# Style Manual for AASHTO Publications
## Table of Contents

### PART 1: PROJECT MANAGEMENT .................................................................................................................. 1

1.1 Overview ......................................................................................................................................................... 1

### PROJECT MANAGEMENT OF AASHTO PUBLICATIONS .................................................................................. 2

1.2 Outsourced Projects .......................................................................................................................................... 3
  1.2.1 Editorial Production .................................................................................................................................. 3
  1.2.2 Design/Layout ......................................................................................................................................... 6
  1.2.3 Technical Review .................................................................................................................................. 7
  1.2.4 Printing .................................................................................................................................................. 9

### PART 2: DESIGN PREFERENCES FOR AASHTO PUBLICATIONS ....................................................................... 12

2.1 Text .............................................................................................................................................................. 12
  2.1.1 Selection of Layout Software .................................................................................................................. 12
  2.1.2 Document Format .................................................................................................................................. 12
  2.1.3 Color ..................................................................................................................................................... 15
  2.1.4 Document Organization .......................................................................................................................... 16
  2.1.5 Figures .................................................................................................................................................. 16
  2.1.6 Tables ................................................................................................................................................... 25
  2.1.7 Equations ............................................................................................................................................. 28

2.2 Front matter ................................................................................................................................................... 28

2.3 End matter .................................................................................................................................................... 30
  2.3.1 Glossary ............................................................................................................................................... 30
  2.3.2 Index .................................................................................................................................................... 30
  2.3.3 Keywords for Web .................................................................................................................................. 30
  2.3.4 References .......................................................................................................................................... 31
  2.3.5 Output .................................................................................................................................................. 31

2.4 Covers .......................................................................................................................................................... 31
  2.4.1 Color .................................................................................................................................................... 31
  2.4.2 Front Cover ........................................................................................................................................... 32
  2.4.3 Back Cover .......................................................................................................................................... 32
  2.4.4 Spine .................................................................................................................................................... 32
  2.4.5 Jewel Case Covers, Tray Card Inserts, and CD-ROM Labels ............................................................... 34
  2.4.6 Output for Bookstore ........................................................................................................................... 34

2.5 Design and Production of AASHTO CD-ROMs .............................................................................................. 34
  2.5.1 Jewel Case Covers .................................................................................................................................. 34
  2.5.2 Tray Card Inserts .................................................................................................................................. 35
  2.5.3 CD-ROM Labels .................................................................................................................................... 35
  2.5.4 Splash Screens ..................................................................................................................................... 36
  2.5.5 Encryption and Security ........................................................................................................................ 36
3.14.3 Books .........................................................................................................................................................66
3.14.4 FHWA Publications ........................................................................................................................................67
3.14.5 TRB Publications .........................................................................................................................................67
3.14.6 Periodicals ...................................................................................................................................................68
3.14.7 Technical Reports .......................................................................................................................................68
3.14.8 Government Documents ..........................................................................................................................68
3.14.9 Court Cases .................................................................................................................................................69
3.14.10 Theses and Dissertations .........................................................................................................................69
3.14.11 Others .......................................................................................................................................................69
3.14.12 Nonprint Materials ....................................................................................................................................70

3.15 Request to Cite from Other Sources .............................................................................................................70
3.15.1 Trade Names ...............................................................................................................................................74

3.16 Endnotes and Footnotes .................................................................................................................................74
3.16.1 Text Citations ............................................................................................................................................74

3.17 Appendixes and Other Attachments .............................................................................................................74
Preface

The *Style Manual for AASHTO Publications* consists of project management information, AASHTO design preferences, style and editorial rules, and web and electronic publication guidelines. The manual can be used in its entirety, as a desk reference, or by individual pertinent sections. There is a detailed table of contents that will quickly direct the reader to the area of interest.

This document was created to assist the many subcommittee volunteers, vendors, consultants, and internal staff in editing, formatting, and preparing text for AASHTO publications. It is our hope, by offering this reference to the volunteers and vendors early in the creation and production process that we can continue to provide timely, accurate, and high-quality publications to our readership.

*AASHTO Publications Production Staff*
Part 1: Project Management

1.1 Overview

As shown on the next page, the flow chart of the project management of AASHTO publications illustrates the life cycle of an AASHTO manuscript. When a manuscript has been generated by the Subcommittee or Task Force responsible for developing the guide and has been balloted and approved by the Subcommittee and Standing Committee on Highways (SCOH), the Director of Publications Production assigns herself, the Assistant Director of Publications Production, or a Publications Specialist as Project Manager of the manuscript.

