

**RATE OF RETURN - ECONOMIC ANALYSIS WORKSHEET**

Ohio Department of Transportation  
Office of Traffic Engineering

County Pike Main Roadway S.R. 32 Begin SLM 20.00 End SLM 0  
 Intersecting Roadway S.R. 220 Date 08/26/04

Prepared by R. Chaffin

Year	TIME OF DAY						ROADWAY CONDITION						CRASH TYPE						Total	
	DAY	NITE	N. S.	DRY	WET	N. S.	L. T.	R. T.	ANGLE	REAREND	HEAD ON	S. S.	F. O.	OTHER	PDO	I/F	PDO	I/F		
2001	1	3	0	1	0	0	1	0	1	3	0	0	0	0	0	0	0	0	1	4
2002	5	5	0	1	0	0	0	0	5	5	0	0	1	0	0	0	0	0	5	6
2003	3	3	1	0	0	0	0	0	3	3	1	0	0	0	0	0	0	0	4	3
TOTAL	9	11	1	2	0	0	1	0	9	11	1	0	0	0	0	0	0	0	10	13
AVG.	3.00	3.67	0.33	0.67	0.00	0.00	0.33	0.00	3.00	3.67	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.33	4.33

RECOMMENDED IMPROVEMENTS	CRASH TYPE		PDO CRASHES						INU - FAT. CRASHES							
	R1	R2	R1	R2	R3	R4	RT	AVG PDO	EST. RED.	R1	R2	R3	R4	RT	AVG INU-FAT	EST. RED.
1. Relocate Intersection	0.25	0.10	0.33	0.00	0.00	0.00	0.33	0.00	0.00	0.25	0.10			0.33	0.33	0.11
2. Install traffic signal	0.25	0.10	0.33	0.00	0.00	0.00	0.33	0.00	0.00	0.25	0.10			0.33	0.00	0.00
3.	0.25	0.80	0.85	3.00	2.55	0.25	0.80			0.85	3.67			0.85	3.67	3.12
4.	0.25	-0.10	0.18	0.33	0.06	0.25	-0.10			0.18	0.00			0.18	0.00	0.00
5.	0.25	0.10	0.25	0.00	0.00	0.25	0.10			0.25	0.00			0.25	0.00	0.00
6.	0.25	0.10	0.33	0.00	0.00	0.25	0.10			0.33	0.33			0.33	0.33	0.11
7.	0.25	0.00	0.00	0.00	0.00	0.25	0.00			0.25	0.00			0.25	0.00	0.00
8.	0.25	0.00	0.00	0.00	0.00	0.25	0.00			0.25	0.00			0.25	0.00	0.00
								ESTIMATED PDO CRASH REDUCTION	2.61					ESTIMATED INU - FAT. CRASH REDUCTION	3.33	0.00

Project Service Life 20 years  
 Present ADT (PADT) 9000  
 Future ADT (FADT) 12122  
 Average ADT = (PADT + FADT)/2 = ( 9000 + 12121.695 ) / 2 = 10560.848  
 ADT Factor = Average ADT / PADT = 10561 / 9000 = 1.17

**Average Annual Benefits**  
 Annual PDO Benefits = Estimated PDO Crash Reduction \* Avg PDO Cost = 2.61 \* \$2,500 = \$6,521  
 Annual INJ.-FAT. Benefits = Estimated INJ.-FAT. Crash Reduction \* Avg INJ.-FAT. Cost = 3.33 \* \$67,900 = \$226,333  
 Total Benefits = \$232,854  
 Average Annual Benefits = Total Benefits \* ADT Factor = 1.17 \* \$232,854 = \$273,237

Project Cost \$1,000,000  
 Maintenance and Energy Costs \_\_\_\_\_  
 Salvage Value \_\_\_\_\_  
**Rate of Return** 27%

# RATE OF RETURN - ECONOMIC ANALYSIS WORKSHEET

Ohio Department of Transportation  
Office of Traffic Engineering

County Pike Main Roadway S.R. 32 Begin SLM 20.00 End SLM 0  
 Intersecting Roadway S.R. 220 Date 08/26/04 Office of Traffic Engineering

Prepared by R. Chaffin

Year	TIME OF DAY				ROADWAY CONDITION				CRASH TYPE				Total			
	DAY	NITE	N. S.	DRY	WET	N. S.	L. T.	R. T.	ANGLE	REAREND	HEAD ON	S. S.		F. O.	OTHER	
	PDO	I/F	PDO	PDO	PDO	I/F	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	
2001	1	3	0	1	0	0	0	1	3	0	0	0	0	0	0	4
2002	5	5	0	1	0	0	0	5	5	0	0	1	0	0	0	6
2003	3	3	1	0	0	0	0	3	3	1	0	0	0	0	0	3
TOTAL	9	11	1	2	0	0	0	9	11	1	0	0	0	0	0	10
AVG.	3.00	3.67	0.33	0.67	0.00	0.00	0.00	3.00	3.67	0.33	0.00	0.00	0.00	0.00	0.00	3.33

