bridges, is usually limited by obsolescence as well as structural deficiency and deterioration. Obsolescence may be due to insufficient capacity for heavier loads and greater volume of traffic than the bridge was originally designed for, safety requirements, and location. Superstructures and pile bents are considered to have a service life of 50 years. Masonry substructure which could be reused in the renovation of a bridge is considered to have a service life of 100 years.

(4) The foregoing service life figures are not to be used arbitrarily, but as a basis for a fair judgment of the service life considering all other factors that pertain in any particular case.

APPENDIX A TO PART 277—SEC. 6, PUB. L. 647, AS AMENDED (33 U.S.C. 516)

At the time the Secretary shall authorize the bridge owner to proceed with the project, as provided in Section 515 of this title, and after an opportunity to the bridge owner to be heard thereon, the Secretary shall determine and issue an order specifying the proportionate shares of the total cost of the project to be borne by the United States and by the bridge owner. Such apportionment shall be made on the following basis: The bridge owner shall bear such part of the cost as is attributable to the direct and special benefits which will accrue to the bridge owner as a result of the alteration, including the expectable savings in repair or maintenance costs; and that part of the cost attributable to the requirements of traffic by railroad or highway, or both, including any expenditure for increased carrying capacity of the bridge, and including such proportion of the actual capital cost of the old bridge or of such part of the old bridge as may be altered or changed or rebuilt, as the used service life of the whole or a part, as the case may be, bears to the total estimated service life of the whole or such part.

Provided, that in the event the alteration or relocation of any bridge may be desirable for the reason that the bridge unreasonably obstructs navigation, but also for some other reason, the Secretary may require equitable contribution from any interested person, firm, association, corporation, municipality, county, or State desiring such alteration or relocation for such other reason, as a condition precedent to the making of an order for such alteration or relocation. The United States shall bear the balance of the costs, including that part attributable to the necessities of navigation; and provided further, that where

*Secretary of Transportation.

the bridge owner proceeds with the alteration on a successive partial bid basis the Secretary is authorized to issue an order of apportionment of cost for the entire alteration based on the accepted bid for the first part of the alteration and an estimate of cost for the remainder of the work. The Secretary is authorized to revise the order of apportionment of cost, to the extent he deems reasonable and proper to meet any changed conditions.


APPENDIX B TO PART 277—HYPOTHETICAL EXAMPLE OF COST APPORTIONMENT

Following is the interpretation of the principles as applied to the alteration of a hypothetical highway—railroad bridge across Blank River between City A and City B.

1. Total estimated cost of alteration project. A $10,917,300

1. Total estimated cost of alteration project. A $10,917,300

This value is deducted from the original cost to determine the actual capital cost (Table VII). It is also deducted from the Total Estimated Cost of Alteration Project to determine the cost to be apportioned.

2. Salvage $77,300

2. Salvage $77,300

A fixed charge such as engineering, design and inspection costs, realtor’s and counsel’s fees, and bridge owner’s administrative expenses is an undistributed cost shared in the ratio that each party shares the cost of construction less fixed charges. In computing the bridge owner’s share of the fixed charges, all other financial liabilities assigned to the bridge owner shall be included in the computation. (Table II).

3. Direct and special benefits:

   a. Removing old bridge (owner’s share) $165,489 l
   b. Fixed charges (owner’s share) 284,460 II

3. Direct and special benefits:

   a. Removing old bridge (owner’s share) $165,489 l
   b. Fixed charges (owner’s share) 284,460 II

Section 6 of the Act provides that in the event the alteration or relocation of any bridge may be desirable for the reason that the bridge unreasonably obstructs navigation, but also for some other reason, the Secretary may require equitable contribution

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Corps of Engineers, Dept. of the Army, DoD

from any interested person, firm, association, corporation, municipality, county, or State desiring such alteration or relocation for such other reason, as a condition precedent to the making of an order for such alteration or relocation. In the instant case, testimony at the hearing developed that the bridge would require alteration because of the navigation project but also City A desires to relieve traffic on a nearby secondary road by providing access to the new bridge. It is considered that as an equitable contribution, City A should contribute an amount equal to one half of the expectable road user benefit accruing over the next 10 years. Other methods for determining the third party’s contribution are acceptable depending on the circumstances.