The Project Manager first completes the preproduction tasks which include organizing the components of the publication; preparing the publications jacket; entering the new project in the publications database; preparing file boxes and/or tracking charts, if necessary; and determining the layout design, color options, and printing specifications for the project.

The second step the Project Manager takes is to proofread the manuscript and to compile queries that need to be referred to the technical reviewer. The Project Manager then cleans up the electronic file and makes any corrections stemming from the copyediting of the manuscript. Sometimes this editing process is outsourced to a vendor.

At this point, the revised manuscript is typeset. The typesetting may be done in-house by the Project Manager or another member of the Publications Staff, or outsourced to a vendor.

When the layout is complete, the Project Manager sends the revised manuscript and any queries that have been compiled to the technical reviewer(s) of the Subcommittee or Task Force. The technical reviewers, who are responsible for the technical accuracy of the document, usually review the final draft within one to four weeks (depending upon the size of the document) and then return their revisions and comments to the Project Manager.

The Project Manager and the typesetter make the final revisions determined during the technical review.

The Project Manager or Fulfillment Coordinator attaches the appropriate fulfillment paperwork to the document and sends the final draft to press. The printer returns bluelines or proofs to the Project Manager for review and approval. If a CD is to be produced, the Project Manager also checks the security features and hyperlinks provided by AASHTO’s encryption vendor. Upon approval of the Project Manager, the printing or replication is completed.

The printer then sends a sample carton to the Project Manager to check. Upon approval, the Project Manager notifies the Fulfillment Coordinator to authorize shipment of the product to the fulfillment center. The Fulfillment Coordinator also issues transmittal letters so that the fulfillment center can ship the gratis copies to the member departments, instructs the online bookstore manager to make the publication available to the general public, and notifies the marketing coordinator and the AASHTO staff that the publication is available for purchase.

When a new publication supersedes the previous edition or when SCOH so determines, the Director of Publications Production archives a specific edition of a publication.
Project Management of AASHTO Publications

Subcommittee or Task Force delivers balloted and approved manuscript

Director of Publications Production assigns ms to Pub Staff

Complete preproduction tasks

Proofread/copyedit manuscript

Cleanup/revise electronic files

Design/Layout/Check revised manuscript

Manuscript returned to authors for Technical Review

Revise ms according to Technical Review

Final formatted manuscript

Fulfillment setup

Printer returns blue lines/proofs for approval

CD security and replication/approve sample CD

Post on website in lieu of or along with printing

Fulfillment and Marketing

Archived by Director of Publications Production
1.2 Outsourced Projects

AASHTO sometimes outsources one or more operations of the production of a project. Selected vendors will be invited to bid on a project based upon specifications established by the Project Manager. In general, the lowest bid will be accepted.

1.2.1 Editorial Production

If awarded a contract for editorial review, the vendor will be expected to perform the following tasks:

1. Take inventory to ensure that all components of the manuscript have been received.
2. Proofread a hard copy of the files. See “Style Rules for AASHTO Publications” for a discussion of specific style rules to be used for AASHTO publications. For items not covered in that section, refer to The Chicago Manual of Style or contact AASHTO.

When proofreading AASHTO’s technical documents, look for grammatical, spelling, and formatting errors and for inconsistencies. Do not make substantive revisions. If a sentence or paragraph needs to be reworded, write the revised copy as a recommendation that can be submitted to the technical reviewer for confirmation.

The following is a list of proofreader’s marks that AASHTO generally uses:

**Proofreader’s Marks**

**General Rules**

Mark every error in both the text and the margin.

Use left and right margins, whichever margin is closer to the error.

