



Appendix G

Rate of Return Analysis Worksheets



RATE OF RETURN - ECONOMIC ANALYSIS WORKSHEET

Ohio Department of Transportation
Office of Systems Planning and Program Management

Cells in Yellow Require User Input

County: Clark County Lower Valley Pike Begin SLM: 1.24 End SLM: 7.54
 Prepared by: JH Date: 3/20/2009 Main Roadway: Lower Valley Pike Intersecting Roadway: Crash BDate: 20050101 Crash EDate: 20071231

Year	TIME OF DAY						ROADWAY CONDITION						CRASH TYPE						TOTAL	
	DAY	DAWN/DUSK	DARK	DRY	WET	SNOW/ICE	REAR END	LEFT	RIGHT	ANGLE	HEAD ON	SS PASS	FIXED OBJ	RAN OFF RD	PEDESTRIAN	OTHER	PDO	I/F		
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
2005	12	11	0	2	7	5	13	14	4	2	3	2	1	0	0	0	0	0		
2006	13	8	0	1	12	8	13	14	11	2	1	1	1	0	0	0	0	0		
2007	14	6	1	0	6	7	12	6	4	3	3	2	0	0	0	0	0	0		
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
TOTAL	39	25	1	3	25	20	38	34	21	8	7	6	5	3	2	0	0	0		
AVG.	13.0	8.3	0.3	1.0	8.3	6.7	12.7	11.3	7.0	2.7	2.3	2.0	1.7	1.0	0.7	0.0	0.0	0.0		

--The "TOTAL" and "AVERAGE" row formulas are set to only use 2005-2007 crash data. If the crash data is not for these three years, the formulas must be modified by the user to calculate the associated year data.

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.				
Select Countermeasures																		
42 Stabilize berms - rural section																		
	LEFT	0				0	1.00	0	0	0	0	0	0	0.67				
	RIGHT	0				0	0.00	0	0	0	0	0	0	0.00				
	ANGLE	0				0	2.67	0	0	0	0	0	3.67	0.00				
	REAR END	0				0	2.00	0	0	0	0	0	1.67	0.00				
	HEAD ON	0				0	0.00	0	0	0	0	0	0.00	0.00				
	SS PASS	0				0	1.33	0	0	0	0	0	0.00	0.00				
	FIXED OBJ	0.38				0.38	8.33	3.17	0.3	0.3	0.3	0.3	6.67	2.00				
	RAN OFF RD	0.38				0.38	0.00	0.00	0.3	0.3	0.3	0.3	0.00	0.00				
	OTHER	0.38				0.38	6.67	2.53	0.3	0.3	0.3	0.3	3.33	1.00				
	NIGHT						0	8.33	0.00	0	0	0	6.67	0.00				
	WET						7.00	0.00	0	0	0	0	2.67	0.00				
	PEDESTRIAN						0	0.00	0	0	0	0	0.00	0.00				
							ESTIMATED PDO CRASH REDUCTION =	5.70					ESTIMATED INJ. - FAT. CRASH REDUCTION =	3.00				

Project Service Life: 20 years
 Present ADT (PADT): 2366 veh / day
 Future ADT (FADT): 2839 veh / day

Average Annual Benefits = Estimated PDO Crash Reduction * Avg PDO Cost
 Annual INJ.-FAT. Benefits = Estimated INJ.-FAT. Crash Reduction * Avg INJ.-FAT. Cost
 Total Benefits = Total Benefits * ADT Factor
 Average Annual Benefits = Total Benefits * ADT Factor

Rate of Return (PE) = \$91,661
 Right-of-Way Construction = \$916,608
Rate of Return = 35.48%

Total Safety Project Cost (Design, Right-of-Way, and Construction) = \$1,008,269
 Annual Maintenance and Energy Costs = \$0
 Salvage Value = \$0
 See Text Box Below for Additional Details on Project Costs for ODOT Safety Projects

Cost Estimate

Date: 03/19/2009

Lower Valley Pike

- 1) Install two foot paved shoulder for entire length of project --- $6.2 \text{ miles} * 2' * 5280' * \$14/\text{ft}$
= \$916608

