INSTRUCTIONS FOR BRIDGE ECONOMIC ANALYSIS WORKSHEET

1. An economic analysis should be done for all proposed bridge replacements and rehabilitations. The worksheet provides a rapid and uniform method to demonstrate that a proposed bridge replacement or rehabilitation is a cost-effective use of public funds. The proposed analysis does give a reasonable measure of the bridge's relative economic value to the transportation network. It does this by assessing the hypothetical costs of abandoning the bridge against the costs of needed improvements. The economic analysis is not, however, the only factor, or necessarily the most important factor in project selection. Other factors that should receive appropriate weight are indicated under "other considerations."

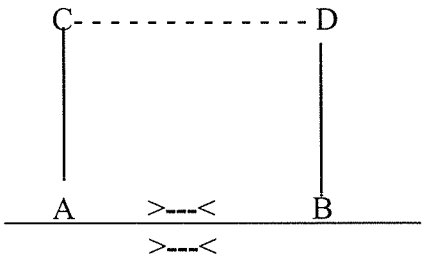
2. The remaining crossing life without the project should be estimated based on professional judgement. The following formula, based on the NYS bridge condition rating (CR) may be used as a guide:

   HIGH REMAINING LIFE (rehabilitation) = CR x (CR - 1)
   LOW REMAINING LIFE (replacement) = CR x (CR - 2)

3. Estimated project costs should include all costs associated with the project. This includes the costs of approach work, design and construction engineering, right of way, construction, maintenance of traffic (MOT) and improvements for construction detours. Costs should be in 2002 dollars.

4. Detour limits, detour lengths and present link lengths are defined as follows for the link network shown here.

   Detour limits : A and B
   Present link length (PL): AB
   Detour length (DL) : ACDB



This diagram represents the general case. In more complex instances, where an accounting for diverse traffic origins and destinations and several detour possibilities is needed, estimate the proportion of the present bridge traffic diverting to each significant detour. Label and fill out a worksheet for each detour. The benefits are additive, so then sum them on the primary worksheet.

The selected detour should as far as possible minimize user costs for the current bridge traffic. Long detours are often avoided by improving a closer route not presently designed to accommodate the bridge traffic. In such cases, the cost of required detour improvements should be considered in minimizing detour costs as well as in total project costs. However, in all cases traffic origins and destinations should be assessed to determine the detour limits.

5. The average annual daily traffic (AADT) is available from the Department's Traffic Volume Report. Explain if another source is used.

6. BASE BENEFITS (BB) are calculated as shown on the worksheet, using unit benefits (UB) and life factors from the tables below. The UNIT BENEFIT is the user cost and time savings from not having to use the detour (per vehicle, per mile of present link length). It is important to be realistic in selecting detour limits. They represent the points where through traffic would depart from its present route if the bridge being analyzed were permanently closed. Different detour limits may be used for different segments of the total bridge traffic. If your ratio of DL/PL exceeds about 3, take another look at the detour limits!!!!

7. The LIFE FACTOR provides the relative present worth of the project based on its life and the remaining life in the current structure. A 4% rate of interest is assumed. It is 1.00 for a bridge replacement with estimated 50-year project life and no significant remaining life of the existing bridge. For rehabilitation projects, and for replacements where there is remaining life, determine the life factor from the table below.

UNIT BENEFITS ($1000s)

DL/PL	UB*
1.0	0.299
1.2	1.032
1.4	1.766
1.6	2.497
1.8	3.227
2.0	3.963
2.2	4.696
2.4	5.429
2.6	6.160
2.8	6.896
3.0	7.631
3.5	9.462
4.0	11.297
4.5	13.127
5.0	14.960
6.0	18.625
7.0	22.292
8.0	25.958
9.0	29.620
10.	33.288

* Table values reflect consideration of vehicle operating costs, time costs and construction detour costs. ASSUMED: 50 year project life for bridge replacements, 4% interest rate, **2006** dollars, detour speed 40 mph with at least 5 mph higher speed on present route, 10% trucks, 5% reverse traffic with half having both origin and destination within detour limits.

CROSSING W/ PROJECT — CROSSING LIFE WITHOUT PROJECT (yrs.)

	0	2	4	6	8	10	15	20	25	30	40
5	.21	.12	.04								
10	.38	.29	.21	.13	.06						
15	.52	.43	.35	.27	.20	.14					
20	.63	.54	.46	.39	.32	.26	.12				
25	.73	.64	.56	.48	.41	.35	.21	.09			
30	.80	.72	.64	.56	.49	.43	.29	.17	.08		
35	.87	.78	.70	.62	.56	.49	.35	.24	.14	.06	
40	.92	.83	.75	.68	.61	.54	.40	.29	.19	.12	
45	.96	.88	.80	.72	.65	.59	.45	.33	.24	.16	.04
50	1.00	.91	.83	.76	.69	.62	.48	.37	.27	.20	.08

$$UB = 3.6655\left(\frac{DL}{PL}\right) - 3.3676$$

7. ADJUSTMENTS to base benefits is necessary under special circumstances:

   Bridge traffic having origins or destinations within detour limits would have to go some distance in a direction reverse to their present travel, if the bridge were closed. Some reverse traffic is built into the base benefits, but when more than 10% of AADT represent REVERSE traffic, an adjustment in benefits is warranted. This could occur, for example, in a village with only a single crossing of an important stream or railroad barrier.

   A SPEED adjustment is appropriate in villages or other areas with low speed limits, when detour speeds are lower than 40 mph and also lower than the speed on the present route.

   When truck traffic is heavy, higher unit time and operating costs should be considered. Ten percent is built into the base benefits but an adjustment can be made when truck volumes exceed 15% of AADT.

   An eight month consideration detour is built into the base benefits. Where traffic can be maintained through stage construction or an on-site detour, the adjustment for NO CONSTRUCTION DETOUR is warranted. (The added cost of an on-site detour during construction should be kept less than 5% of benefits for a one-season detour, 9% for a two-season detour). Special benefits resulting from building the replacement bridge on new alignment should also be noted under OTHER CONSIDERATIONS.

8. OTHER CONSIDERATIONS should be used to describe circumstances or unique problems that influence programming decisions and/or project priority.

   SCHOOL BUSES: indicate the total number of round trips per day, when available.

   EMERGENCY SERVICE: indicate those services materially dependent on the bridge (e.g., a nearby hospital or firehouse).

   COMMUNITY SENTIMENT: indicate how this bridge, compared to similar bridge projects, is viewed. Rate the intensity of sentiment from 1 to 5, where 1 is indifference, 2 is average, and 5 is extraordinary.

   For DEAD END ROADS, check the box provided under OTHER CIRCUMSTANCES and indicate the number of people or households served and the nature and probably value of property on the dead-end portion of the road. In this case, the B/C calculation is simply the property value divided by the project cost.

   NEARBY INVESTMENT: indicate other upcoming projects, major needs, or developments which will affect this roadway link.

   ADDITIONAL CIRCUMSTANCES: point out other items of unusual significance if relevant.