d. Betterments ........................ $18,360 III

4. Expectable savings in repair or maintenance costs.
   Repair ..................................... $100,000
   Maintenance ............................ 16,288 IV

The new bridge is designed for increased loading and width greater than that of the old bridge. Therefore, the estimated annual maintenance cost was based on a hypothetical bridge designed, but not constructed, for the same loading and width as the old bridge but with increased clearances as required to meet the needs of waterborne navigation, and not on the estimated annual maintenance cost of the new bridge. The savings in repair costs represents a savings to the bridge owner who will not have to re-store the bridge that was recently damaged since it is being altered as a part of a proposed navigation improvement.

5. Costs attributable to requirements of railway and highway traffic.
   Maintenance ............................ $1,534,000 V

The old bridge carries a highway deck on the upper level consisting of a roadway 18 feet wide (no sidewalks) and a railway deck on the lower level with 110-lb. rails. The new bridge will carry a highway deck on the upper level consisting of one 28-foot roadway and two 5-foot sidewalks, and the railway deck will have new 130-lb. rails. In addition, the railway deck will be paved to carry highway traffic. Thus, the bridge may be kept in an intermediate raised position when not being used by railway traffic to pass small-boat traffic without delaying highway traffic. City A also desires to provide additional highway approaches and right-of-way to connect a nearby secondary road with the new bridge.

6. Expenditure for increased carrying capacity.  $2,330,000 VI

The highway deck of the old bridge was designed for a live loading equivalent to AASHO HS20–44 and the railway deck for live loading of Cooper E 40. Accordingly, the bridge owner will pay the additional cost for the increased carrying capacity of the new bridge.

7. Expired service life of old bridge .......................... $511,300 VII

The structure of the old bridge was completed in 1908 and the superstructure completed in 1909. For this hypothetical example it was assumed the bridge would be replaced in 1970.

8. The following is an explanation of the procedure for determining the tabulation of proportionate shares of costs to be borne by the United States and the bridge owner presented in Table B.

   1) Cost of alteration to be apportioned is the total estimated cost of the project (excluding contingencies) less salvage value (§277.8(b)), less contribution by third party, if applicable (§277.8(c)).

   2) Share to be borne by the bridge owner is the sum of the direct and special benefits (§277.8(c)) expectable savings in repair or maintenance costs (paragraph 8d), costs attributable to requirements of railway and highway traffic (§277.8(e)), expenditure for increased carrying capacity (§277.8(f)) and expired service life of old bridge (§277.8(g)).

   3) Share to be borne by the United States is the difference between the cost of alteration to be apportioned and the share to be borne by the bridge owner.

   4) The exact amount of costs to be borne by the bridge owner will be determined upon completion of the project.

   5) Contingencies may be included in the total shares to be borne by both the United States and the bridge owner.

TABLES

A. Summary of Estimated Project Costs.
B. Tabulation of Proportionate Shares of Cost To Be Borne by the United States and the Bridge Owner.
I. Bridge Owner’s Share of Removing Old Bridge.
II. Fixed Charges To Be Paid by Bridge Owner.
III. Betterments.
IV. Expectable Savings in Repair or Maintenance Costs.
V. Costs Attributable to Requirements of Railway and Highway Traffic.
VI. Expenditure for Increased Carrying Capacity.
VII. Value of Expired Service Life of Old Bridge.
### Table A—Summary of Estimated Project Costs

<table>
<thead>
<tr>
<th>No. and item</th>
<th>Cost</th>
<th>Fixed charges</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 New bridge</td>
<td>$8,104,062</td>
<td>$570,000</td>
<td>$8,674,062</td>
</tr>
<tr>
<td>2 Removal of old bridge</td>
<td>521,908</td>
<td>500</td>
<td>522,408</td>
</tr>
<tr>
<td>3 Approaches</td>
<td>50,000</td>
<td>5,000</td>
<td>55,000</td>
</tr>
<tr>
<td>4 Additional highway approaches</td>
<td>1,530,000</td>
<td>15,000</td>
<td>1,545,000</td>
</tr>
<tr>
<td>5 Railroad force account work</td>
<td>41,800</td>
<td>3,500</td>
<td>45,300</td>
</tr>
<tr>
<td>6 Additional signaling</td>
<td>27,000</td>
<td>2,400</td>
<td>29,400</td>
</tr>
<tr>
<td>7 Right-of-way</td>
<td>13,240</td>
<td>900</td>
<td>14,140</td>
</tr>
<tr>
<td>8 Additional right-of-way</td>
<td>30,900</td>
<td>1,100</td>
<td>32,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10,318,900</strong></td>
<td><strong>598,400</strong></td>
<td><strong>10,917,300</strong></td>
</tr>
</tbody>
</table>