Total: \$916608

Cost Estimate

Date: 01/05/2009

Osborn Road & Lower Valley Pike

- 1) Remove and relocate utility pole on southeast corner ----- \$3500
- 2) Trim vegetation around westbound "Stop Ahead" signs ----- \$500
- 3) Install curve warning sign with speed plaque ----- 2*\$250 = \$500
- 4) Install four foot paved shoulder for 250 feet on each approach -- 2000'*\$26 = \$52000

Total: \$56500

RATE OF RETURN - ECONOMIC ANALYSIS WORKSHEET

Ohio Department of Transportation
Office of Systems Planning and Program Management

Cells in Yellow Require User Input

County Clark County Main Roadway Lower Valley Pike Begin SLM 2.23 End SLM 2.54
Intersecting Roadway Gerlaugh Road Date 4/14/2009 Crash BDate 20050101 Crash EDate 20071231

Year	TIME OF DAY						ROADWAY CONDITION						CRASH TYPE						TOTAL	
	DAY	DAWN/DUSK	DARK	DRY	WET	SNOW/ICE	REAR END	LEFT	RIGHT	ANGLE	HEAD ON	SS PASS	FIXED OBJ	RAN OFF RD	PEDESTRIAN	OTHER				
	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	2	1	0	0	3	0	1	0	0	1	0	0	0	0	0	0	0	0	1	4
2006	5	2	0	0	2	3	2	4	5	1	0	0	0	0	0	6	3	0	0	7
2007	2	2	0	0	2	2	0	2	2	0	0	0	0	0	0	0	0	1	0	2
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	9	5	0	0	4	3	7	6	2	0	0	0	0	0	0	7	4	0	0	13
AVG	3.0	1.7	0.0	0.0	1.3	1.0	2.3	2.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.3	0.0	0.0	4.3

--The "TOTAL" and "AVERAGE" row formulas are set to only use 2005-2007 crash data. If the crash data is not for these three years, the formulas must be modified by the user to calculate the associated year data.

RECOMMENDED IMPROVEMENTS	PDO CRASHES						INJ. - FAT. CRASHES							
	CRASH TYPE						CRASH TYPE							
	R1	R2	R3	R4	RT	AVG PDO	EST. RED.	R1	R2	R3	R4	RT	AVG INJ.-FAT	EST. RED.
Select Countermeasures	0.2	0.2	0	0	0	0.36	0.12	0.2	0.25	0	0	0.4	0.33	0.13
57 Install/improve warning signs on rural curves [curve crashes only]	0.2	0.2	0	0	0	0.36	0.00	0.00	0.25	0	0	0.4	0.00	0.00
8 Warning signs at intersection - rural	0.2	0.2	0	0	0	0.36	0.67	0.24	0.25	0	0	0.4	0.67	0.27
42 Stabilize berms - rural section	0.2	0.2	0	0	0	0.36	0.33	0.12	0.25	0	0	0.4	0.33	0.13
REAR END	0.2	0.2	0	0	0	0.36	0.00	0.00	0.25	0	0	0.4	0.00	0.00
HEAD ON	0.2	0.2	0	0	0	0.36	0.00	0.00	0.25	0	0	0.4	0.00	0.00
SS PASS	0.2	0.2	0	0	0	0.36	0.00	0.00	0.25	0	0	0.4	0.00	0.00
FIXED OBJ	0.2	0.2	0.38	0.6	2.33	1.41	1.41	0.2	0.25	0.3	0.58	1.33	0.77	0.77
RAN OFF RD	0.2	0.2	0.38	0.6	2.33	1.41	1.41	0.2	0.25	0.3	0.58	1.33	0.77	0.77
OTHER	0.2	0.2	0	0	0	0.36	0.67	0.24	0.25	0	0	0.4	0.00	0.00
NIGHT	0.2	0.2	0	0	0	0.36	0.67	0.24	0.25	0	0	0.4	0.00	0.00
WET	0	0	0	0	0	0	1.33	0.00	0.25	0	0	0	1.00	0.00
PEDESTRIAN	0	0	0	0	0	0	2.00	0.00	0.25	0	0	0	0.67	0.00
	0	0	0	0	0	0	0.00	0.00	0.25	0	0	0	0.00	0.00