RECOMMENDED IMPROVEMENTS	CRASH TYPE				PDO CRASHES				INJ. - FAT. CRASHES					
	R1	R2	R3	R4	RT	AVG PDO	EST. RED.	R1	R2	R3	R4	RT	AVG INJ-FAT	EST. RED.
1. Relocate Intersection	0.25	0.10			0.33	0.00	0.00	0.25	0.10			0.33	0.33	0.11
2. Install traffic signal	0.25	0.10			0.33	0.00	0.00	0.25	0.10			0.33	0.00	0.00
3.	0.25	0.80			0.85	3.00	2.55	0.25	0.80			0.85	3.67	3.12
4.	0.25	-0.10			0.18	0.33	0.06	0.25	-0.10			0.18	0.00	0.00
5.	0.25				0.25	0.00	0.00	0.25				0.25	0.00	0.00
6.	0.25	0.10			0.33	0.00	0.00	0.25	0.10			0.33	0.33	0.11
7.	0.25				0.25	0.00	0.00	0.25				0.25	0.00	0.00
8.					0.00	0.00	0.00	0.00				0.00	0.00	0.00
					0.00	0.00	0.00	0.00				0.00	0.00	0.00
	ESTIMATED PDO CRASH REDUCTION				2.61				ESTIMATED INJ. - FAT. CRASH REDUCTION				3.33	

Project Service Life 20 years  
 Present ADT (PADT) 9000  
 Future ADT (FADT) 12122  
 Average ADT = (PADT + FADT)/2 = ( 9000 + 12121.695 ) / 2 = 10560.848  
 ADT Factor = Average ADT / PADT = 10561 / 9000 = 1.17

**Average Annual Benefits**  
 Annual PDO Benefits = Estimated PDO Crash Reduction \* Avg PDO Cost = 2.61 \* \$2,500 = \$6,521  
 Annual INJ.-FAT. Benefits = Estimated INJ.-FAT. Crash Reduction \* Avg INJ.-FAT. Cost = 3.33 \* \$67,900 = \$226,333  
 Total Benefits = \$232,854  
 Average Annual Benefits = Total Benefits \* ADT Factor = 1.17 \* \$232,854 = \$273,237

**Rate of Return**  
 Project Cost \$2,000,000  
 Maintenance and Energy Costs \_\_\_\_\_  
 Salvage Value \_\_\_\_\_  
 Rate of Return 12%

RATE OF RETURN - ECONOMIC ANALYSIS WORKSHEET

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Year	TIME OF DAY					ROADWAY CONDITION					CRASH TYPE					Total
	DAY	NITE	N.S.	DRY	WET	N.S.	L.T.	R.T.	ANGLE	REAREND	HEAD ON	S.S.	F.O.	OTHER	PDO	
2001	1	3	0	1	0	0	1	0	3	0	0	0	0	0	0	1
2002	5	5	0	1	0	0	0	0	5	0	0	1	0	0	5	
2003	3	3	1	0	0	0	0	0	3	1	0	0	0	0	4	
TOTAL	9	11	1	2	0	0	1	0	9	1	0	1	0	0	10	
AVG.	3.00	3.67	0.33	0.67	0.00	0.00	0.33	0.00	3.00	0.33	0.00	0.33	0.00	0.00	3.33	

RECOMMENDED IMPROVEMENTS	CRASH TYPE	PDO CRASHES				INJ. - FAT. CRASHES									
		R1	R2	R3	R4	RT	AVG PDO	EST. RED.	R1	R2	R3	R4	RT	AVG INJ-FAT	EST. RED.
1. Relocate Intersection	Left Turn	0.25	0.10			0.33	0.00	0.00	0.25	0.10			0.33	0.33	0.11
2. Install traffic signal	Right Turn	0.25	0.10			0.33	0.00	0.00	0.25	0.10			0.33	0.00	0.00
3.	Angle	0.25	0.80			0.85	3.00	2.55	0.25	0.80			0.85	3.67	3.12
4.	Rearend	0.25	-0.10			0.18	0.33	0.06	0.25	-0.10			0.18	0.00	0.00
5.	Head On	0.25				0.25	0.00	0.00	0.25				0.25	0.00	0.00
6.	Side Swipe	0.25	0.10			0.33	0.00	0.00	0.25	0.10			0.33	0.33	0.11
7.	Fixed Object	0.25				0.25	0.00	0.00	0.25				0.25	0.00	0.00
8.							0.00	0.00						0.00	0.00
	ESTIMATED PDO CRASH REDUCTION					0.00	0.00	2.61	0.00	0.00			0.00	0.00	0.00
	ESTIMATED INJ. - FAT. CRASH REDUCTION														3.33

