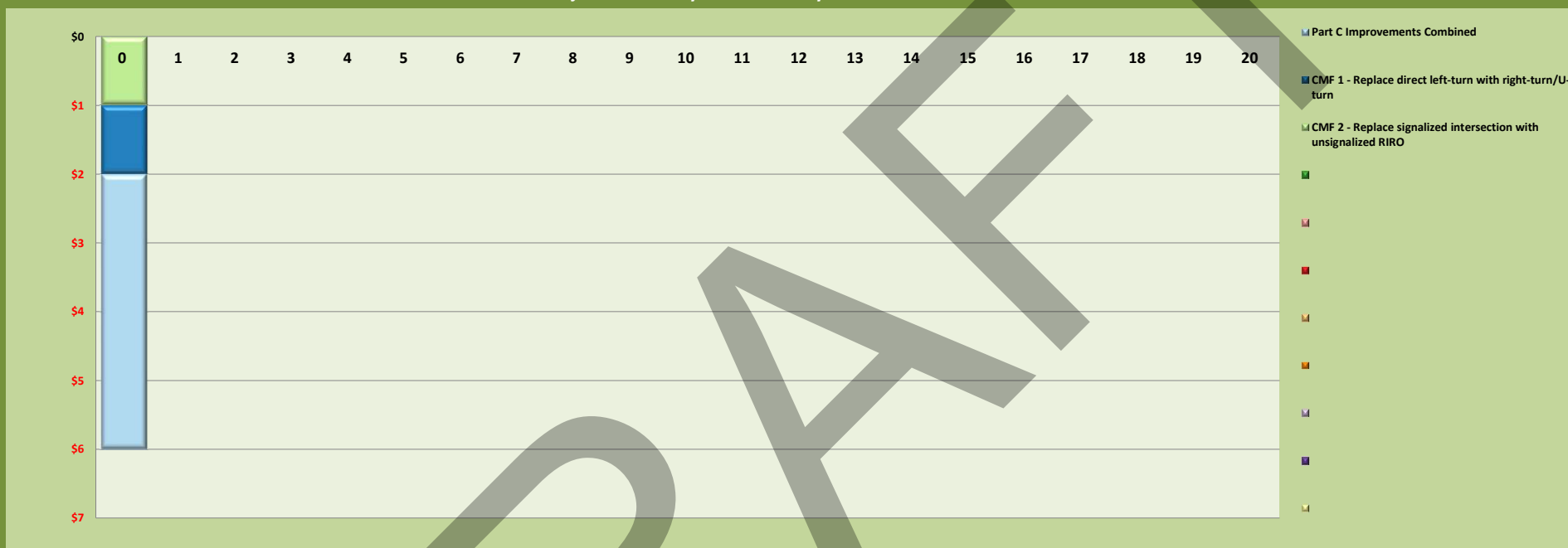


Safety Benefit - Cost Analysis

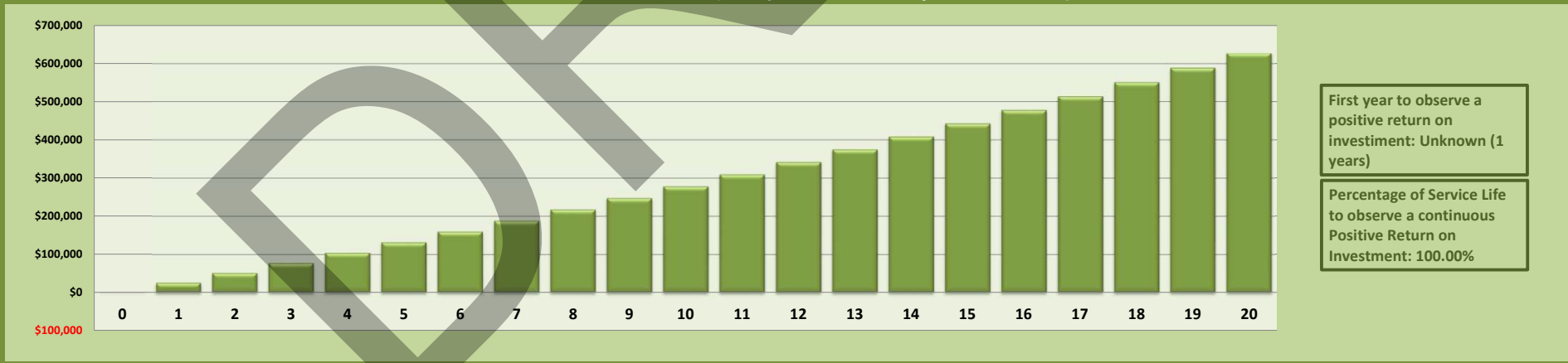
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



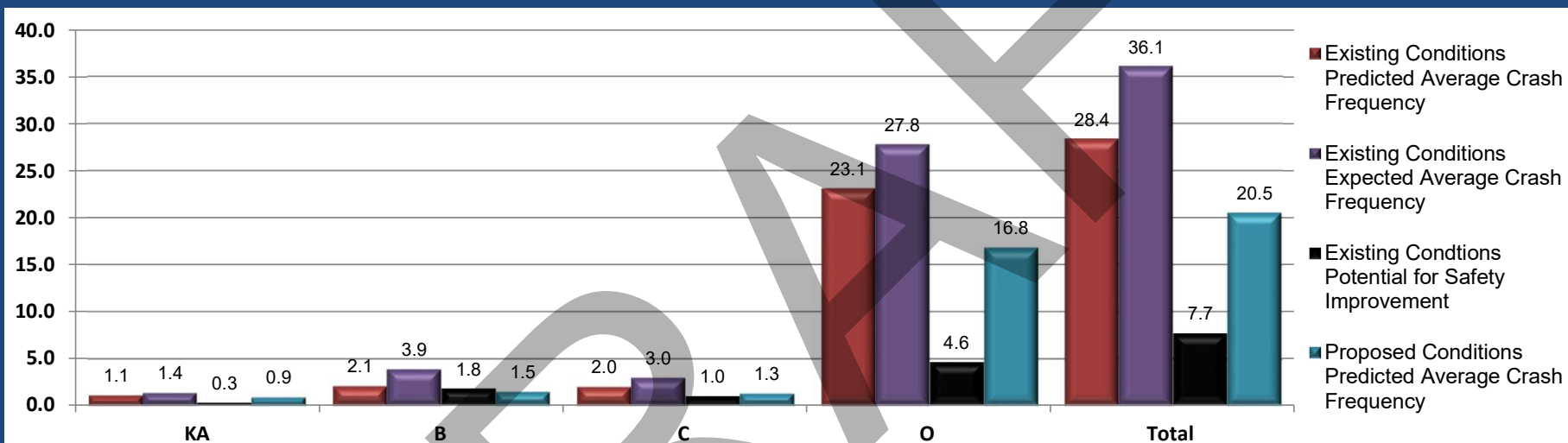


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept B	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.1072	2.1060	2.0316	23.1321	28.3769
N_{expected} - Existing Conditions	1.4410	3.8657	3.0322	27.7569	36.0958
$N_{\text{potential for improvement}}$ - Existing Conditions	0.3338	1.7597	1.0006	4.6248	7.7189
$N_{\text{predicted}}$ - Proposed Conditions	0.8834	1.4654	1.3190	16.8136	20.4814



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept B	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	South of Main	0.0207	0.0207	0.0207	0.2443	0.3064
US23; 16.04-16.259	Main - Del Dam	0.0537	0.0537	0.0537	0.629	0.7901
US23; 16.259-16.619	Del Dam - Penry	0.0287	0.0287	0.0287	0.5055	0.5916
US23; 16.619-16.838	Penry - Downing	0.0188	0.0188	0.0188	0.3288	0.3852
US23; 16.838-17.213	Downing - Willey	0.0318	0.0318	0.0318	0.5607	0.6561
US23; 17.213-17.558	Willey - Del State Park	0.0275	0.0275	0.0275	0.4843	0.5668
US23; 17.558-17.663	Del State Park - Troutman	0.0082	0.0082	0.0082	0.1474	0.172
US23; 17.663-18.336	Troutman - Irwin	0.0535	0.0535	0.0535	0.9448	1.1053
US23; 18.336-18.76	Irwin - Radnor	0.0331	0.0331	0.0331	0.5837	0.683
US23; 18.76-21.434	Radnor - SR 229	0.2089	0.2089	0.2089	3.6807	4.3074
US23; 21.434-21.558	US 23 - North of 229	0.0096	0.0096	0.0096	0.1726	0.2014
US23; 0-0.53	US 23 - Marion Co	0.0418	0.0418	0.0418	0.7378	0.8632
US23; 16.04	Main	0.0586	0.1367	0.1187	0.9443	1.2583
US23; 16.259	Del Dam	0.0241	0.0566	0.0492	0.537	0.6669
US23; 16.619	Penry	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 16.838	Downing	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 17.213	Willey	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 17.558	Del State Park	0.0373	0.2288	0.1915	1.6859	2.1435
US23; 17.663	Troutman	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 18.336	Irwin	0.0241	0.0566	0.0492	0.537	0.6669
US23; 18.76	Radnor	0.0419	0.0983	0.0854	0.8038	1.0294
US23; 21.434	SR 229	0.1892	0.534	0.6034	6.2885	7.6151