ESTIMATED PDO CRASH REDUCTION = 2.13
ESTIMATED INJ. - FAT. CRASH REDUCTION = 1.31
ADT Factor = _____

Project Service Life 20 years
Present ADT (PADT) 6290 veh / day
Future ADT (FADT) 6919 veh / day
Average ADT = (PADT + FADT)/2 = (6290 + 6919) / 2 = 6604.5
ADT Factor = Average ADT / PADT = 6604.5 / 6290 = 1.05

Average Annual Benefits
Annual PDO Benefits = Estimated PDO Crash Reduction * Avg PDO Cost = _____
Annual INJ.-FAT. Benefits = Estimated INJ.-FAT. Crash Reduction * Avg INJ.-FAT. Cost = _____
Average Annual Benefits = Total Benefits * ADT Factor = _____

Select Facility Type Below:
Rural State Highways = 2.13 * \$ 12,799.26 = \$ 27,230.01
= 1.31 * \$ 84,339.83 = \$ 110,204.05
= 1.05 * \$ 137,434.06 = \$ 144,305.76
Rate of Return **271.00%**

Total Safety Project Cost (Design, Right-of-Way, and Construction) \$53,250
Annual Maintenance and Energy Costs \$0
Salvage Value \$0
Rate of Return Design (PE) \$0
Right-of-Way \$0
Construction \$53,250
See Text Box Below for Additional Details on Project Costs for ODOT Safety Projects

Cost Estimate

Date: 01/05/2009

Gerlaugh Road & Lower Valley Pike

- 1) Install curve warning signs with speed plaque ----- $2 * \$250 = \500
- 2) Install "Signal Ahead" signs ----- $3 * \$250 = \750
- 5) Install four foot paved shoulder for 250 feet on each approach -- $2000' * \$26 = \52000

Total: \$53250

RATE OF RETURN - ECONOMIC ANALYSIS WORKSHEET

Ohio Department of Transportation
Office of Systems Planning and Program Management

Cells in Yellow Require User Input

County: Clark County; Main Roadway: Lower Valley Pike; Intersecting Roadway: Spangler Road/Sycamore Street; Date: 4/14/2009; Begin SLM: 3.01; End SLM: 3.17; Crash BDate: 20050101; Crash EDate: 20071231

Table with columns: Year, ROADWAY CONDITION (DAY, DAWN/DUSK, DARK, DRY, WET, SNOW/ICE), CRASH TYPE (HEAD ON, SS PASS, FIXED OBJ, RAN OFF RD, PEDESTRIAN, OTHER), TOTAL. Includes data for years 2003-2008 and summary rows.

--The "TOTAL" and "AVERAGE" row formulas are set to only use 2005-2007 crash data. If the crash data is not for these three years, the formulas must be modified by the user to calculate the associated year data.

Table with columns: RECOMMENDED IMPROVEMENTS, PDO CRASHES (R1-R4), EST. RED., INJ. - FAT. CRASHES (R1-R4), EST. RED., AVG PDO, AVG INJ-FAT, CRASH REDUCTION =. Includes improvements like 'Upgrade existing signal - general' and 'Install/warning signs on rural curves'.

Project Service Life: 20 years

Present ADT (PADT): 12710 veh/day

Future ADT (FADT): 13981 veh/day

Average ADT = (PADT + FADT)/2 = (12710 + 13981) / 2 = 13345.5
ADT Factor = Average ADT / PADT = 13345.5 / 12710 = 1.05

Average Annual Benefits

Annual PDO Benefits = Estimated PDO Crash Reduction * Avg PDO Cost

Annual INJ.-FAT. Benefits = Estimated INJ.-FAT. Crash Reduction * Avg INJ.-FAT. Cost

Total Benefits

Average Annual Benefits = Total Benefits * ADT Factor

Total Safety Project Cost (Design, Right-of-Way, and Construction) = \$12,750

Annual Maintenance and Energy Costs = \$0

Salvage Value = \$0

See Text Box Below for Additional Details on Project Costs for ODOT Safety Projects