Mark from left to right, and use slashes in the margins to separate multiple marks or to call attention to inconspicuous marks.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations (delete, insert, replace, transpose)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>caret to illustrate place of insertion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>replace character or word</td>
<td></td>
<td></td>
</tr>
<tr>
<td>make same correction consecutively as many times as slashes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>used to separate two or more marks and often as a concluding stroke at the end of an insertion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>let stand or ignore marked change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>transpose adjacent words or letters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>delete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>caret to illustrate place of insertion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>replace character or word</td>
<td></td>
<td></td>
</tr>
<tr>
<td>make same correction consecutively as many times as slashes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>used to separate two or more marks and often as a concluding stroke at the end of an insertion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>let stand or ignore marked change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>transpose adjacent words or letters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symbol</td>
<td>Meaning</td>
<td>Example</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>spell out</td>
<td>change $\frac{5}{20}$ to five percent</td>
<td></td>
</tr>
<tr>
<td>broken character</td>
<td>effective character</td>
<td></td>
</tr>
<tr>
<td>query to author</td>
<td>$Q$ Should 0.3 be changed to 0.03 or is it correct as is?</td>
<td></td>
</tr>
<tr>
<td>close up</td>
<td>print as $\text{one word}$</td>
<td></td>
</tr>
<tr>
<td>delete and close up</td>
<td>delete and close up</td>
<td></td>
</tr>
<tr>
<td>insert and close up at left</td>
<td>insert and close up at left</td>
<td></td>
</tr>
<tr>
<td>insert and close up at right</td>
<td>insert and close up at right</td>
<td></td>
</tr>
<tr>
<td>set farther to the left</td>
<td>move to the left</td>
<td></td>
</tr>
<tr>
<td>set farther to the right</td>
<td>move right</td>
<td></td>
</tr>
<tr>
<td>insert a space</td>
<td>insert a space here #</td>
<td></td>
</tr>
<tr>
<td>equalize space between words</td>
<td>equalize space between words</td>
<td></td>
</tr>
<tr>
<td>less space between words</td>
<td>close up space between words</td>
<td></td>
</tr>
<tr>
<td>center horizontally</td>
<td>center horizontally</td>
<td></td>
</tr>
<tr>
<td>center vertically</td>
<td>center vertically</td>
<td></td>
</tr>
<tr>
<td>set as ligature (such as $\text{æ}$)</td>
<td>formula$\text{æ}$ should be set as formulæ</td>
<td></td>
</tr>
<tr>
<td>align horizontally</td>
<td>align horizontally</td>
<td></td>
</tr>
<tr>
<td>align vertically</td>
<td>align vertically</td>
<td></td>
</tr>
<tr>
<td>indent or insert em quad space</td>
<td></td>
<td></td>
</tr>
<tr>
<td>push down or work-up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>insert line space</td>
<td>#</td>
<td></td>
</tr>
<tr>
<td>Symbol</td>
<td>Meaning</td>
<td>Example</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Spacing or Position (cont’d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td># &gt;</td>
<td>delete or close up line space</td>
<td># \text{ delete line space} or delete line space</td>
</tr>
<tr>
<td>( )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breaks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( )</td>
<td>begin a new paragraph</td>
<td>start new paragraph Here</td>
</tr>
<tr>
<td>( )</td>
<td>no new paragraph or new line</td>
<td>run ( \uparrow ) up</td>
</tr>
<tr>
<td>( )</td>
<td>begin new line</td>
<td>begin new line here</td>
</tr>
<tr>
<td>( )</td>
<td>carry back to previous line</td>
<td>carry back to previous line</td>
</tr>
<tr>
<td>( ) \text{ or (run back) }</td>
<td>insert pagebreak</td>
<td>Type Ctrl + Shift + Space bar to set nonbreaking space; e.g., 3 mm</td>
</tr>
<tr>
<td>( \text{PgBrk})</td>
<td>set with nonbreaking space between words</td>
<td></td>
</tr>
<tr>
<td>( \text{NBS})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \text{cap})</td>
<td>set in capitals</td>
<td>set \text{ ben} as \text{ Ben}</td>
</tr>
<tr>
<td>( \text{sm cap or s.c.})</td>
<td>set in SMALL CAPITALS</td>
<td>set \text{ section} as \text{ SECTION}</td>
</tr>
<tr>
<td>( \text{lc})</td>
<td>set in lowercase</td>
<td>set \text{ Text} with lowercase \text{ t} as \text{ text}</td>
</tr>
<tr>
<td>( \text{ital})</td>
<td>set in \textit{italic}</td>
<td>set \text{ in situ} in \textit{italic} type as \textit{in situ}</td>
</tr>
<tr>
<td>( \text{rom})</td>
<td>set in roman</td>
<td>set \text{ text} in roman type as \text{ text}</td>
</tr>
<tr>
<td>( \text{bf})</td>
<td>set in \textbf{boldface}</td>
<td>set \text{ text} in \textbf{boldface} type as \textbf{text}</td>
</tr>
<tr>
<td>( ) \text{ or } \text{bf}</td>
<td>set as superscript or superior</td>
<td>set \text{ 2} as superscript in ft(^2)</td>
</tr>
<tr>
<td>( ) \text{ or } \text{bf} \text{ or } \text{bf}</td>
<td>set as subscript or inferior</td>
<td>set \text{ 2} as subscript in H\text{\textsubscript{2}}O</td>
</tr>
<tr>
<td>( )</td>
<td>turn over an inverted letter</td>
<td>inverted</td>
</tr>
<tr>
<td>( )</td>
<td>wrong font</td>
<td>wrong size or (\text{font})</td>
</tr>
<tr>
<td>Punctuation Symbols</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \text{= or (-) or } \text{(\overline{\text{(\overline{\text{-}})})}}) or (\text{(\overline{\text{(\overline{\text{-}})})}})</td>
<td>hyphen</td>
<td>multi-colored</td>
</tr>
<tr>
<td>Symbol</td>
<td>Meaning</td>
<td>Example</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>\textendash or \textemdash or \textendash</td>
<td>en dash</td>
<td>1965–72</td>
</tr>
<tr>
<td>\textemdash or \textendash</td>
<td>em (or long) dash</td>
<td>Now—at last!—we know.</td>
</tr>
<tr>
<td>,</td>
<td>comma</td>
<td></td>
</tr>
<tr>
<td>’</td>
<td>apostrophe</td>
<td></td>
</tr>
<tr>
<td>.</td>
<td>period</td>
<td></td>
</tr>
<tr>
<td>!</td>
<td>exclamation point</td>
<td></td>
</tr>
<tr>
<td>;</td>
<td>semicolon</td>
<td></td>
</tr>
<tr>
<td>:</td>
<td>colon</td>
<td></td>
</tr>
<tr>
<td>“ ” or ‘ ’</td>
<td>quotation marks</td>
<td></td>
</tr>
<tr>
<td>( )</td>
<td>parentheses</td>
<td></td>
</tr>
<tr>
<td>[ ]</td>
<td>brackets</td>
<td></td>
</tr>
</tbody>
</table>