### Table B—Tabulation of Proportionate Shares of Costs to Be Borne by the United States and the Bridge Owner

<table>
<thead>
<tr>
<th></th>
<th>States and the Bridge Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total estimated cost of project (excluding contingencies) (Table A)</td>
<td>$10,917,300</td>
</tr>
<tr>
<td>Less salvage</td>
<td>77,300</td>
</tr>
<tr>
<td>Less contribution by third party</td>
<td>432,000</td>
</tr>
<tr>
<td><strong>Total cost of alteration to be apportioned</strong></td>
<td><strong>10,408,000</strong></td>
</tr>
</tbody>
</table>

| Share to be borne by the United States | 5,449,103 |
| Contingencies 15 pct | 817,365 |
| **Total** | **6,266,468** |

| Share to be borne by the Bridge Owner | 4,959,897 |
| Contingencies 15 pct | 743,985 |
| **Total** | **5,703,882** |

**Note:** The exact amount to be borne by the bridge owner will be determined after completion of the project.

### Table I—Bridge Owner’s Share of Removing Old Bridge

<table>
<thead>
<tr>
<th>Item to be removed</th>
<th>Age at time of removal (years)</th>
<th>Owner’s share percent</th>
<th>Owner’s removal cost</th>
<th>Owner’s removal remaining</th>
<th>Present worth factor</th>
<th>Owner’s present liability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substructure</td>
<td>62</td>
<td>62</td>
<td>$241,935</td>
<td>$150,000</td>
<td>38</td>
<td>.1639</td>
</tr>
<tr>
<td>Protection Works</td>
<td>37</td>
<td>67</td>
<td>60,000</td>
<td>40,200</td>
<td>18</td>
<td>424.25</td>
</tr>
<tr>
<td>Superstructure</td>
<td>61</td>
<td>87</td>
<td>206,896</td>
<td>180,000</td>
<td>9</td>
<td>.6516</td>
</tr>
<tr>
<td>Signaling</td>
<td>61</td>
<td>100</td>
<td>440</td>
<td>440</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Ties and Timber</td>
<td>20</td>
<td>67</td>
<td>6,000</td>
<td>4,000</td>
<td>10</td>
<td>.6213</td>
</tr>
<tr>
<td>Rail and Accessories:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rail, 110 lb</td>
<td>33</td>
<td>100</td>
<td>1,000</td>
<td>1,000</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Rail, 110 lb</td>
<td>13</td>
<td>65</td>
<td>5,637</td>
<td>3,664</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE I—BRIDGE OWNER’S SHARE OF REMOVING OLD BRIDGE—Continued

<table>
<thead>
<tr>
<th>Item to be removed</th>
<th>Age at time of removal (years)</th>
<th>Owner’s share percent—(2)</th>
<th>Removal cost—(3)</th>
<th>Owner’s share of removal—(4)</th>
<th>Years remaining—(5)</th>
<th>Present worth factor—(6)</th>
<th>Owner’s present ability—(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>521,908</td>
<td>368,104</td>
<td></td>
<td></td>
<td>165,489</td>
</tr>
</tbody>
</table>

*Present Worth Factor based on 4 7⁄8%, FY 1970, as established by Water Resources Council. The actual factor to be used shall be that current at the time of alteration.*

TABLE II—FIXED CHARGES TO BE PAID BY BRIDGE OWNER

| Cost of construction | $10,361,860 |
| Less fixed charges | 598,400 |
| Total | 9,763,460 |

Owner’s share less fixed charges:

- Removing old bridge | 165,489 |
- Betterments | 18,360 |
- Expected savings in repair or maintenance costs:
  - Repair | 100,000 |
  - Maintenance | 16,288 |
- Costs attributable to requirements of railway and highway traffic (less right-of-way) | 1,503,100 |
- Expenditure for increased carrying capacity | 2,330,000 |
- Expired service life of old bridge | 511,300 |