Select Facility Type Below: Rural State Highways

Annual PDO Benefits = 3.78 * \$12,799.26 = \$48,377.81

Annual INJ.-FAT. Benefits = 2.19 * \$84,339.83 = \$184,558.04

Average Annual Benefits = 1.05 * \$232,935.85 = \$244,582.64

Rate of Return (PE) = \$0

Right-of-Way = \$0

Construction = \$12,750

Rate of Return = 1918.30%

Cost Estimate

Date: 01/05/2009

Spangler Road/Sycamore Street & Lower Valley Pike

- 1) Add auxiliary N/B signal head (includes signal cable) ----- \$2000
- 2) Modify Signal Timing ----- \$500
- 3) Wood Pole, Installed ----- \$1500
- 4) Mobilization ----- \$1000
- 5) Install curve warning sign with speed plaque ----- \$250
- 6) Install solar powered "Signal Ahead" sign flasher assembly ---- \$7500

Total: \$12750

RATE OF RETURN - ECONOMIC ANALYSIS WORKSHEET

Ohio Department of Transportation
Office of Systems Planning and Program Management

Cells in Yellow Require User Input

County Clark County Main Roadway Lower Valley Pike Begin SLM 3.99 End SLM 4.25
 Intersecting Roadway Union Road
 Prepared by UBT Date 4/14/2009 Crash BDate 20050101 Crash EDate 20071231

Year	TIME OF DAY						ROADWAY CONDITION						CRASH TYPE					
	DAY PDO I/F	DAWN/DUSK PDO I/F	DARK PDO I/F	DRY PDO I/F	WET PDO I/F	SNOW / ICE PDO I/F	REAR END PDO I/F	LEFT PDO I/F	RIGHT PDO I/F	ANGLE PDO I/F	HEAD ON PDO I/F	SS PASS PDO I/F	FIXED OBJ PDO I/F	RAN OFF RD PDO I/F	PEDESTRIAN PDO I/F	OTHER PDO I/F	TOTAL PDO I/F	
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2005	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2006	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2007	1	2	1	1	1	2	2	1	0	1	2	0	1	0	0	0	0	
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL	2	4	1	0	3	2	3	5	3	1	0	0	1	0	0	0	0	
AVG.	0.7	1.3	0.3	0.0	1.0	0.7	1.0	1.7	1.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	

--The "TOTAL" and "AVERAGE" row formulas are set to only use 2005-2007 crash data. If the crash data is not for these three years, the formulas must be modified by the user to calculate the associated year data.

	RECOMMENDED IMPROVEMENTS														PDO CRASHES							INJ. - FAT. CRASHES						
	CRASH TYPE	R1	R2	R3	R4	RT	AVG PDO	EST. RED.	R1	R2	R3	R4	RT	AVG INJ-FAT	EST. RED.	CRASH TYPE	R1	R2	R3	R4	RT	AVG INJ-FAT	EST. RED.					
R1	Select Countermeasures	0.3	0	0	0	0.3	0.00	0.00	0.3	0	0	0	0.3	0.00	0.00	LEFT	0.3	0	0	0	0.3	0.00	0.00					
R2	30 install warning sign-mounted flasher	0.3	0	0	0	0.3	0.00	0.00	0.3	0	0	0	0.3	0.00	0.00	RIGHT	0.3	0	0	0	0.3	0.00	0.00					
R3	42 Stabilize berms - rural section	0.3	0	0	0	0.3	0.00	0.00	0.3	0	0	0	0.3	0.00	0.00	ANGLE	0.3	0	0	0	0.3	0.00	0.00					
R4	11 Speed zone	0.3	0	0	0	0.3	0.00	0.00	0.3	0	0	0	0.3	0.00	0.00	REAR END	0.3	0	0	0	0.3	0.00	0.00					
	10 Eliminate parking	0.3	0	0	0	0.3	0.00	0.00	0.3	0	0	0	0.3	0.00	0.00	HEAD ON	0.3	0	0	0	0.3	0.00	0.00					
		0.3	0	0	0	0.3	0.00	0.00	0.3	0	0	0	0.3	0.00	0.00	SS PASS	0.3	0	0	0	0.3	0.00	0.00					
		0.3	0	0	0	0.3	0.00	0.00	0.3	0	0	0	0.3	0.00	0.00	FIXED OBJ	0.3	0.38	0.38	0	0.3	0.00	0.00					
		0.3	0	0	0	0.3	0.00	0.00	0.3	0	0	0	0.3	0.00	0.00	RAN OFF RD	0.3	0.38	0.38	0	0.3	0.00	0.00					
		0.3	0	0	0	0.3	0.00	0.00	0.3	0	0	0	0.3	0.00	0.00	OTHER	0.3	0	0	0	0.3	0.00	0.00					
		0	0	0	0	0	1.00	0.00	0	0	0	0	0	1.00	0.00	NIGHT	0	0	0	0	0	0.67	0.00					
		0	0	0	0	0	1.00	0.00	0	0	0	0	0	1.00	0.00	WET	0	0	0	0	0	0.33	0.00					
		0	0	0	0	0	0.00	0.00	0	0	0	0	0	0.00	0.00	PEDESTRIAN	0	0	0	0	0	0.00	0.00					