(3) Depending upon the contract, the vendor may also be asked to mark up a hard copy of a chapter to determine the styles/tags that will be required.

(4) Prepare a list of queries. If a query will affect formatting, contact AASHTO or the technical reviewer to resolve the issue before typesetting the document. Otherwise, all queries are submitted to the authors during the technical review.

(5) Prepare the electronic files.

(6) Revise the Word file according to the editorial changes determined during the initial proofreading.

(7) Remove formatting in order to have a clean copy for layout, if necessary.

(8) Complete revisions to figures as indicated.

(9) Complete revisions to equations as indicated.

(10) Review each chapter to ensure that revisions have been made correctly.

1.2.2 Design/Layout

See “Design Preferences for AASHTO Publications” for a discussion of specific design styles to be used for AASHTO publications.

The vendor may be asked to perform the following tasks:

(1) Typeset/layout the book.

(2) Review typeset document for layout.
(3) Make any revisions or adjustments as determined during the technical review. Print and review a clean copy of the final document.

(4) Prepare electronic files or PDFs for printing or CD replication.

All files and mechanicals must be returned to AASHTO upon completion of the project.

1.2.3 Technical Review

Members of the Subcommittee or Task Force responsible for the publication will be the technical reviewers who are responsible for the technical accuracy of the document. The Subcommittee on Bridges and Structures and the Subcommittee on Materials use technical sections to oversee specifications pertaining to specific subjects; for example, the technical sections for the SOM focus on different types of construction materials—asphalts, bituminous material, hydraulic cement, pipe, etc. (The LRFD books are the exception to this rule. One consultant group, Modjeski and Masters, is the sole author of this series.) The technical section chairmen serve as the contact persons during the technical review process. The remaining Subcommittees designate members to serve as chapter authors, who act as the contact persons for individual chapters during the technical review. On rare occasions, for small publications such as Guide Specifications for Shotcrete Repair of Highway Bridges, only one person will act as the technical reviewer. This person is usually the Chairman or Secretary of the Task Force responsible for the publication.

The schedules for the technical reviews vary depending upon the size of the project. A small publication may be reviewed from overnight to one week. Large publications may require one month to complete the review process.

The AASHTO Project Manager sends the document to the designated technical section chairman or chapter author for review. Included in the package are hard copies of the formatted manuscript, a cover letter that states the deadline for return of the Technical Review comments, any queries to the technical reviewers, a checklist of items that the technical reviewers should consider during their review, and a sign-off letter to be returned to AASHTO.