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept B	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	South of Main	0.0116	0.0297	0.016	0.0172	0.0745
US23; 16.04-16.259	Main - Del Dam	0.0808	0.2074	0.1125	0.2679	0.6686
US23; 16.259-16.619	Del Dam - Penry	0.0246	0.0633	0.0342	0.575	0.6971
US23; 16.619-16.838	Penry - Downing	0.0159	0.0408	0.0222	0.0803	0.1592
US23; 16.838-17.213	Downing - Willey	0.0356	0.092	0.0496	0.5704	0.7476
US23; 17.213-17.558	Willey - Del State Park	0.0318	0.0816	0.0442	0.9949	1.1525
US23; 17.558-17.663	Del State Park - Troutman	0.0073	0.0181	0.01	0.0383	0.0737
US23; 17.663-18.336	Troutman - Irwin	0.0707	0.1815	0.0983	1.0768	1.4273
US23; 18.336-18.76	Irwin - Radnor	0.0446	0.1148	0.0622	0.9993	1.2209
US23; 18.76-21.434	Radnor - SR 229	0.2926	0.752	0.4074	5.4773	6.9293
US23; 21.434-21.558	US 23 - North of 229	0.0166	0.0426	0.0231	0.1153	0.1976
US23; 0-0.53	US 23 - Marion Co	0.0605	0.1553	0.0842	1.1995	1.4995
US23; 16.04	Main	0.0539	0.1263	0.1096	1.5677	1.8575
US23; 16.259	Del Dam	0.0235	0.0549	0.0476	0.5412	0.6672
US23; 16.619	Penry	0.051	0.119	0.1035	0.7761	1.0496
US23; 16.838	Downing	0.0329	0.0766	0.0666	0.7117	0.8878
US23; 17.213	Willey	0.0556	0.1295	0.1126	1.0311	1.3288
US23; 17.558	Del State Park	0.0432	0.2647	0.2216	1.0859	1.6154
US23; 17.663	Troutman	0.0597	0.1398	0.1214	1.3793	1.7002
US23; 18.336	Irwin	0.0235	0.0549	0.0476	0.6004	0.7264
US23; 18.76	Radnor	0.0468	0.1093	0.095	0.9383	1.1894
US23; 21.434	SR 229	0.3583	1.0116	1.1428	7.713	10.2257



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept B	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				
		KA	B	C	O	Total
US23; 15.96-16.04	South of Main	-0.0091	0.009	-0.0047	-0.2271	-0.2319
US23; 16.04-16.259	Main - Del Dam	0.0271	0.1537	0.0588	-0.3611	-0.1215
US23; 16.259-16.619	Del Dam - Penry	-0.0041	0.0346	0.0055	0.0695	0.1055
US23; 16.619-16.838	Penry - Downing	-0.0029	0.022	0.0034	-0.2485	-0.226
US23; 16.838-17.213	Downing - Willey	0.0038	0.0602	0.0178	0.0097	0.0915
US23; 17.213-17.558	Willey - Del State Park	0.0043	0.0541	0.0167	0.5106	0.5857
US23; 17.558-17.663	Del State Park - Troutman	-0.0009	0.0099	0.0018	-0.1091	-0.0983
US23; 17.663-18.336	Troutman - Irwin	0.0172	0.128	0.0448	0.132	0.322
US23; 18.336-18.76	Irwin - Radnor	0.0115	0.0817	0.0291	0.4156	0.5379
US23; 18.76-21.434	Radnor - SR 229	0.0837	0.5431	0.1985	1.7966	2.6219
US23; 21.434-21.558	US 23 - North of 229	0.007	0.033	0.0135	-0.0573	-0.0038
US23; 0-0.53	US 23 - Marion Co	0.0187	0.1135	0.0424	0.4617	0.6363
US23; 16.04	Main	-0.0047	-0.0104	-0.0091	0.6234	0.5992
US23; 16.259	Del Dam	-0.0006	-0.0017	-0.0016	0.0042	0.0003
US23; 16.619	Penry	-0.0038	-0.0094	-0.0079	-0.127	-0.1481
US23; 16.838	Downing	0.0016	0.0031	0.0029	0.105	0.1126
US23; 17.213	Willey	0.0008	0.0011	0.0012	0.128	0.1311
US23; 17.558	Del State Park	0.0059	0.0359	0.0301	-0.6	-0.5281
US23; 17.663	Troutman	0.0049	0.0114	0.01	0.4762	0.5025
US23; 18.336	Irwin	-0.0006	-0.0017	-0.0016	0.0634	0.0595
US23; 18.76	Radnor	0.0049	0.011	0.0096	0.1345	0.16
US23; 21.434	SR 229	0.1691	0.4776	0.5394	1.4245	2.6106



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept B	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	Main - South of Main	0.0207	0.0207	0.0207	0.2443	0.3064
US23; 16.04-16.259	Main - Del Dam	0.0537	0.0537	0.0537	0.629	0.7901
US23; 16.259-16.619	Del Dam - Penry	0.0287	0.0287	0.0287	0.5055	0.5916
US23; 16.619-16.838	Penry - Downing	0.0188	0.0188	0.0188	0.3288	0.3852
US23; 16.838-17.213	Downing - Willey	0.0318	0.0318	0.0318	0.5607	0.6561
US23; 17.213-17.558	Willey - Del State Park	0.0275	0.0275	0.0275	0.4843	0.5668
US23; 17.558-17.663	Del State Park - Troutman	0.0082	0.0082	0.0082	0.1474	0.172
US23; 17.663-18.336	Troutman - Irwin	0.0535	0.0535	0.0535	0.9448	1.1053
US23; 18.336-21.434	Radnor - SR 229	0.2426	0.2426	0.2426	4.2696	4.9974
US23; 21.434-21.558	US 23 - North of 229	0.0096	0.0096	0.0096	0.1726	0.2014
US23; 0-0.53	US 23 - Marion Co	0.0418	0.0418	0.0418	0.7378	0.8632
US23; 16.04	Main	0.0296	0.0727	0.0638	0.7049	0.871
US23; 16.259	Del Dam	0.0352	0.087	0.0763	0.7568	0.9553
US23; 16.619	Penry	0.0277	0.0684	0.0599	0.6737	0.8297
US23; 16.838	Downing	0.0352	0.087	0.0763	0.7568	0.9553
US23; 17.213	Willey	0.0618	0.152	0.1332	1.12	1.467
US23; 17.558	Del State Park	0.0267	0.1651	0.1468	1.4115	1.7501
US23; 17.663	Troutman	0.0618	0.152	0.1332	1.12	1.467
US23; 18.337	Frontage Rd access	0.0397	0.0835	0.0497	0.812	0.9849
US23; 21.433	SR 229 CRs	0.0288	0.0608	0.0429	0.4331	0.5656



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept B	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.1878	0.2315	0.0437	0.1737
Head On	0.3082	0.3881	0.0799	0.1647
Rear End	7.4383	9.4864	2.0481	4.6631
Backing	1.4629	1.7781	0.3152	0.6630
Sideswipe - Meeting	0.1869	0.2274	0.0405	0.1800
Sideswipe - Passing	3.4570	4.3587	0.9017	2.7614
Angle	3.8391	4.8014	0.9623	2.2289
Parked Vehicle	0.7270	0.9083	0.1813	0.4592
Pedestrian	0.1507	0.2024	0.0517	0.0761
Animal	13.8259	17.9292	4.1033	13.8340
Train	0.0038	0.0046	0.0008	0.0000
Pedalcycles	0.0494	0.0449	-0.0045	0.0331
Other Non-Vehicle	0.0000	0.0000	0.0000	0.0000
Fixed Object	6.3480	8.3804	2.0324	5.8285
Other Object	0.8080	1.0239	0.2159	0.7664
Overturning	0.4913	0.6665	0.1752	0.4684
Other Non-Collision	0.9490	1.1751	0.2261	0.8870
Left Turn	1.3496	1.6930	0.3434	0.7007
Right Turn	0.6199	0.7251	0.1052	0.4274