Project Service Life 20 years
 Present ADT (PADT) 5850 veh / day
 Future ADT (FADT) 6435 veh / day
 Average ADT = $(PADT + FADT) / 2 = \frac{5850 + 6435}{2} = 6142.5$
 ADT Factor = $\frac{6435}{5850} = 1.05$

Average Annual Benefits
 Select Facility Type Below: Rural State Highways
 Annual PDO Benefits = Estimated PDO Crash Reduction * Avg PDO Cost = \$0
 Annual INJ.-FAT. Benefits = Estimated INJ.-FAT. Crash Reduction * Avg INJ.-FAT. Cost = \$ 84,339.83
 Total Benefits = \$ 84,339.83
 Average Annual Benefits = Total Benefits * ADT Factor = \$ 65,322.11

Rate of Return
 Total Safety Project Cost (Design, Right-of-Way, and Construction) = \$58,500
 Annual Maintenance and Energy Costs = \$0
 Salvage Value = \$0
 See Text Box Below for Additional Details on Project Costs for ODOT Safety Projects

Rate of Return = $\frac{\text{Average Annual Benefits}}{\text{Total Safety Project Cost}} = \frac{65,322.11}{58,500} = 117.24\%$

Cost Estimate

Date: 01/05/2009

Union Road & Lower Valley Pike

- 1) Install flashing lights on "Stop Ahead" & "Stop" signs for northbound and southbound traffic ----- \$5000
- 2) Install four foot paved shoulder for 250 feet on each approach -- $2000' * \$26 = \52000
- 3) Extend 45 Mph Speed Zone ----- \$500
- 4) Add "No Parking" signs ----- $4 * \$250 = \1000

Total: \$58500

RATE OF RETURN - ECONOMIC ANALYSIS WORKSHEET

Ohio Department of Transportation
Office of Systems Planning and Program Management

County Clark County

Main Roadway Lower Valley Pike
Intersecting Roadway Lammes Lane
Date 4/14/2009

Begin SLM 4.83
Crash BDate 20050101

End SLM 5.27
Crash EDate 20071231

Table with columns for Year, Time of Day, Roadway Condition, Crash Type, and various crash metrics (PDO, I/F, R1, R2, R3, R4, RT, EST. RED, etc.). Includes a summary row for 2003-2008 and a 'TOTAL' row.

--The "TOTAL" and "AVERAGE" row formulas are set to only use 2005-2007 crash data. If the crash data is not for these three years, the formulas must be modified by the user to calculate the associated year data.

Table showing Recommended Improvements (R1-R4) with columns for Crash Type, PDO Crashes, and Inj.-Fat. Crashes.

Project Service Life 20 years
Present ADT (PADT) 2950 veh / day
Future ADT (FADT) 3245 veh / day
Average ADT = (PADT + FADT)/2 = (2950 + 3245) / 2 = 3097.5
ADT Factor = Average ADT / PADT = 3097.5 / 2950 = 1.05

Annual PDO Benefits = Estimated PDO Crash Reduction * Avg PDO Cost
Annual INJ.-FAT. Benefits = Estimated INJ.-FAT. Crash Reduction * Avg INJ.-FAT. Cost
Average Annual Benefits = Total Benefits * ADT Factor

Total Safety Project Cost (Design, Right-of-Way, and Construction) \$52,000
Annual Maintenance and Energy Costs \$0
Salvage Value \$0
Rate of Return 33.96%

See Text Box Below for Additional Details on Project Costs for ODOT Safety Projects

Cost Estimate

Date: 01/05/2009

Lammes Lane & Lower Valley Pike

- 1) Install four foot paved shoulder for 250 feet on each approach -- $2000' * \$26 = \52000