Queries should refer the specific location of the item in question—section or page number, paragraph or line, etc. If possible, word the query in such a way that the technical reviewer simply has to circle an item for a quick response. An example from the Materials Book is as follows:

Technical Section 4g

M 225M/M 225  In Section 8.1.3 and in the caption for Table 4, should “welded fabric” be changed to “welded wire reinforcement”?  Yes  No

A sample checklist for technical reviewers follows.
Checklist for Technical Review of [Title of Publication]

Content
Check accuracy of content.

Determine that the text is complete, mathematically correct, and presented in a logical order. Make sure no portions of text were inadvertently dropped in the preparation of the document.

Check that all reference citations are exactly correct.

Be certain all queries by the AASHTO publications staff have been answered.

Check that the notes are accurate and are numbered correctly in the text.

We suggest having a second person on your staff proofread the document, particularly if you were involved in its original preparation or revision. You cannot proofread your own writing; your brain will see what is supposed to be there, not what really is there. [Hint: Please print the document if reviewing an electronic file because proofreading paper copy is generally more accurate than proofreading online.]

Double-check accuracy of content.

Style and Format

AASHTO follows The Chicago Manual of Style for consistency and uniformity and the GPO Style Manual as a secondary source. Please follow these guides closely.

If you change the words in a document on the computer, carefully proofread all around that change because you may either leave in a word from the older version or take out too many words.

Spell out acronyms when first used.

Check the footers and/or headers to determine that the correct chapter heading is listed and that all pages are numbered sequentially.

Figures, Tables, and Equations

Make sure all referenced matter (tables, figures, notes) follows the first in-text callout.

Make sure all tables and figures (illustrations and photographs) have titles.

Number all notes, tables, and figures consecutively throughout a chapter, including ones in appendices, annexes, and supplements.

Check that the figures (illustrations and photographs) are complete, correct, and legible, and are placed in the correct position in the text.

Cross-reference text references to figures, tables, or equations.

Check that all entries in tables are correct and located in proper rows and columns, i.e., under correct headings, and placed in the correct position in the text.

Check descriptions of tables in text against information on tables themselves.

Check that equations and formulas are complete and accurate and placed in the correct position in the text.
Sign-Off Letter

The following is an example of the text for a sign-off letter that the technical reviewers should return with their comments at the end of the technical review period:

Re: AASHTO’s [Book Title]

Dear [Project Manager]:

This is to certify that I (or my designee) have thoroughly reviewed the enclosed page proofs and have found such to be complete and accurate, with the appropriate corrections as marked legibly on the proofs, and suitable for final publication and distribution by AASHTO.

Sincerely,

Author’s or Designee’s Name __________________________

Date _____________________________

*Please return this form no later than ___[date]___

When the technical reviewer(s) indicates that the publication is again ready for production, the designer should make any changes resulting from responses to queries.

The designer should then print and review a clean copy of the final document. Collate all parts/chapters so that the book is in the correct order. Check that all revisions have been made correctly and that the formatting is correct. Prepare the electronic files for delivery to the printer.

1.2.4 Printing

Selected printers may be invited to bid on a project based upon specifications established by the Project Manager. In general, the lowest bid will be accepted.

The AASHTO Project Manager provides the following information in order to enable the printer to determine an accurate proposal:

- number of copies to be printed,
- paper size,
- number of pages in publication,
- method of submission (PDF, software files, camera-ready copy) for text and covers,
- type, color, and quantity of artwork,
- type of paper for text,
- type of paper and finishes for covers,
- color of ink for text and covers,
- number of and design of covers and spine (printed one- or two-sided, bleeds, etc.),
- type of binding,
- type of proofs requested,
- delivery instructions (including the delivery of the sample carton),
- schedule required, and
- any special requirements or features (insertion of CD, tipping in map, etc.).
The following is a sample bid letter that AASHTO would send out.

Dear [Vendor]:

The American Association of State Highway and Transportation Officials is seeking bids for the printing and binding of a publication based on the specifications listed below:

**Title:** A Policy on Geometric Design of Highways and Streets

**Quantity:** 10,000 copies

**Size:** 8-1/2 in. by 11 in.

**Pages:** approximately 948

**Text:** submitted as PDF files

**Text stock:** 50# bright white

**Text ink:** Black

**Covers:** Adobe Illustrator files on disk or PDF

**Cover stock:** KIVAR 3-17 Graphic White in Homespun Finish

**Cover ink:** 5/C cover; full bleeds on covers 1, 4, and spine. Some text on covers 1, 4, and spine reverses out to white. Inside covers 2 and 3 do not print. Covers are to be varnished.

**Binding:** Perfect bound. (With the last two printings, we have had problems with the binding detaching due to heavy use of the book. Please make specific recommendations on methods to ensure that the binding remains intact and strong.)