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept B	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-3.666	(\$280,268)
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-2.291	\$2,022,323
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-1.938	\$1,409,136
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-7.896	\$3,151,191



Safety Benefit - Cost Analysis

General Information

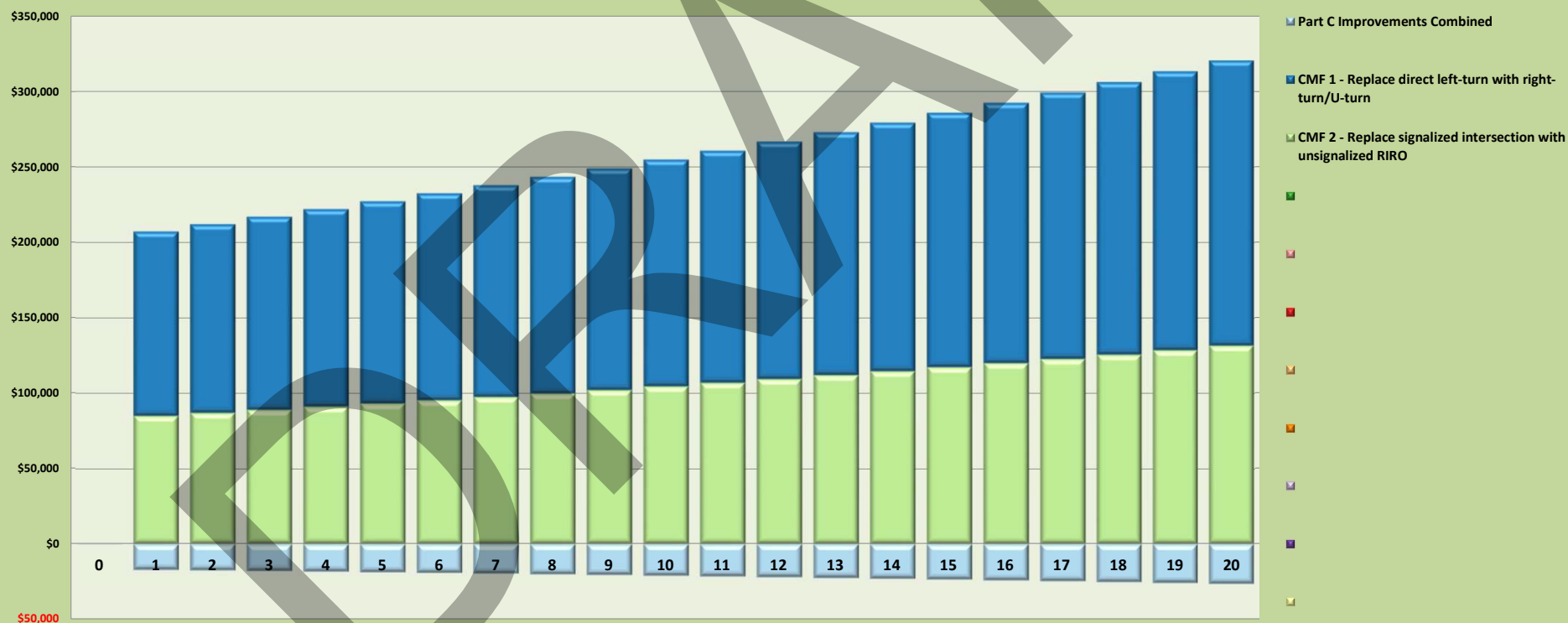
Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept B	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	
Net Present Value of Project	\$6.00
Net Present Value of Safety Benefits	\$3,151,191.37
Net Benefit	\$3,151,185.37
Benefit / Cost Ratio	525198.56

Expected Annual Crash Adjustment	
Number of Fatal & Incapacitating Injury Crashes	-0.224
Number of Injury Crashes	-1.577
Number of Total Crashes	-7.896

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



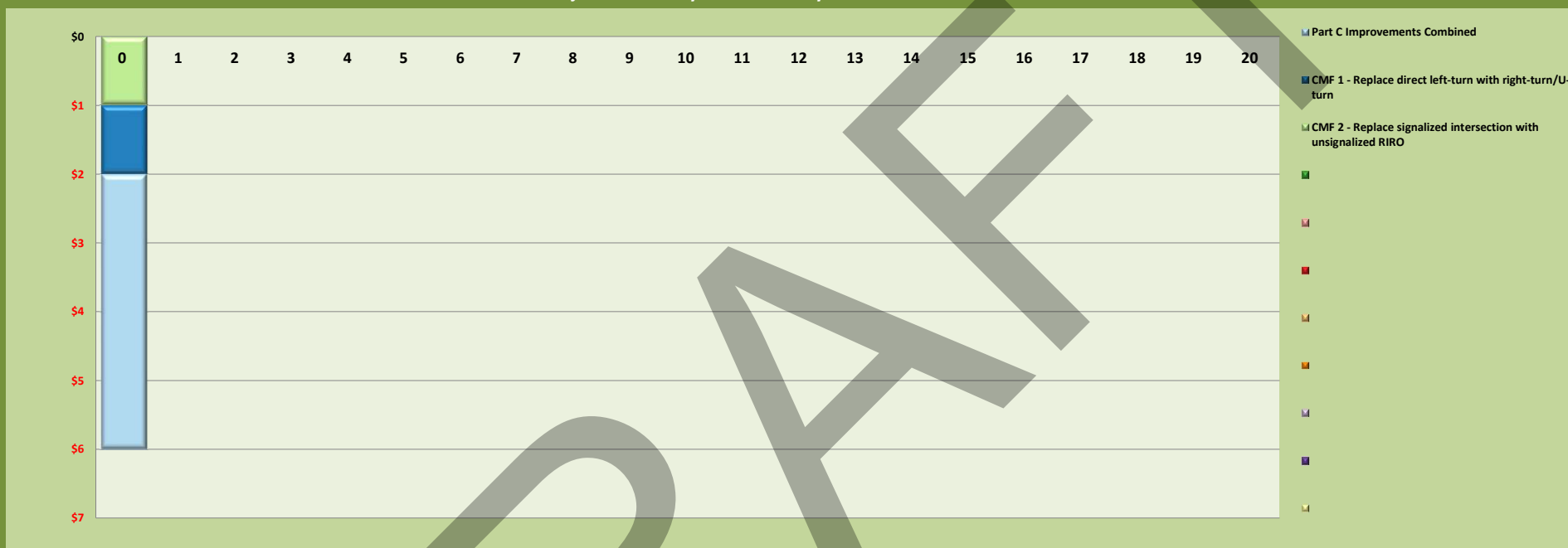


Safety Benefit - Cost Analysis

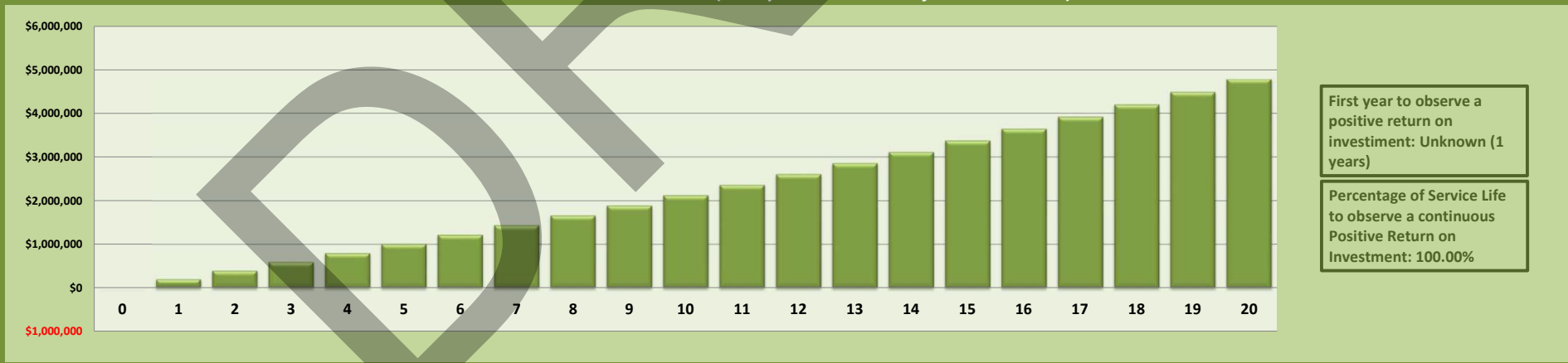
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept B	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