Total: \$52000

RATE OF RETURN - ECONOMIC ANALYSIS WORKSHEET

Ohio Department of Transportation
Office of Systems Planning and Program Management

Cells in Yellow Require User Input

County Clark County Lower Valley Pike Main Roadway Begin SLM 5.85 End SLM 6.04
 Preparing by UBT Date 4/14/2009 Intersecting Roadway Snider Road Crash BDate 20050101 Crash EDate 20071231

Year	TIME OF DAY								ROADWAY CONDITION								CRASH TYPE								TOTAL														
	DAY	DAWN/DUSK	DARK	DRY	WET	SNOW/ICE	REAR END	LEFT	RIGHT	ANGLE	HEAD ON	SS PASS	FIXED OBJ	RAN OFF RD	PEDESTRIAN	OTHER	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	2	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2	1	0	2	1	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AVG.	0.7	0.3	0.0	0.3	0.7	0.0	0.7	0.3	0.0	0.3	0.0	0.3	0.7	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

--The "TOTAL" and "AVERAGE" row formulas are set to only use 2005-2007 crash data. If the crash data is not for these three years, the formulas must be modified by the user to calculate the associated year data.

RECOMMENDED IMPROVEMENTS	PDO CRASHES																INJ.-FAT. CRASHES								EST. RED.															
	CRASH TYPE	R1	R2	R3	R4	RT	AVG PDO	EST. RED.	R1	R2	R3	R4	RT	AVG INJ-FAT	EST. RED.	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO		I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	EST. RED.			
Select Countermeasures																																								
42 Stabilize berms - rural section																																								
8 Warning signs at intersection - rural																																								
57 Install/improve warning signs on rural curves [curve crashes only]																																								

Project Service Life 20 years
 Present ADT (PADT) 3380 veh / day
 Future ADT (FADT) 3718 veh / day

Annual PDO Benefits = Estimated PDO Crash Reduction * Avg PDO Cost
 Annual INJ.-FAT. Benefits = Estimated INJ.-FAT. Crash Reduction * Avg INJ.-FAT. Cost
 Total Benefits = Total Benefits * ADT Factor
 Average Annual Benefits = Total Benefits / ADT Factor

ESTIMATED PDO CRASH REDUCTION = 0.72 ESTIMATED INJ.-FAT. CRASH REDUCTION = 0.33

Average ADT = $(PADT + FADT) / 2 = (3380 + 3718) / 2 = 3549$

ADT Factor = $\frac{Average ADT / PADT}{Average ADT / FADT} = \frac{3549}{3380} = 1.05$

Select Facility Type Below: Rural State Highways

Annual PDO Benefits = $0.72 * \$12,799.26 = \$9,256.43$

Annual INJ.-FAT. Benefits = $0.33 * \$84,359.83 = \$27,551.01$

Average Annual Benefits = $1.05 * \$36,807.44 = \$38,647.81$

Total Safety Project Cost (Design, Right-of-Way, and Construction) \$52,500

Annual Maintenance and Energy Costs \$0

Salvage Value \$0

See Text Box Below for Additional Details on Project Costs for ODOT Safety Projects

Rate of Return = 73.61%

Cost Estimate

Date: 01/05/2009

Snider Road & Lower Valley Pike

- 1) Install four foot paved shoulder for 250 feet on each approach -- $2000' * \$26 = \52000
- 2) Install curve warning sign for westbound traffic ----- \$250
- 3) Install curve warning sign with speed plaque for southbound traffic ----- \$250

Total: \$52500

RATE OF RETURN - ECONOMIC ANALYSIS WORKSHEET

Ohio Department of Transportation
Office of Systems Planning and Program Management

Cells in Yellow Require User Input

County: Clark County Main Roadway: Lower Valley Pike Begin SLM: 6.35 End SLM: 6.62
 Preparing by: UBT Intersecting Roadway: South Hampton Road Crash BDate: 20050101 Crash EDate: 20071231

Year	TIME OF DAY				ROADWAY CONDITION				CRASH TYPE				OTHER				TOTAL	
	DAY	DAWN/DUSK	DARK	DAY	WET	SNOW/ICE	REAR END	LEFT	RIGHT	ANGLE	HEAD ON	SS PASS	FIXED OBJ	RAN OFF RD	PEDESTRIAN	OTHER		TOTAL
	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F	PDO	I/F
2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1
2006	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2
2007	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2	0	0	1	1	1	0	0	0	0	0	1	1	0	0	0	0	3
AVG.	0.7	0.0	0.0	0.3	0.3	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	1.0

--The "TOTAL" and "AVERAGE" row formulas are set to only use 2005-2007 crash data. If the crash data is not for these three years, the formulas must be modified by the user to calculate the associated year data.