Total | 4,644,537 |

Fixed charges by owner | 284,460 |
4,644,537+598,400=284,460
9,763,460

TABLE III—BETTERMENTS

- New furniture and water cooler in control house | $1,050 |
- Increased cost of elevators over stairways | 13,360 |
- Increased cost of galvanized steel grating walkways over timber walkways | 3,950 |

Total | 18,360 |

TABLE IV—EXPECTABLE SAVINGS IN REPAIR OR MAINTENANCE COSTS

| Repair Cost | $100,000 |

Maintenance Cost

- Average annual maintenance cost for old bridge | 16,875 |
- Estimated annual maintenance cost for new bridge | 16,000 |
- Total decrease in annual maintenance costs | 875 |
- Annual savings capitalized (50 years) @ 4 7⁄8%, FY 1970, as established by Water Resources Council. The actual factor to be used shall be that current at the time of the study. | 16,288 |

TABLE V—COSTS ATTRIBUTABLE TO REQUIREMENTS OF RAILWAY AND HIGHWAY TRAFFIC

- Heavy rail running rail (130 lb in lieu of 110 lb) | $11,200 |
- Additional signaling | 27,000 |
- Additional highway approaches | 1,430,000 |
- Subtotal | 1,503,100 |
- Additional right-of-way | 30,900 |
- Total | 1,534,000 |

TABLE VI—EXPENDITURE FOR INCREASED CARRYING CAPACITY

- Cost of new bridge designed for Cooper E 60 and AASHO HS20–44 loading | $8,609,592 |
- Cost of replacement-in-kind (hypothetical) bridge designed for Cooper E 45 and AASHO H15–44 loading | 6,279,592 |
### TABLE VI—EXPENDITURE FOR INCREASED CARRYING CAPACITY—Continued

Total .......................................................................................................................... 2,330,000