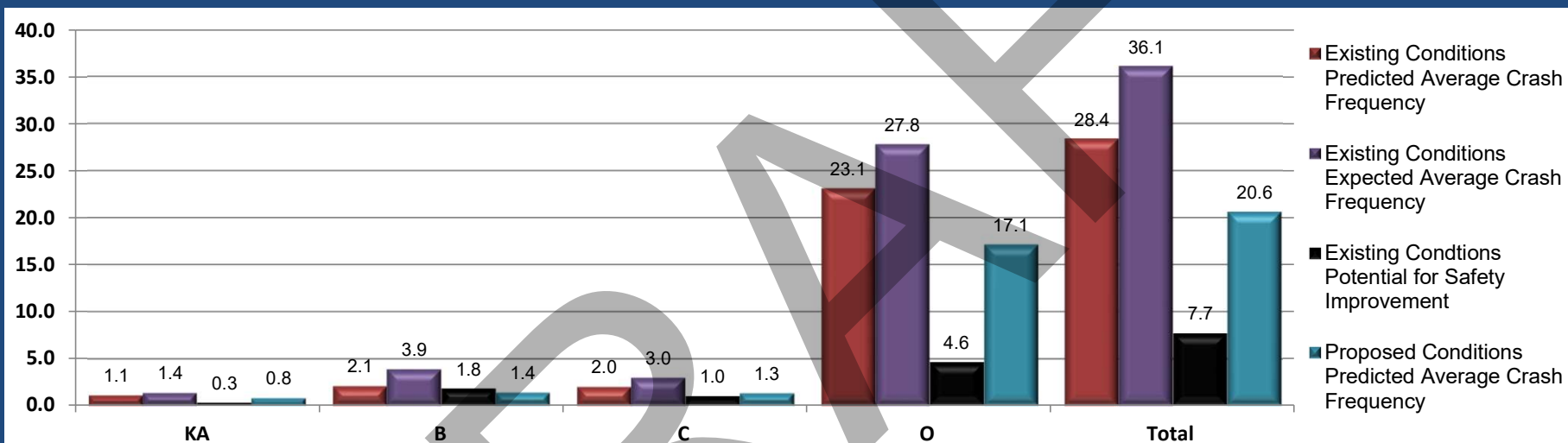


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept C	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.1072	2.1060	2.0316	23.1321	28.3769
N_{expected} - Existing Conditions	1.4410	3.8657	3.0322	27.7569	36.0958
$N_{\text{potential for improvement}}$ - Existing Conditions	0.3338	1.7597	1.0006	4.6248	7.7189
$N_{\text{predicted}}$ - Proposed Conditions	0.8232	1.3590	1.2787	17.1058	20.5667



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept C	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	South of Main	0.0207	0.0207	0.0207	0.2443	0.3064
US23; 16.04-16.259	Main - Del Dam	0.0537	0.0537	0.0537	0.629	0.7901
US23; 16.259-16.619	Del Dam - Penry	0.0287	0.0287	0.0287	0.5055	0.5916
US23; 16.619-16.838	Penry - Downing	0.0188	0.0188	0.0188	0.3288	0.3852
US23; 16.838-17.213	Downing - Willey	0.0318	0.0318	0.0318	0.5607	0.6561
US23; 17.213-17.558	Willey - Del State Park	0.0275	0.0275	0.0275	0.4843	0.5668
US23; 17.558-17.663	Del State Park - Troutman	0.0082	0.0082	0.0082	0.1474	0.172
US23; 17.663-18.336	Troutman - Irwin	0.0535	0.0535	0.0535	0.9448	1.1053
US23; 18.336-18.76	Irwin - Radnor	0.0331	0.0331	0.0331	0.5837	0.683
US23; 18.76-21.434	Radnor - SR 229	0.2089	0.2089	0.2089	3.6807	4.3074
US23; 21.434-21.558	US 23 - North of 229	0.0096	0.0096	0.0096	0.1726	0.2014
US23; 0-0.53	US 23 - Marion Co	0.0418	0.0418	0.0418	0.7378	0.8632
US23; 16.04	Main	0.0586	0.1367	0.1187	0.9443	1.2583
US23; 16.259	Del Dam	0.0241	0.0566	0.0492	0.537	0.6669
US23; 16.619	Penry	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 16.838	Downing	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 17.213	Willey	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 17.558	Del State Park	0.0373	0.2288	0.1915	1.6859	2.1435
US23; 17.663	Troutman	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 18.336	Irwin	0.0241	0.0566	0.0492	0.537	0.6669
US23; 18.76	Radnor	0.0419	0.0983	0.0854	0.8038	1.0294
US23; 21.434	SR 229	0.1892	0.534	0.6034	6.2885	7.6151



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept C	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	South of Main	0.0116	0.0297	0.016	0.0172	0.0745
US23; 16.04-16.259	Main - Del Dam	0.0808	0.2074	0.1125	0.2679	0.6686
US23; 16.259-16.619	Del Dam - Penry	0.0246	0.0633	0.0342	0.575	0.6971
US23; 16.619-16.838	Penry - Downing	0.0159	0.0408	0.0222	0.0803	0.1592
US23; 16.838-17.213	Downing - Willey	0.0356	0.092	0.0496	0.5704	0.7476
US23; 17.213-17.558	Willey - Del State Park	0.0318	0.0816	0.0442	0.9949	1.1525
US23; 17.558-17.663	Del State Park - Troutman	0.0073	0.0181	0.01	0.0383	0.0737
US23; 17.663-18.336	Troutman - Irwin	0.0707	0.1815	0.0983	1.0768	1.4273
US23; 18.336-18.76	Irwin - Radnor	0.0446	0.1148	0.0622	0.9993	1.2209
US23; 18.76-21.434	Radnor - SR 229	0.2926	0.752	0.4074	5.4773	6.9293
US23; 21.434-21.558	US 23 - North of 229	0.0166	0.0426	0.0231	0.1153	0.1976
US23; 0-0.53	US 23 - Marion Co	0.0605	0.1553	0.0842	1.1995	1.4995
US23; 16.04	Main	0.0539	0.1263	0.1096	1.5677	1.8575
US23; 16.259	Del Dam	0.0235	0.0549	0.0476	0.5412	0.6672
US23; 16.619	Penry	0.051	0.119	0.1035	0.7761	1.0496
US23; 16.838	Downing	0.0329	0.0766	0.0666	0.7117	0.8878
US23; 17.213	Willey	0.0556	0.1295	0.1126	1.0311	1.3288
US23; 17.558	Del State Park	0.0432	0.2647	0.2216	1.0859	1.6154
US23; 17.663	Troutman	0.0597	0.1398	0.1214	1.3793	1.7002
US23; 18.336	Irwin	0.0235	0.0549	0.0476	0.6004	0.7264
US23; 18.76	Radnor	0.0468	0.1093	0.095	0.9383	1.1894
US23; 21.434	SR 229	0.3583	1.0116	1.1428	7.713	10.2257