	RECOMMENDED IMPROVEMENTS				PDO CRASHES				INJ. - FAT. CRASHES				EST. RED.	
	R1	R2	R3	R4	RT	AVG PDO	EST. RED.	R1	R2	R3	R4	RT		AVG INJ-FAT
R1	0	0	0	0	0	0.33	0.00	0	0	0	0	0	0.00	
R2	0	0	0	0	0	0.00	0.00	0	0	0	0	0	0.00	
R3	0	0	0	0	0	0.00	0.00	0	0	0	0	0	0.00	
R4	0	0	0	0	0	0.00	0.00	0	0	0	0	0	0.00	
LEFT	0	0	0	0	0	0.00	0.00	0	0	0	0	0	0.00	
RIGHT	0	0	0	0	0	0.00	0.00	0	0	0	0	0	0.00	
ANGLE	0	0	0	0	0	0.00	0.00	0	0	0	0	0	0.00	
REAR END	0	0	0	0	0	0.00	0.00	0	0	0	0	0	0.00	
HEAD ON	0	0	0	0	0	0.00	0.00	0	0	0	0	0	0.00	
SS PASS	0	0	0	0	0	0.00	0.00	0	0	0	0	0	0.00	
FIXED OBJ	0.38	0.38	0.38	0.38	0.38	0.33	0.13	0.3	0.3	0.3	0.3	0.3	0.10	
RAN OFF RD	0.38	0.38	0.38	0.38	0.38	0.33	0.00	0.3	0.3	0.3	0.3	0.3	0.00	
OTHER	0	0	0	0	0	0.33	0.00	0	0	0	0	0	0.33	
NIGHT	0	0	0	0	0	0.33	0.00	0	0	0	0	0	0.67	
WET	0	0	0	0	0	0.33	0.00	0	0	0	0	0	0.33	
PEDESTRIAN	0	0	0	0	0	0.00	0.00	0	0	0	0	0	0.00	
ESTIMATED PDO CRASH REDUCTION =					0.13					ESTIMATED INJ. - FAT. CRASH REDUCTION =	0.10			

Project Service Life: 20 years
 Present ADT (PADT): 2730 veh / day
 Future ADT (FADT): 3003 veh / day
 Average ADT = (PADT + FADT) / 2 = (2730 + 3003) / 2 = 2866.5
 ADT Factor = Average ADT / PADT = 2866.5 / 2730 = 1.05

Average Annual Benefits
 Annual PDO Benefits = Estimated PDO Crash Reduction * Avg PDO Cost = 0.13 * \$12,799.26 = \$1,621.24
 Annual INJ.-FAT. Benefits = Estimated INJ.-FAT. Crash Reduction * Avg INJ.-FAT. Cost = 0.10 * \$84,339.83 = \$8,433.98
 Total Benefits = \$1,621.24 + \$8,433.98 = \$10,055.22
 Average Annual Benefits = Total Benefits * ADT Factor = \$10,055.22 * 1.05 = \$10,557.98

Select Facility Type Below:
 Rural State Highways
 Rate of Return: 19.75%

Total Safety Project Cost (Design, Right-of-Way, and Construction) = \$52,000
 Annual Maintenance and Energy Costs = \$0
 Salvage Value = \$0

See Text Box Below for Additional Details on Project Costs for ODOT Safety Projects

Cost Estimate

Date: 01/05/2009

South Hampton Road & Lower Valley Pike

- 1) Install four foot paved shoulder for 250 feet on each approach -- $2000' * \$26 = \52000

Total: \$52000

Cost Estimate

Date: 01/05/2009

Enon Road & Lower Valley Pike

- 1) Install four foot paved shoulder for 250 feet on each approach -- $2000' * \$26 = \52000

Total: \$52000