Guidelines for
Risk-Based Inspection and Strength Evaluation of
Suspension Bridge Main Cable Systems

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American Association of State Highway and Transportation Officials
555 12th Street, NW, Suite 1000
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202-624-5800 phone
www.transportation.org

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Section 1:

GENERAL

1.1—INTRODUCTION

These Guidelines, developed as part of National Cooperative Highway Research Program (NCHRP) Project 12-115 (Blabac, 2022; see Section 6), are based on previous NCHRP sponsored work, in particular NCHRP Report 534 (Mayrbaurl and Camo, 2004a; see Section 6). Much of the methodology of inspection and material testing remains unchanged from that previous work, as it has withstood the test of time and has proven to be practical and effective. The methodology of determining an estimated cable strength presented in these Guidelines is based on the random field method and represents an improvement over the previously used methods.

Other methods of evaluating the strength of suspension bridge main cables are available, including NCHRP report 534, and these Guidelines are not intended to prevent owners from utilizing other methods or to restrict their use in any way (Mayrbaurl and Camo, 2004a; see Section 6). If bridge Owners choose to utilize other methods, they are encouraged to also evaluate the cable strength using these Guidelines in order to provide a consistent basis for comparison across the nation.

1.1.1—Scope of Guidelines

The purpose of these Guidelines is to provide the following:

- methods of inspecting bridge cables,
- criteria for gathering data to obtain the best statistical sample for the least effort and cost,
- criteria for testing wire, and
- methods of estimating cable strength to determine the factor of safety.

The Guidelines are primarily intended for suspension bridges with parallel wire cables. This is especially true of the Articles that describe wedging and interior inspection of the cable and estimation of cable strength. However, much of the content has relevance in a broad sense to helical strand cables (additional guidance for these is provided in Article 2.2.5.2).

1.1.2—Users of Guidelines

These Guidelines are intended for use by the following:

- suspension bridge Owners, in planning inspections and preparing specifications for scopes of work;
- Investigators and supporting personnel, in planning inspections and evaluating the information gathered in inspections;
- field inspection personnel, in executing inspections;
- construction crews, in providing access, unwrapping and wedging the cable, and rewrapping or replacing the protection system; and
- laboratory personnel, in testing wire samples.

The recommended intervals between inspections and locations for inspection are especially useful to bridge Owners, as are the codes, standards, and procedures for cable inspection and evaluation. These Guidelines are not intended, however, to be used as a substitute for experienced staff to inspect or evaluate cables. An engineer who is practiced in the evaluation of cable elements should always be in charge of a cable investigation.

Mathematical proficiency at the college-graduate level is needed for the estimation of cable strength.

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