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept C	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 15.96-16.04	South of Main	-0.0091	0.009	-0.0047	-0.2271	-0.2319	
US23; 16.04-16.259	Main - Del Dam	0.0271	0.1537	0.0588	-0.3611	-0.1215	
US23; 16.259-16.619	Del Dam - Penry	-0.0041	0.0346	0.0055	0.0695	0.1055	
US23; 16.619-16.838	Penry - Downing	-0.0029	0.022	0.0034	-0.2485	-0.226	
US23; 16.838-17.213	Downing - Willey	0.0038	0.0602	0.0178	0.0097	0.0915	
US23; 17.213-17.558	Willey - Del State Park	0.0043	0.0541	0.0167	0.5106	0.5857	
US23; 17.558-17.663	Del State Park - Troutman	-0.0009	0.0099	0.0018	-0.1091	-0.0983	
US23; 17.663-18.336	Troutman - Irwin	0.0172	0.128	0.0448	0.132	0.322	
US23; 18.336-18.76	Irwin - Radnor	0.0115	0.0817	0.0291	0.4156	0.5379	
US23; 18.76-21.434	Radnor - SR 229	0.0837	0.5431	0.1985	1.7966	2.6219	
US23; 21.434-21.558	US 23 - North of 229	0.007	0.033	0.0135	-0.0573	-0.0038	
US23; 0-0.53	US 23 - Marion Co	0.0187	0.1135	0.0424	0.4617	0.6363	
US23; 16.04	Main	-0.0047	-0.0104	-0.0091	0.6234	0.5992	
US23; 16.259	Del Dam	-0.0006	-0.0017	-0.0016	0.0042	0.0003	
US23; 16.619	Penry	-0.0038	-0.0094	-0.0079	-0.127	-0.1481	
US23; 16.838	Downing	0.0016	0.0031	0.0029	0.105	0.1126	
US23; 17.213	Willey	0.0008	0.0011	0.0012	0.128	0.1311	
US23; 17.558	Del State Park	0.0059	0.0359	0.0301	-0.6	-0.5281	
US23; 17.663	Troutman	0.0049	0.0114	0.01	0.4762	0.5025	
US23; 18.336	Irwin	-0.0006	-0.0017	-0.0016	0.0634	0.0595	
US23; 18.76	Radnor	0.0049	0.011	0.0096	0.1345	0.16	
US23; 21.434	SR 229	0.1691	0.4776	0.5394	1.4245	2.6106	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept C	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	Main - South of Main	0.0207	0.0207	0.0207	0.2443	0.3064
US23; 16.04-16.259	Main - Del Dam	0.0537	0.0537	0.0537	0.629	0.7901
US23; 16.259-16.619	Del Dam - Penry	0.0287	0.0287	0.0287	0.5055	0.5916
US23; 16.619-16.838	Penry - Downing	0.0188	0.0188	0.0188	0.3288	0.3852
US23; 16.838-17.213	Downing - Willey	0.0318	0.0318	0.0318	0.5607	0.6561
US23; 17.213-17.558	Willey - Del State Park	0.0275	0.0275	0.0275	0.4843	0.5668
US23; 17.558-17.663	Del State Park - Troutman	0.0082	0.0082	0.0082	0.1474	0.172
US23; 17.663-18.336	Troutman - Irwin	0.0535	0.0535	0.0535	0.9448	1.1053
US23; 18.336-18.76	Irwin - Radnor	0.0331	0.0331	0.0331	0.5837	0.683
US23; 18.76-21.434	Radnor - SR 229	0.2089	0.2089	0.2089	3.6807	4.3074
US23; 21.434-21.558	US 23 - North of 229	0.0096	0.0096	0.0096	0.1726	0.2014
US23; 0-0.53	US 23 - Marion Co	0.0418	0.0418	0.0418	0.7378	0.8632
US23; 16.04	Main	0.0296	0.0727	0.0638	0.7049	0.871
US23; 16.259	Del Dam	0.0158	0.0392	0.0343	0.4504	0.5397
US23; 16.619	Penry	0.0277	0.0684	0.0599	0.6737	0.8297
US23; 16.838	Downing	0.0158	0.0392	0.0343	0.4504	0.5397
US23; 17.213	Willey	0.0277	0.0684	0.0599	0.6737	0.8297
US23; 17.558	Del State Park	0.0267	0.1651	0.1468	1.4115	1.7501
US23; 17.663	Troutman	0.0277	0.0684	0.0599	0.6737	0.8297
US23; 18.336	Irwin	0.0536	0.1257	0.1092	0.9022	1.1907
US23; 18.76	Radnor	0.0275	0.0681	0.0597	0.6742	0.8295
US23; 21.434	SR 229	0.0348	0.1075	0.1146	1.4715	1.7284



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept C	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Expected Crash Frequency
Unknown	0.1878	0.2315	0.0437	
Head On	0.3082	0.3881	0.0799	
Rear End	7.4383	9.4864	2.0481	
Backing	1.4629	1.7781	0.3152	
Sideswipe - Meeting	0.1869	0.2274	0.0405	
Sideswipe - Passing	3.4570	4.3587	0.9017	
Angle	3.8391	4.8014	0.9623	
Parked Vehicle	0.7270	0.9083	0.1813	
Pedestrian	0.1507	0.2024	0.0517	
Animal	13.8259	17.9292	4.1033	
Train	0.0038	0.0046	0.0008	
Pedalcycles	0.0494	0.0449	-0.0045	
Other Non-Vehicle	0.0000	0.0000	0.0000	
Fixed Object	6.3480	8.3804	2.0324	
Other Object	0.8080	1.0239	0.2159	
Overturning	0.4913	0.6665	0.1752	
Other Non-Collision	0.9490	1.1751	0.2261	
Left Turn	1.3496	1.6930	0.3434	
Right Turn	0.6199	0.7251	0.1052	



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept C	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-0.265	\$366,691
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-1.659	\$1,281,196
CMF 2 - Replace signalized intersection with unsignalized RIRO	20	\$1.00			\$1.00	\$1.00	-5.887	\$2,153,686
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$6.00	\$0.00	\$0.00	\$6.00	\$6.00	-7.810	\$3,801,573



Safety Benefit - Cost Analysis

General Information

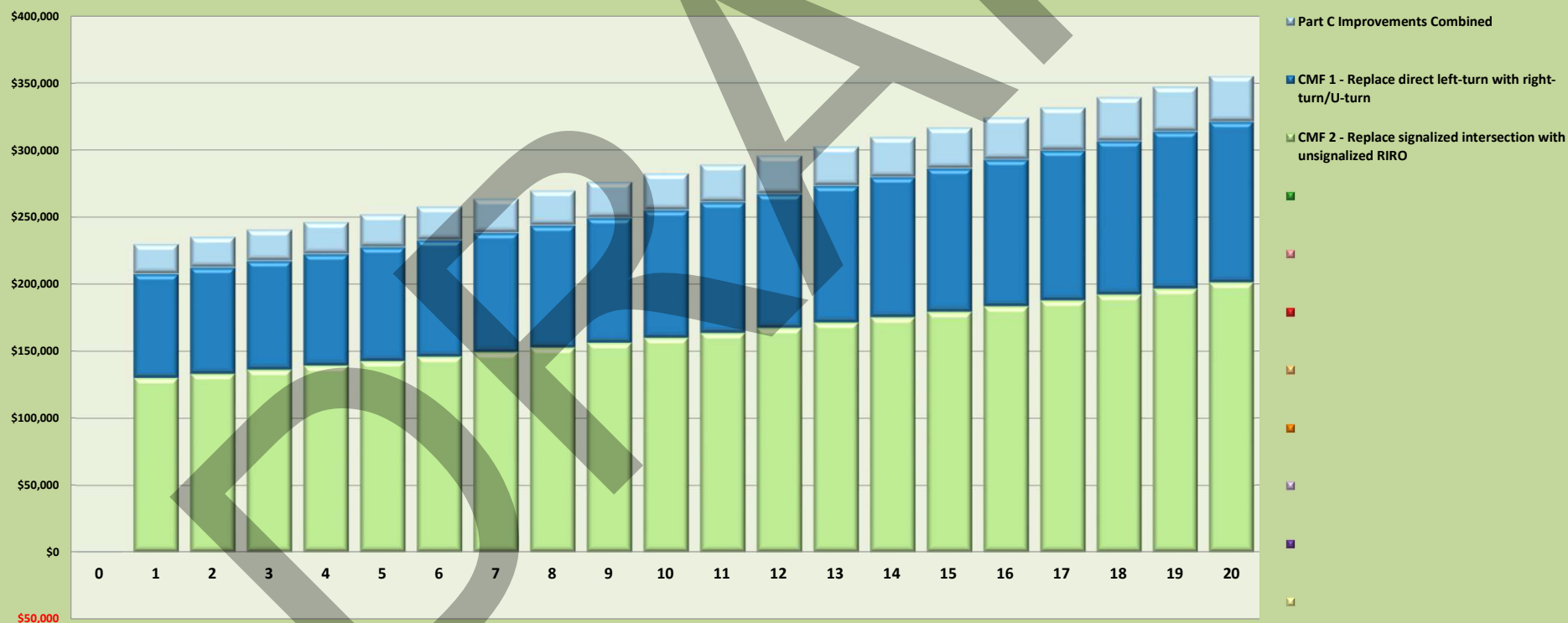
Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept C	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	
Net Present Value of Project	\$6.00
Net Present Value of Safety Benefits	\$3,801,572.58
Net Benefit	\$3,801,566.58
Benefit / Cost Ratio	633595.43

Expected Annual Crash Adjustment	
Number of Fatal & Incapacitating Injury Crashes	-0.284
Number of Injury Crashes	-1.784
Number of Total Crashes	-7.810

