February 16, 1995
AT/mms

Introduced By: Bruce Laing

Proposed No.: 94-554

ORDINANCE NO. 11693

AN ORDINANCE relating to bridges; adopting priority rehabilitation, replacement, retrofit and redeck criteria.

BE IT ORDAINED BY THE COUNCIL OF KING COUNTY:

SECTION 1. For the purpose of effective prioritization of the use of limited available financial resources for the rehabilitation, replacement and seismic retrofit of the bridges of King County, the council makes the following legislative findings:

A. King County maintains a 2,400-mile road system, including 197 bridges. As these bridges age, maintenance needs increase, repairs become more extensive and frequent, rehabilitation or, ultimately, replacement becomes necessary. Since 135 of these bridges were built prior to 1960, the costs associated with their increased use are mounting, leading to increased demands upon available funding in coming years.

B. In addition to an aging inventory of bridges, other factors generating the need for a systematic approach to meeting the county's bridge needs include: heightened concern over the potential impact of seismic events; increased flows in waterways spanned by county bridges, greater traffic volumes with the attendant safety concerns and structural stresses.

C. The large number of bridges, the growing number of age-related concerns and the complexity of structural and operational factors to be considered can be best addressed by the establishment of a bridge replacement and rehabilitation prioritization process for King County. The objective and

purpose of this process is to establish the basic policy of King County for decisions on bridge replacement and rehabilitation. The evaluation of these decisions requires a difficult series of discretionary judgments weighing the availability of funds, the competing uses of funds for road and bridge construction and maintenance, the public safety affected by various road and bridge structures, and the expertise of the county road engineer.

D. The age, location, structure type, use and maintenance history which contribute to the unique circumstances of each of King County's 197 bridges also require that any prioritization process retain a degree of flexibility for the county road engineer to address the special circumstances of any bridge and based on these recommend additional factors for consideration. The legislative authority of King County exercises its policy discretion by adopting these criteria and the Bridge Needs Report annual update.

SECTION 2. The department of public works is directed to prepare a resume of bridge needs, identifying a list of bridges needing replacement rehabilitation, seismic retrofit or redecking. The resume of bridge needs shall be subject to an annual review and update process preparatory to the capital improvement program budgeting process and shall be included in the annual bridge report of the county road engineer. Updates shall incorporate modifications to structures, study results, structural analysis and other information available to the county road engineer. Before finalization of the annual roads capital improvement program budget, the department of public works shall provide an update report to the executive and council on these elements identifying possible changes to the bridge needs list and providing the rationale.

SECTION 3. The prioritization procedure for bridge replacement and rehabilitation projects shall include ten

criteria. Each criterion includes a specific formula and weighting factor to be used in determining the final priority rating. The elements are:

A. Sufficiency rating. The sufficiency rating for each bridge is taken directly from State of Washington Inventory of Bridges and Structures (SWIBS). This rating is based on three factors: a bridge's structural adequacy and safety, its serviceability and functional obsolescence, and its essentiality for public use.

B. Seismic rating. This rating is based on structural vulnerability, importance, seismicity, and life hazard. The structural vulnerability factor is an evaluation of the capacity of the structure to withstand earthquake-induced loads. The importance factor depends upon the route carried or crossed by the bridge, the traffic volumes, the detour length and the cost of replacing or retrofitting the bridge. The seismicity factor varies according to the local geology and the type of bridge foundation. The life hazard potential accounts for the possibility of severe injury or loss of life in the event of a bridge failure.

C. Geometrics. The geometric rating is based on values for the approach roadway alignment, deck geometry relative to the number of traffic lanes, the curb-to-curb bridge deck width, the Average Daily Traffic (ADT), the minimum vertical clearance over the bridge deck, and the federal functional classification of the roadway.

D. Hydraulics. The hydraulics rating is an appraisal of the adequacy of the bridge opening with respect to the passage of water beneath the structure.

E. Load limited bridges. This rating is derived from a formula which assigns values of 1 for posted bridges or 0 for unposted bridges.

F. Traffic safety. This rating is derived from a formula relating average daily traffic (ADT), accidents, roadway width, bridge width and position of guardrails.

G. Serviceability. The formula for serviceability is developed based on ADT, bridge width, approach roadway width, and vertical clearance. It scores the bridge based on its adequacy for the number of vehicles that use the bridge.

H. Importance. The importance rating is based on federal functional classification, ADT, detour lengths and presence of utility lines.

I. Useful life. All bridges are separated into three major categories depending on the material comprising the main superstructure: steel, concrete, or timber. An expected useful life has been assigned to each type of bridge. The remaining useful life is calculated based on the year built. The expected life is adjusted when rehabilitation or major maintenance is performed on a bridge.

J. Structural concern. This criteria is used to give a higher rating to structures with an identified major structural deficiency.

SECTION 4. The ten criteria for bridge replacement and rehabilitation priority shall be weighted in accordance with the following table:

	Criterion	Replacement / Rehabilitation Weight
A.	Sufficiency rating	3
B.	Seismic rating	1
C.	Geometrics	2
D.	Hydraulics	2
E.	Load limited	3
F.	Traffic safety	4
G.	Serviceability	3
H.	Importance	1
I.	Useful life	2
J.	Structural concern	4

The total priority score for each bridge is the sum of the individual scores for each criterion multiplied by the corresponding weighting factor, adjusted to a 100 point scale. The resultant rating ranges from 0(best bridge) to 100(worst bridge), for each bridge for either replacement or rehabilitation.

SECTION 5. The prioritization procedure for bridge seismic retrofit projects shall include the four criteria defined in Section 3-B. The elements are:

A. Structural vulnerability.

B. Importance.

C. Seismicity.

D. Life hazard.

For the purposes of determining retrofit priority, each criterion shall be weighted equally.

SECTION 6. The priority process shall also include a categorization of bridges into three levels of seismic retrofit. The three levels are defined as:

A. Level I. Bridge would avoid catastrophic failure, but would likely be left with substantial damage and require immediate repair.

B. Level II. Bridge would likely suffer minor damage, but of a nature considered repairable so the bridge could be returned to normal serviceable status.

C. Level III. Bridge would likely have the ability to withstand a seismic event and could be expected to maintain serviceable status.

SECTION 7. The department of public works is directed to concentrate seismic retrofit engineering efforts on level II and on bridges not scheduled for rehabilitation or replacement within ten years. The county road engineer may modify these goals upon completion of an engineering evaluation. Modifications to the goal will be identified in the "Annual Bridge Report" submitted to the executive and council.

SECTION 8. The department of public works is directed to prioritize bridge deck replacement and rehabilitation projects (hereinafter "bridge redeck projects"). There shall be three categories of bridge redeck projects: concrete, timber, and asphalt surface. Bridges shall be evaluated based on the extent and severity of deterioration of the

surface with similar rated bridges having higher average daily traffic volumes receiving priority.

SECTION 9. The bridge needs program shall be implemented through:

A. Adoption of an annual six-year capital improvement program.

B. Bridge maintenance and traffic operating improvements.

C. Pursuit of additional funding sources at the local, state and federal levels whenever possible.

INTRODUCED AND READ for the first time this 12th day of September, 1994.

PASSED by a vote of 10 to 0 this 21st day of February, 1995.

KING COUNTY COUNCIL
KING COUNTY, WASHINGTON

Kent Pullen
Chair

ATTEST:

Gerald A. Peterson
Clerk of the Council

APPROVED this 1st day of March, 1995.

King County Executive

Attachments: