In 1986, a major modification was released which provided a significantly more sophisticated design and analysis tool. The improvements primarily were in the areas of failure definition, statistical treatment, and soil characterization.

Performance and failure concerns were incorporated in the 1986 edition by virtue of then longer term monitoring of the pavement sections in the original test. Pavement condition was added through the Pavement Serviceability Index (PSI), a qualitative evaluation of ride condition using a Likert-type scale. Using this approach, it is possible to select the amount of condition change which constitutes failure. A model was developed which linked the change in the pavement condition over time to the usage and environment of the roadway. In addition to providing more performance-based design, this improvement also allowed life cycle cost analysis.

The underlying concept of life-cycle analysis is to select a pavement solution for the transportation corridor, rather than for the pavement itself. Simply put, the idea is to consider pavement systems with a lower initial cost (perhaps due to thinner pavement) and a higher maintenance cost (including overlays) alongside methods with higher initial costs and lower maintenance costs. Because of the serviceability index concept, one can keep track of the changing pavement performance with time, and thereby determine the timing of major maintenance for economic analyses. Most modern pavement design methods utilize some form of life cycle analysis.

Also new in the 1986 interim AASHTO method was treatment of statistical variability. The statistical variability of the input parameters and pavement performance are incorporated through two factors- reliability and standard deviation. The reliability factor accounts for chance variation in traffic prediction and performance by allowing the selection of a degree of confidence that the design will last the design period. The higher the desired degree of confidence in the design, the thicker the pavement. The standard deviation factor accounts for statistical variability in the input parameters, particularly the traffic predictions.

The last significant change was in the input parameter to use for describing the supporting soil strength. In the 1986 edition, the soil is characterized by the resilient modulus instead of the more nebulous soil support number used in the 1972 interim method. The resilient modulus is a measure of the soil behavior after thousands of load repetitions, and has come to be widely regarded as the most accurate characterization variable for pavement design. Climate is directly included in the resilient modulus determination through the boundary values used for the test.

AASHTO released the final method in 1993. The most significant changes in the intervening years (1986-1993) concerned the design method for overlays and rehabilitation. A major evaluation of the performance of the design method and its underlying assumptions is currently underway in the United States, as part of the Strategic Highway Research Program (SHRP). This analysis includes detailed observation of nearly 800 test sections scattered across all parts of the United States, and an assessment of the ability of the AASHTO method to predict serviceability and performance. Preliminary results (SHRP, 1994) indicate that while traffic loadings are notoriously under-predicted (a non-conservative error), the results are to some extent offset by severe under-prediction of field moduli in the laboratory resilient modulus test (a conservative error). The major change that is expected in the future will be direct analysis of each potential failure mode, rather than the serviceability approach currently in use, which lumps together many different failure modes.

The AASHTO method has been modified by many individual state departments of transportation in the United States. The Arizona Department of Transportation method (ADOT, 1992) is optimized for the hot climate of the southwestern United States. The method is very similar to the AASHTO method, but deals more explicitly with the statistical variability of the underlying soils. The resilient modulus is the operative soil characterization variable, although due to difficulty in measurement of the resilient modulus ADOT uses a correlation with the Hveem Resistance Value (R-value).