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



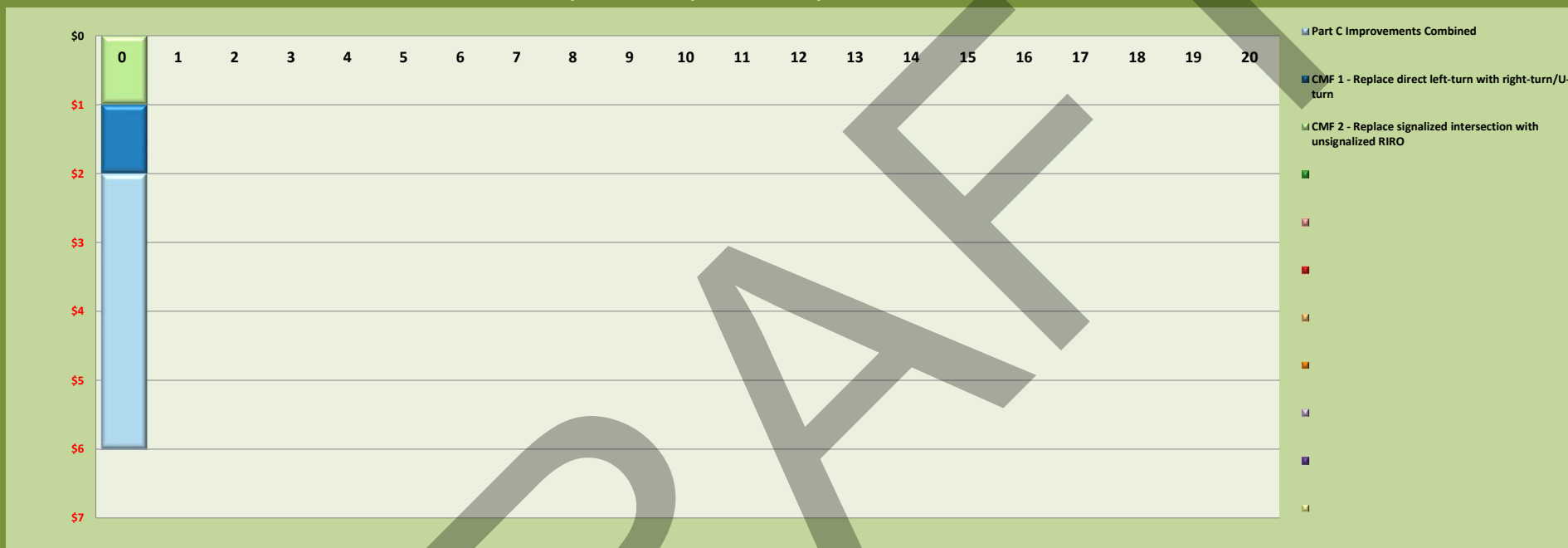


Safety Benefit - Cost Analysis

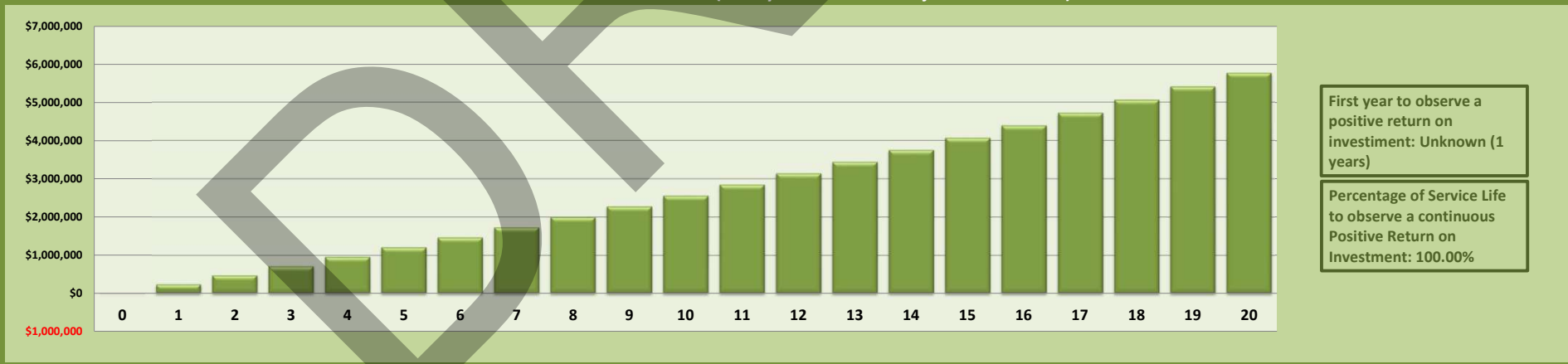
General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number	Concept C	Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)



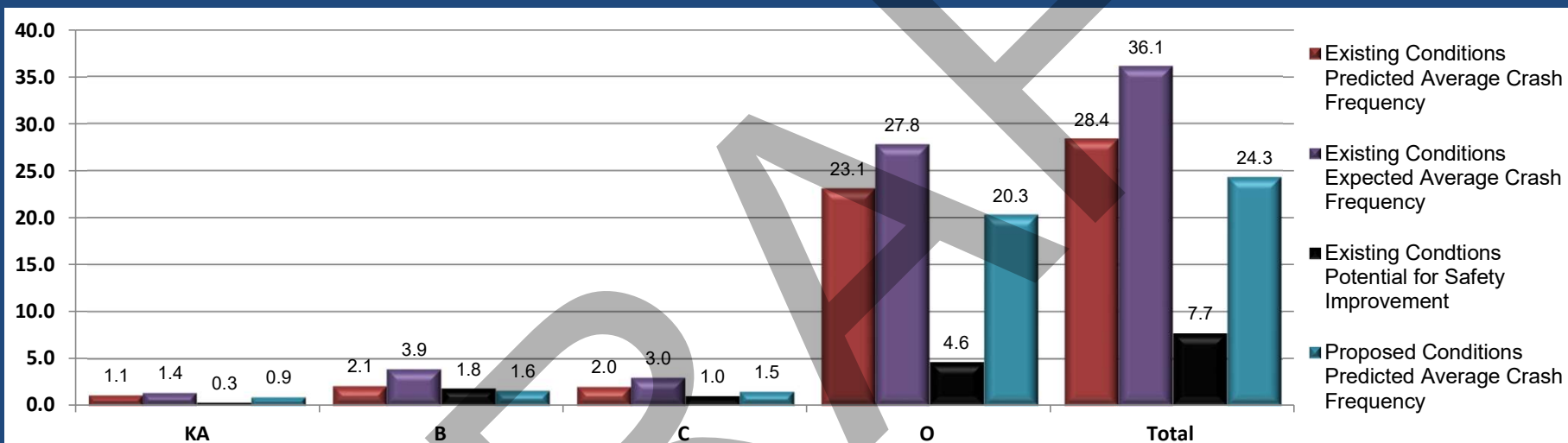


Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Summary of Anticipated Safety Performance of the Project (average crashes/year)



Project Summary Results (Without Animal Crashes)

	KA	B	C	O	Total
$N_{\text{predicted}}$ - Existing Conditions	1.1072	2.1060	2.0316	23.1321	28.3769
N_{expected} - Existing Conditions	1.4410	3.8657	3.0322	27.7569	36.0958
$N_{\text{potential for improvement}}$ - Existing Conditions	0.3338	1.7597	1.0006	4.6248	7.7189
N_{expected} - Proposed Conditions	0.9315	1.5518	1.5407	20.2656	24.2896



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	South of Main	0.0207	0.0207	0.0207	0.2443	0.3064
US23; 16.04-16.259	Main - Del Dam	0.0537	0.0537	0.0537	0.629	0.7901
US23; 16.259-16.619	Del Dam - Penry	0.0287	0.0287	0.0287	0.5055	0.5916
US23; 16.619-16.838	Penry - Downing	0.0188	0.0188	0.0188	0.3288	0.3852
US23; 16.838-17.213	Downing - Willey	0.0318	0.0318	0.0318	0.5607	0.6561
US23; 17.213-17.558	Willey - Del State Park	0.0275	0.0275	0.0275	0.4843	0.5668
US23; 17.558-17.663	Del State Park - Troutman	0.0082	0.0082	0.0082	0.1474	0.172
US23; 17.663-18.336	Troutman - Irwin	0.0535	0.0535	0.0535	0.9448	1.1053
US23; 18.336-18.76	Irwin - Radnor	0.0331	0.0331	0.0331	0.5837	0.683
US23; 18.76-21.434	Radnor - SR 229	0.2089	0.2089	0.2089	3.6807	4.3074
US23; 21.434-21.558	US 23 - North of 229	0.0096	0.0096	0.0096	0.1726	0.2014
US23; 0-0.53	US 23 - Marion Co	0.0418	0.0418	0.0418	0.7378	0.8632
US23; 16.04	Main	0.0586	0.1367	0.1187	0.9443	1.2583
US23; 16.259	Del Dam	0.0241	0.0566	0.0492	0.537	0.6669
US23; 16.619	Penry	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 16.838	Downing	0.0313	0.0735	0.0637	0.6067	0.7752
US23; 17.213	Willey	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 17.558	Del State Park	0.0373	0.2288	0.1915	1.6859	2.1435
US23; 17.663	Troutman	0.0548	0.1284	0.1114	0.9031	1.1977
US23; 18.336	Irwin	0.0241	0.0566	0.0492	0.537	0.6669
US23; 18.76	Radnor	0.0419	0.0983	0.0854	0.8038	1.0294
US23; 21.434	SR 229	0.1892	0.534	0.6034	6.2885	7.6151



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Expected Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	South of Main	0.0116	0.0297	0.016	0.0172	0.0745
US23; 16.04-16.259	Main - Del Dam	0.0808	0.2074	0.1125	0.2679	0.6686
US23; 16.259-16.619	Del Dam - Penry	0.0246	0.0633	0.0342	0.575	0.6971
US23; 16.619-16.838	Penry - Downing	0.0159	0.0408	0.0222	0.0803	0.1592
US23; 16.838-17.213	Downing - Willey	0.0356	0.092	0.0496	0.5704	0.7476
US23; 17.213-17.558	Willey - Del State Park	0.0318	0.0816	0.0442	0.9949	1.1525
US23; 17.558-17.663	Del State Park - Troutman	0.0073	0.0181	0.01	0.0383	0.0737
US23; 17.663-18.336	Troutman - Irwin	0.0707	0.1815	0.0983	1.0768	1.4273
US23; 18.336-18.76	Irwin - Radnor	0.0446	0.1148	0.0622	0.9993	1.2209
US23; 18.76-21.434	Radnor - SR 229	0.2926	0.752	0.4074	5.4773	6.9293
US23; 21.434-21.558	US 23 - North of 229	0.0166	0.0426	0.0231	0.1153	0.1976
US23; 0-0.53	US 23 - Marion Co	0.0605	0.1553	0.0842	1.1995	1.4995
US23; 16.04	Main	0.0539	0.1263	0.1096	1.5677	1.8575
US23; 16.259	Del Dam	0.0235	0.0549	0.0476	0.5412	0.6672
US23; 16.619	Penry	0.051	0.119	0.1035	0.7761	1.0496
US23; 16.838	Downing	0.0329	0.0766	0.0666	0.7117	0.8878
US23; 17.213	Willey	0.0556	0.1295	0.1126	1.0311	1.3288
US23; 17.558	Del State Park	0.0432	0.2647	0.2216	1.0859	1.6154
US23; 17.663	Troutman	0.0597	0.1398	0.1214	1.3793	1.7002
US23; 18.336	Irwin	0.0235	0.0549	0.0476	0.6004	0.7264
US23; 18.76	Radnor	0.0468	0.1093	0.095	0.9383	1.1894
US23; 21.434	SR 229	0.3583	1.0116	1.1428	7.713	10.2257



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Existing Conditions Project Element Potential for Safety Improvement Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level					Total
		KA	B	C	O		
US23; 15.96-16.04	South of Main	-0.0091	0.009	-0.0047	-0.2271	-0.2319	
US23; 16.04-16.259	Main - Del Dam	0.0271	0.1537	0.0588	-0.3611	-0.1215	
US23; 16.259-16.619	Del Dam - Penry	-0.0041	0.0346	0.0055	0.0695	0.1055	
US23; 16.619-16.838	Penry - Downing	-0.0029	0.022	0.0034	-0.2485	-0.226	
US23; 16.838-17.213	Downing - Willey	0.0038	0.0602	0.0178	0.0097	0.0915	
US23; 17.213-17.558	Willey - Del State Park	0.0043	0.0541	0.0167	0.5106	0.5857	
US23; 17.558-17.663	Del State Park - Troutman	-0.0009	0.0099	0.0018	-0.1091	-0.0983	
US23; 17.663-18.336	Troutman - Irwin	0.0172	0.128	0.0448	0.132	0.322	
US23; 18.336-18.76	Irwin - Radnor	0.0115	0.0817	0.0291	0.4156	0.5379	
US23; 18.76-21.434	Radnor - SR 229	0.0837	0.5431	0.1985	1.7966	2.6219	
US23; 21.434-21.558	US 23 - North of 229	0.007	0.033	0.0135	-0.0573	-0.0038	
US23; 0-0.53	US 23 - Marion Co	0.0187	0.1135	0.0424	0.4617	0.6363	
US23; 16.04	Main	-0.0047	-0.0104	-0.0091	0.6234	0.5992	
US23; 16.259	Del Dam	-0.0006	-0.0017	-0.0016	0.0042	0.0003	
US23; 16.619	Penry	-0.0038	-0.0094	-0.0079	-0.127	-0.1481	
US23; 16.838	Downing	0.0016	0.0031	0.0029	0.105	0.1126	
US23; 17.213	Willey	0.0008	0.0011	0.0012	0.128	0.1311	
US23; 17.558	Del State Park	0.0059	0.0359	0.0301	-0.6	-0.5281	
US23; 17.663	Troutman	0.0049	0.0114	0.01	0.4762	0.5025	
US23; 18.336	Irwin	-0.0006	-0.0017	-0.0016	0.0634	0.0595	
US23; 18.76	Radnor	0.0049	0.011	0.0096	0.1345	0.16	
US23; 21.434	SR 229	0.1691	0.4776	0.5394	1.4245	2.6106	



Project Safety Performance Report

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Proposed Conditions Project Element Predicted Crash Summary (Without Animal Crashes)

Project Element ID	Common Name	Crash Severity Level				Total
		KA	B	C	O	
US23; 15.96-16.04	Main - South of Main	0.0207	0.0207	0.0207	0.2443	0.3064
US23; 16.04-16.259	Main - Del Dam	0.0537	0.0537	0.0537	0.629	0.7901
US23; 16.259-16.619	Del Dam - Penry	0.0287	0.0287	0.0287	0.5055	0.5916
US23; 16.619-16.838	Penry - Downing	0.0188	0.0188	0.0188	0.3288	0.3852
US23; 16.838-17.213	Downing - Willey	0.0318	0.0318	0.0318	0.5607	0.6561
US23; 17.213-17.558	Willey - Del State Park	0.0275	0.0275	0.0275	0.4843	0.5668
US23; 17.558-17.663	Del State Park - Troutman	0.0082	0.0082	0.0082	0.1474	0.172
US23; 17.663-18.336	Troutman - Irwin	0.0535	0.0535	0.0535	0.9448	1.1053
US23; 18.336-18.76	Irwin - Radnor	0.0331	0.0331	0.0331	0.5837	0.683
US23; 18.76-21.434	Radnor - SR 229	0.2089	0.2089	0.2089	3.6807	4.3074
US23; 21.434-21.558	US 23 - North of 229	0.0096	0.0096	0.0096	0.1726	0.2014
US23; 0-0.53	US 23 - Marion Co	0.0418	0.0418	0.0418	0.7378	0.8632
US23; 16.04	Main	0.0296	0.0727	0.0638	0.7049	0.871
US23; 16.259	Del Dam	0.0158	0.0392	0.0343	0.4504	0.5397
US23; 16.619	Penry	0.0277	0.0684	0.0599	0.6737	0.8297
US23; 16.838	Downing	0.0158	0.0392	0.0343	0.4504	0.5397
US23; 17.213	Willey	0.0277	0.0684	0.0599	0.6737	0.8297
US23; 17.559	Del State Park	0.0277	0.0684	0.0599	0.6737	0.8297
US23; 17.663	Troutman	0.0277	0.0684	0.0599	0.6737	0.8297
US23; 18.336	Irwin	0.0536	0.1257	0.1092	0.9022	1.1907
US23; 18.76	Radnor	0.0419	0.0983	0.0854	0.8038	1.0294
US23; 21.434	SR 229	0.1277	0.3668	0.4378	5.2395	6.1718



Project Safety Performance Report

General Information

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Reference Number		Date Performed	
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Agency/Company	ms consultants		

Summary by Crash Type

Crash Type	Existing			Proposed
	Predicted Crash Frequency	Expected Crash Frequency	PSI	Predicted Crash Frequency
Unknown	0.1878	0.2315	0.0437	0.1864
Head On	0.3082	0.3881	0.0799	0.2395
Rear End	7.4383	9.4864	2.0481	6.0118
Backing	1.4629	1.7781	0.3152	1.3022
Sideswipe - Meeting	0.1869	0.2274	0.0405	0.1860
Sideswipe - Passing	3.4570	4.3587	0.9017	3.1342
Angle	3.8391	4.8014	0.9623	2.6503
Parked Vehicle	0.7270	0.9083	0.1813	0.6646
Pedestrian	0.1507	0.2024	0.0517	0.1199
Animal	13.8259	17.9292	4.1033	13.8259
Train	0.0038	0.0046	0.0008	0.0034
Pedalcycles	0.0494	0.0449	-0.0045	0.0288
Other Non-Vehicle	0.0000	0.0000	0.0000	0.0000
Fixed Object	6.3480	8.3804	2.0324	5.9758
Other Object	0.8080	1.0239	0.2159	0.7926
Overturning	0.4913	0.6665	0.1752	0.4623
Other Non-Collision	0.9490	1.1751	0.2261	0.8744
Left Turn	1.3496	1.6930	0.3434	1.0385
Right Turn	0.6199	0.7251	0.1052	0.5093



Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Comments:

Select Site Types to be used in Benefit-Cost Analysis:

All Sites

Countermeasure Service Lives, Costs, and Safety Benefits

Countermeasures	Service Life (Years)	Initial Cost of Countermeasure	Annual Maintenance & Energy Costs	Salvage Value	Net Present Cost of Countermeasure	Total Cost of Countermeasures	Summary of Annual Crash Modifications	Net Present Value of Safety Benefits
Site Characteristic Improvements (Please add description about improvements i.e. Lane widening)	20	\$1.00			\$1.00	\$1.00	-1.378	\$563,340
Site Characteristic Improvements (Please add description about improvements i.e. Lighting)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Signal Phasing)	20	\$1.00			\$1.00	\$1.00		
Site Characteristic Improvements (Please add description about improvements i.e. Added Right Turn Lane)	20	\$1.00			\$1.00	\$1.00		
CMF 1 - Replace direct left-turn with right-turn/U-turn	20	\$1.00			\$1.00	\$1.00	-2.709	\$1,916,227
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
					\$0.00	\$0.00	0.000	\$0
Totals		\$5.00	\$0.00	\$0.00	\$5.00	\$5.00	-4.087	\$2,479,567



Safety Benefit - Cost Analysis

General Information

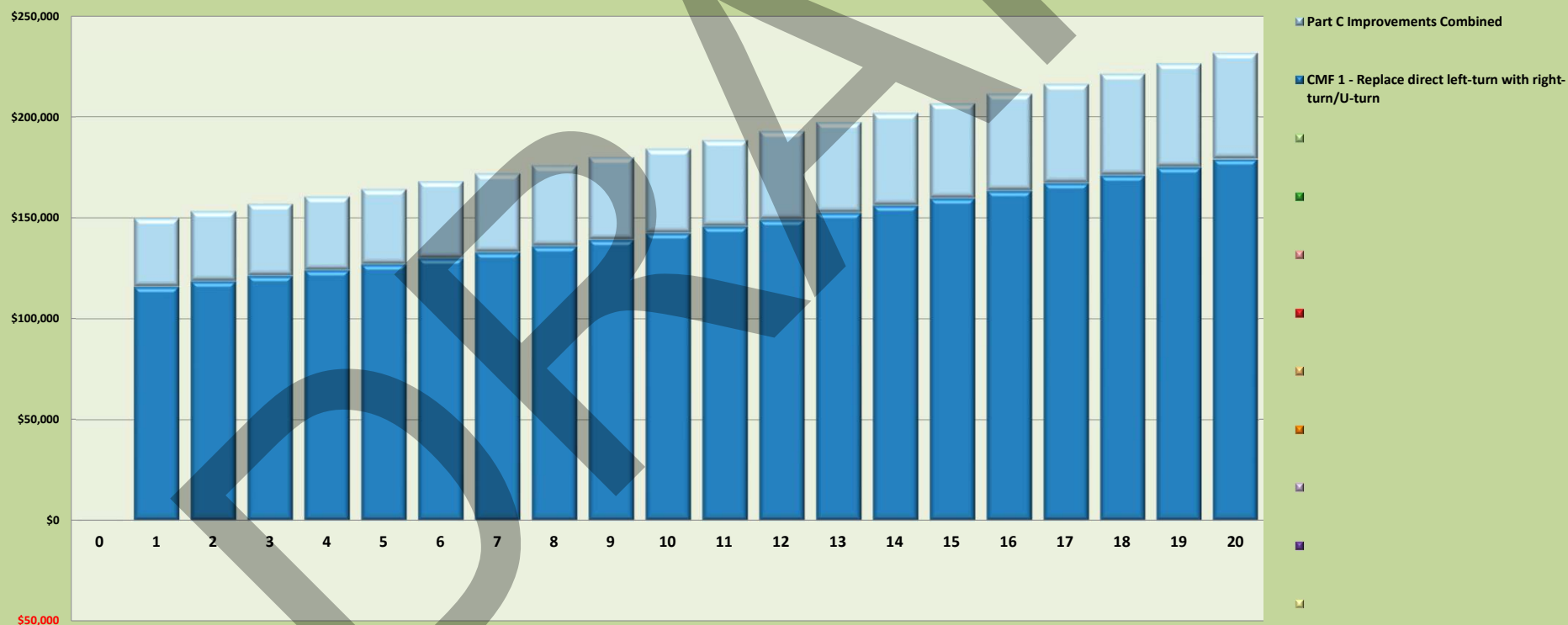
Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
Analyst	JRH	Analysis Year	
Agency/Company	ms consultants		

Benefit - Cost Calculator	
Net Present Value of Project	\$5.00
Net Present Value of Safety Benefits	\$2,479,566.66
Net Benefit	\$2,479,561.66
Benefit / Cost Ratio	495913.33

Expected Annual Crash Adjustment	
Number of Fatal & Incapacitating Injury Crashes	-0.176
Number of Injury Crashes	-1.221
Number of Total Crashes	-4.087

Comments:

Safety Benefits and Project Costs Combined Cash Flows By Countermeasure Per Year



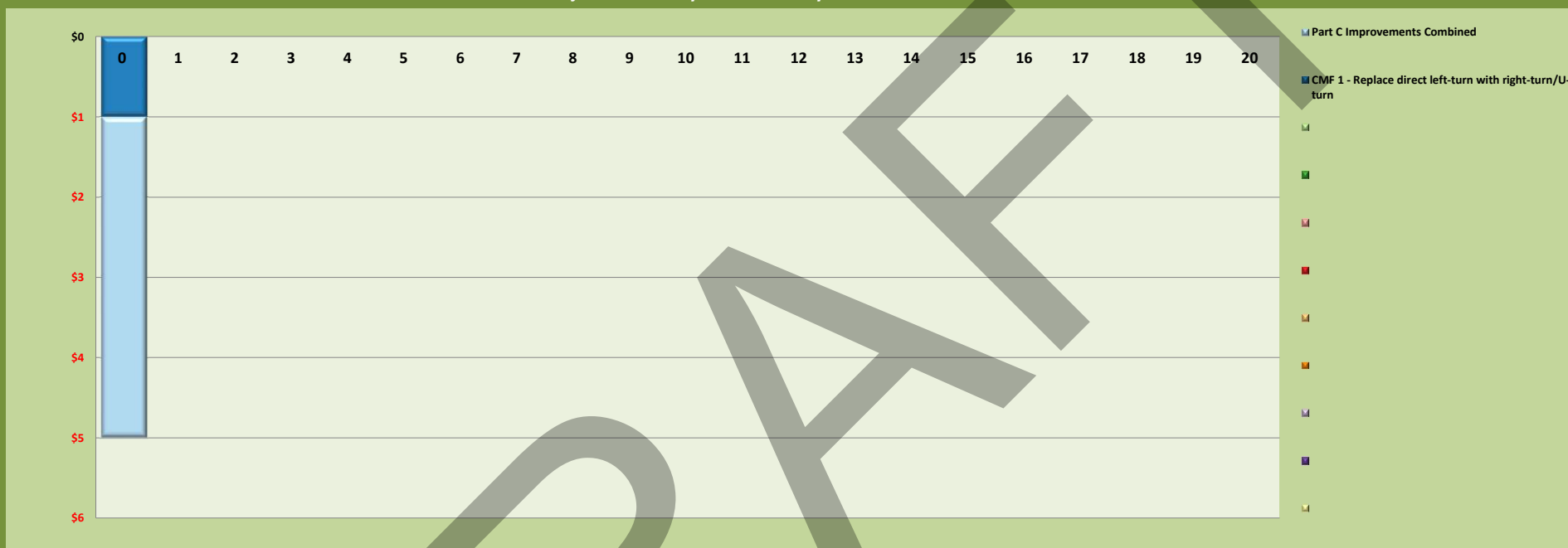


Safety Benefit - Cost Analysis

General Information

Project Name	Route 23 Connect	Contact Email	
Project Description	Segment 7	Contact Phone	
Reference Number		Date Performed	
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Project Costs Only Cash Flows By Countermeasure Per Year



Return on Investment (Safety Benefits and Project Investments)

