SAFETY INDEX CALCULATION WORKSHEET

LOCAL AGENCY _____ DATE _____
CALCULATED BY _____
CHECKED BY _____

PROJECT LOCATION_____

PROPOSED IMPROVEMENT_____
_____
_____

TOTAL COST (in $1,000s) _____ ADT (existing, all directions, in 1,000s) _____

NUMBER OF LOCATIONS, OR LENGTH IN MILES _____ Note: This value is represented by "N" in the formulas below.

SEVERITY OF ACCIDENTS	COLUMN							
	A	**B**	**C**	**D**	**E**		**F**	**G**
	TOTAL ACCIDENTS LAST THREE (3) YEARS	AVERAGE NO. OF ACCIDENTS PER YEAR	REDUCTION FACTOR (See **Table 1**)	ACCIDENTS REDUCED	ACCIDENT COSTS ($1,000's)		IMPROVE-MENT LIFE (See **Table 1**)	SAVINGS IN ACCIDENT COSTS ($1,000's)
		A ÷ 3		**B x C**	**urban**	**rural**		**D x E x F**
FATAL + INJURY					**24.0**	**61.0**		
PDO					**3.2**			
TOTALS								

INITIAL ACCIDENT RATE

IAR = $\frac{\text{"B" (Total)}}{\text{ADT(in 1000s) x 0.365 x N}}$ =_____

EXPECTED ACCIDENT RATE

EAR = $\frac{\text{"B"(Total) - "D"(Total)}}{\text{ADT(in 1000s) x 0.365 x N}}$ =_____

SAFETY INDEX

From **Table 1**, find the Accident Base Rate (ABR) for the Project:
ABR = _____

If EAR ≥ ABR, use the Safety Index formula below:

SI = $\frac{\text{"G"(Total) x 100}}{\text{Total Cost (in \$1000s)}}$

SI = _____

If EAR < ABR, use the Safety Index formula below:

SI = $(\text{EAR/ABR})^3 \times \frac{\text{"G"(Total) x 100}}{\text{Total Cost (\$1000s)}}$

SI = _____

INSTRUCTIONS FOR SAFETY INDEX CALCULATIONS

Local Agency: Write the name of your agency.

Project Location: Provide street name or geographical references to project location(s).

Proposed Improvement: List Type of Improvement proposed.

Total Cost: Divide the "Total Project Cost" amount by 1,000.

ADT: Use the existing (or most current) Average Daily Traffic volumes in all directions and divide by 1,000. For example, if the proposed improvement is at an intersection, the ADT is the combined traffic volume of all approaches to the intersection on an average day. If the proposed improvement is not at an intersection, the ADT is the number of vehicles that use the section of roadway proposed for improvement in both directions on an average day. For projects that involve multiple locations and varying ADTs (by more than 20%), a separate SI must be calculated for each spot location and/or for each 1-mile segment of road. The SI for the entire project will be the average of the SIs calculated for each spot and/or segment.

Number of Locations or Length in Miles: Indicate the number of locations where improvements are proposed, or, if other than spot locations, use the length of the project (in miles). Enter 1 if the length is less than one mile.

Column A: Fill in the "Fatal + Injury" and "Property Damage Only" (PDO) boxes using only the accidents that have been reported during the last three (3) years. Do not include unreported accidents since the Safety Index formula has already been adjusted to account for this anomaly.

- For spot improvements, accidents that occurred within 1/10 mile may be included.
- For corridor or linear improvements, accidents that occurred within the corridor plus accidents that occurred within 1/10 mile of the ends of the project limits may be included.
- For intersection improvements, accidents that occurred within 300 feet of the intersection in all directions may be used. If the distance to the nearest intersection is less than 600 feet, only those accidents that occurred from midblock may be used.

Column B: Divide the number in Column A by three (3). Add the two rows together to obtain a "Total."

Column C: A reduction factor (RF) must be applied to all Safety Index calculations. Table 1 shows the reduction factors to be applied for various categories of work. Identify the category of work being proposed, and find the respective reduction factor and transpose that number to both rows in Column C.

If the project includes more than one type of improvement, apply the reduction factor for the work category that represents the majority of work to be done.

Column D: Multiply the values in Column B and Column C. Add the two rows together to obtain a "Total."

Column E: Circle "24" if the subject location is urban; Circle "61" if the subject location is rural. "Rural" or "urban" determination should be consistent with the Functional Classification of the road(s) involved.

Column F: Table 1 shows the Improvement Life for the various categories of work. Identify the category of work being proposed, and find the respective Improvement Life and transpose that number to both rows in Column F.

Note: The Type of Improvement selected from Table 1 for Column C and Column F must be the same.

Column G: Multiply the values in Columns D, E and F. Add the two rows together to obtain the "Total Savings in Accidents Costs" for the project.

Calculations:

Calculate the Initial Accident Rate (IAR) using the formula shown.

Calculate the Expected Accident Rate (EAR) using the formula shown.

Find the Accident Base Rate for the project from Table 1. Compare the ABR to the Expected Accident Rate (EAR). Apply the correct Safety Index formula and calculate the SI for the project.

TABLE 1. CALCULATION FACTORS FOR HIGHWAY SAFETY PROJECTS

TYPE OF IMPROVEMENT	REDUCTION FACTOR (RF)	ACCIDENT BASE RATE (ABR)	IMPROVEMENT LIFE (In years)
1. Roadway Illumination (where no lighting exists)	.15*	0.80	15
2. Relocated or Breakaway Utility Poles	.20	1.00	10
3. Traffic Signs (general)	.05	1.00	6
4. Curve warning arrows	.20	0.50	6
5. Advance curve warning with advisory speed	.20	0.50	6
6. 4-way stop	.50	0.50	6
7. Upgrade posts with breakaway supports	.20	1.00	10
8. Upgrade Median Barrier (includes new median barrier)	.20	1.00	15
9. Remove Obstacles	.20	1.00	20
10. New Traffic Signals	.15	1.20	10
11. Upgrade Guardrail (includes new guardrail)	.20	1.00	10
12. Impact Attenuators	.20	1.00	10
13. Upgrade Traffic Signals (includes interconnection)	.15	1.20	10
14. Sight Distance Improvement	.20	1.00	10
15. Construct Raised Median for Traffic Separation	.20	1.00	20
16. Groove Pavement for Skid Treatment	.10	1.00	10
17. Turning Lanes and Traffic Channelization	.15	1.00	10
18. New left-turn lane at signalized intersection (with no left-turn phase)	.15	1.00	10
19. New left-turn lane at signalized intersection (with left-turn phase)	.35	1.00	10
20. New left-turn lane at non-signalized intersection	.35	0.80	10
21. Two-way left-turn lane	.25	1.00	10
22. Pavement Markings and Delineation	.05	1.00	2
23. Widen or Improve Shoulder	.20	1.00	20
24. Flatten Side Slopes	.20	1.00	20
25. Realign Roadway	.50	1.00	10
26. Overlay for Skid Treatment	.10	1.00	10
27. Reconstruction (combinations & miscellaneous)	.20	1.00	10

* Applies to night accidents only.