Project Service Life 20 years  
Present ADT (PADT) 9000  
Future ADT (FADT) 12122

Average ADT =  $(PADT + FADT)/2 = (9000 + 12121.695) / 2 = 10560.848$   
ADT Factor = Average ADT / PADT =  $10561 / 9000 = 1.17$

**Average Annual Benefits**

Annual PDO Benefits = Estimated PDO Crash Reduction \* Avg PDO Cost = 2.61 \* \$2,500 = \$6,521  
Annual INJ.-FAT. Benefits = Estimated INJ.-FAT. Crash Reduction \* Avg INJ.-FAT. Cost = 3.33 \* \$67,900 = \$226,333  
Total Benefits = \$232,854  
Average Annual Benefits = Total Benefits \* ADT Factor = \$232,854 \* 1.17 = \$273,237

**Rate of Return**

Project Cost \$3,000,000  
Maintenance and Energy Costs \_\_\_\_\_  
Salvage Value \_\_\_\_\_

Rate of Return 7%

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	DAY	NITE	N. S.	DRY	WET	N. S.	L. T.	R. T.	ANGLE	REAREND	HEAD ON	S. S.	F. O.	OTHER	Total					
	POD	I/F	POD	I/F	POD	I/F	POD	I/F	POD	I/F	POD	I/F	POD	I/F	POD	I/F				
2001	1	3	0	1	0	0	1	0	1	3	0	0	0	0	0	0	1	4		
2002	5	5	0	1	0	0	0	0	5	5	0	0	1	0	0	0	5	6		
2003	3	3	1	0	0	0	0	0	3	3	1	0	0	0	0	0	4	3		
TOTAL	9	11	1	2	0	0	1	0	9	11	1	0	0	0	0	0	10	13		
AVG.	3.00	3.67	0.33	0.67	0.00	0.00	0.33	0.00	3.00	3.67	0.33	0.00	0.00	0.00	0.00	0.00	3.33	4.33		

RECOMMENDED IMPROVEMENTS	CRASH TYPE				PDO CRASHES				INJ. - FAT. CRASHES					
	R1	R2	R3	R4	RT	AVG PDO	EST. RED.	R1	R2	R3	R4	RT	AVG INJ-FAT	EST. RED.
1. Relocate Intersection	0.26	0.10			0.33	0.00	0.00	0.25	0.10			0.33	0.33	0.11
2. Install traffic signal	0.26	0.10			0.33	0.00	0.00	0.25	0.10			0.33	0.00	0.00
3.	0.26	0.80			0.86	3.00	2.55	0.25	0.80			0.85	3.67	3.12
4.	0.26	-0.10			0.18	0.33	0.06	0.25	-0.10			0.18	0.00	0.00
5.	0.26				0.26	0.00	0.00	0.25				0.25	0.00	0.00
6.	0.26	0.10			0.33	0.00	0.00	0.25	0.10			0.33	0.33	0.11
7.	0.26				0.26	0.00	0.00	0.25				0.25	0.00	0.00
8.	0.26				0.00	0.00	0.00	0.00				0.00	0.00	0.00
					0.00	0.00	0.00	0.00				0.00	0.00	0.00
					ESTIMATED PDO CRASH REDUCTION	2.61	ESTIMATED INJ. - FAT. CRASH REDUCTION	3.33						

Project Service Life 20 years  
 Present ADT (PADT) 9000  
 Future ADT (FADT) 12122

Average ADT = (PADT + FADT) / 2 = ( 9000 + 12121.695 ) / 2 = 10560.848  
 ADT Factor = Average ADT / PADT = 10561 / 9000 = 1.17

**Average Annual Benefits**

Annual PDO Benefits = Estimated PDO Crash Reduction * Avg PDO Cost	=	2.61	*	\$2,500	=	\$6,521
Annual INJ.-FAT. Benefits = Estimated INJ.-FAT. Crash Reduction * Avg INJ.-FAT. Cost	=	3.33	*	\$67,900	=	\$226,333
Total Benefits	=				=	\$232,854
Average Annual Benefits = Total Benefits * ADT Factor	=	1.17	*	\$232,854	=	\$273,237

Project Cost \$5,000,000  
 Maintenance and Energy Costs \_\_\_\_\_  
 Salvage Value \_\_\_\_\_

Rate of Return 1%