1 Excludes all items in Table III and first two items in Table V.

### TABLE VII—VALUE OF EXPIRED SERVICE LIFE OF OLD BRIDGE

<table>
<thead>
<tr>
<th>Item to be removed</th>
<th>Year built—(1)</th>
<th>Original cost—(2)</th>
<th>Salvage value—(3)</th>
<th>Actual capital cost (2)—(3)—(4)</th>
<th>Estimated service life—(5)</th>
<th>Expired service life</th>
<th>Value of expired service life—(4)×(7)—(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substructure:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pivot Pier</td>
<td>1908</td>
<td>$34,500</td>
<td>$0</td>
<td>$34,500</td>
<td>100</td>
<td>62</td>
<td>62 $21,390</td>
</tr>
<tr>
<td>Right End Pier</td>
<td>1908</td>
<td>18,580</td>
<td>0</td>
<td>18,580</td>
<td>100</td>
<td>62</td>
<td>62 $11,520</td>
</tr>
<tr>
<td>Left End Pier</td>
<td>1908</td>
<td>21,410</td>
<td>0</td>
<td>21,410</td>
<td>100</td>
<td>62</td>
<td>62 $13,274</td>
</tr>
<tr>
<td>Right Abutment</td>
<td>1908</td>
<td>8,600</td>
<td>0</td>
<td>8,600</td>
<td>100</td>
<td>62</td>
<td>62 $5,332</td>
</tr>
<tr>
<td>Left Abutment</td>
<td>1908</td>
<td>11,410</td>
<td>0</td>
<td>11,410</td>
<td>100</td>
<td>62</td>
<td>62 $7,074</td>
</tr>
<tr>
<td>Protection Works:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pivot Pier</td>
<td>1909</td>
<td>5,800</td>
<td>0</td>
<td>5,800</td>
<td>37</td>
<td>61</td>
<td>150 $2,900</td>
</tr>
<tr>
<td>Right End Pier</td>
<td>1942</td>
<td>3,200</td>
<td>0</td>
<td>3,200</td>
<td>37</td>
<td>28</td>
<td>150 $1,600</td>
</tr>
<tr>
<td>Superstructure:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swing Span</td>
<td>1909</td>
<td>168,920</td>
<td>19,400</td>
<td>149,520</td>
<td>70</td>
<td>61</td>
<td>87 $130,082</td>
</tr>
<tr>
<td>Electrification</td>
<td>1957</td>
<td>5,000</td>
<td>500</td>
<td>4,500</td>
<td>13</td>
<td>59</td>
<td>26 $2,655</td>
</tr>
<tr>
<td>Left Approach Spans</td>
<td>1909</td>
<td>142,017</td>
<td>16,300</td>
<td>125,717</td>
<td>70</td>
<td>61</td>
<td>87 $109,374</td>
</tr>
<tr>
<td>Right Approach Spans</td>
<td>1909</td>
<td>156,692</td>
<td>19,300</td>
<td>137,392</td>
<td>70</td>
<td>61</td>
<td>87 $119,531</td>
</tr>
<tr>
<td>Signaling</td>
<td>1909</td>
<td>15,000</td>
<td>1,000</td>
<td>14,000</td>
<td>35</td>
<td>61</td>
<td>100 $14,000</td>
</tr>
<tr>
<td>Ties and Timber</td>
<td>1908</td>
<td>8,120</td>
<td>0</td>
<td>8,120</td>
<td>61</td>
<td>50</td>
<td>4,060</td>
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<tr>
<td>Road and Accessories:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rail, 110 lb</td>
<td>1937</td>
<td>6,600</td>
<td>2,200</td>
<td>4,400</td>
<td>20</td>
<td>33</td>
<td>100 $4,400</td>
</tr>
<tr>
<td>Road, 110 lb</td>
<td>1957</td>
<td>43,679</td>
<td>18,600</td>
<td>25,079</td>
<td>20</td>
<td>13</td>
<td>65 $16,301</td>
</tr>
<tr>
<td>Roadway Approaches:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pavement</td>
<td>1908</td>
<td>17,841</td>
<td>0</td>
<td>17,841</td>
<td>20</td>
<td>62</td>
<td>150 $8,921</td>
</tr>
<tr>
<td>New Lane</td>
<td>1961</td>
<td>43,609</td>
<td>0</td>
<td>43,609</td>
<td>20</td>
<td>9</td>
<td>45 $19,624</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>77,300</td>
<td>633,678</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>1909</td>
<td>24,695</td>
<td>0</td>
<td>24,695</td>
<td></td>
<td>78</td>
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<tr>
<td>Total</td>
<td></td>
<td>77,300</td>
<td>633,678</td>
<td></td>
<td></td>
<td>78</td>
<td>511,300</td>
</tr>
</tbody>
</table>

1 Held at 50% if maintained in good condition.
2 Roadway approaches to be abandoned.
3 Weighted average 100 ×492,038/633,678 = 78%.

Explanation of Columns for Table VII:

Column (1): Year Built is the original date that an item to be removed became a part of the bridge or the last known date that it was replaced. The items to be removed should be broken down to show as much detail as possible, particularly where there is a variation in the year built and/or the estimated service life.

Column (2): Original cost shall be supported by records furnished by bridge owner. Engineering cost should be estimated if unknown.

Column (3): Salvage—refer to §277.8(b).

Column (4): Actual capital cost is the original cost of the item to be removed minus the salvage value.

Column (5): Estimated Service Life—refer to §277.8(g).

Column (6) & (7): Expired Service Life—refer to §277.8(g).

Column (8): Value of expired service life is the actual capital cost of the item to be removed multiplied by the percent of expired service life.

### PART 279—RESOURCE USE: ESTABLISHMENT OF OBJECTIVES

#### Sec. 279.1 Purpose.

#### 279.2 Applicability.

#### 279.3 References.

#### 279.4 Definitions.

#### 279.5 Policy.

#### 279.6 Overview of objective setting process.

#### 279.7 Information collection and preliminary analysis.

#### 279.8 Synthesis and analysis.

#### 279.9 Objective rationale.

#### 279.10 Implementation.

279.11 Responsibilities.

APPENDIX A TO PART 279—SAMPLE RESOURCE USE OBJECTIVES


SOURCE: 43 FR 14014, April 4, 1978, unless otherwise noted.

§ 279.1 Purpose.

This regulation provides policy and guidance for establishing resource use objectives for all Civil Works water resource projects during Phase I/Phase II