**Proofs:** One set of bluelines or digital proofs to be reviewed by AASHTO.

**Delivery:** One sample carton of 42 copies of the publication, properly labeled per the instructions of our fulfillment house, is to be delivered to AASHTO Headquarters to the attention of:

Name of Project Manager  
AASHTO  
444 N. Capitol Street, N.W., Suite 237  
Washington, DC 20001  
(202) 624-5800

Upon approval of the sample cartons, AASHTO will authorize a bulk delivery to AASHTO’s fulfillment house at:

AB&C Group  
One Executive Way  
Ranson, West Virginia 25438-1070  
(304) 725-7050

**Schedule:** A schedule for delivery must accompany your bid.
Negatives: It is understood that ownership of negatives or files resides with AASHTO. All mechanicals must be returned to AASHTO upon completion of job.

Bids are due in this office as soon as possible but no later than Friday, September 3, 2004, at 10 a.m. They may be faxed to my attention at (202) 508-3835 or e-mailed to [name]@aashto.org.

AASHTO no longer accepts phone calls regarding the status of bids. All vendors invited to bid will be notified of bid results by mail. If you have any questions about the specifications, please call me at (202) 624-[xxxx].

Sincerely,

[Signature of Project Manager]

[Title of Project Manager]
Part 2: Design Preferences for AASHTO Publications

2.1 Text

2.1.1 Selection of Layout Software
AASHTO works in an IBM-compatible, Windows environment. Please submit documents in Microsoft Word. Submit the text, tabular/equation, and graphic files as separate, individual components rather than integrated in one single file. Embed the graphic files in Word documents only if the Word file is the final layout of the publication (see “Formatting in Word Documents”). Always include a hard copy of the document along with the electronic files. Please save the master files in Postscript.

Most of AASHTO’s technical publications are currently laid out in Microsoft Word files that are then converted to Portable Document Format files (PDFs) for printing. This method enables the Subcommittee and Task Force members to edit the files for the next edition. Printing from PDFs also sometimes allows AASHTO to use the same files for replicating CD-ROMs.

Smaller publications, including policy documents, are usually formatted in the desktop layout programs QuarkExpress 5.0 or Pagemaker 7.0 (for PC only, not Mac). Photos should not be embedded in the desktop file. Photos may, however, be embedded as low-resolution graphics as placeholders only. The original photos must be clearly labeled on the back and delivered at the same time as the electronic files. (See the section on “Preparing Photographs for Production.”)

2.1.2 Document Format

Page Setup
Basic page setup for AASHTO publications is 8½ in. × 11 in. portrait (tall). Landscape pages should be used only for tables or figures that will not fit on portrait-oriented pages.

New chapters/sections should start on the right-hand (recto) page.

Margins
Documents that are to be perfect-bound or saddle-stitched may be set up with 1-in. margins on all sides or with mirror margins. Publications that are to be 3-hole-drilled are usually set up as mirror margins with a 1.5-in. inside margin and a 0.5-in. outside margin. However, Bridge books are set up with top and bottom margins of 0.7 in. and side margins of 0.95 in. on the inside and 0.7 in. on the outside.

Typography in Design
In general, limit the use of different typefaces to two within one document.

Use a serif font for large bodies of text. Times New Roman is the preferred serif choice for AASHTO documents formatted in Microsoft Word because of its widespread use.

Headings, subheads, captions, and small bodies of text may be a serif or sans serif font. Arial is the preferred sans serif choice for AASHTO documents formatted in Microsoft Word because of its widespread use.

Do not expand or condense typefaces.
Font sizes generally run between 10 and 12 points for text, 10 and 14 points for headings, and 8 to 10 points for tables. In general, the body text style for AASHTO publications is Times New Roman 11 points normal; for Bridge books, the default text style is Times New Roman 10 pt normal. Never use fonts that are smaller than 7 points. Avoid fonts that are distractingly large.

Symbols must be of an ASCII format that will not change if the graphic is converted to a PDF. The preferred typeface for AASHTO documents is Symbols.

Fractions should be presented in the same way—\(\frac{1}{2}\), \(\frac{1}{2}\), or \(\frac{0}{6}\)—not in a combination of ways, i.e., some using diagonal slashes and some with numerator directly over the denominator, etc.

Avoid using all caps except for short primary headings or for emphasis. Avoid setting text in boldface, italics, script, or a novelty face.

Use boldface or italics, however, to help emphasize headings of sections or specialized notices such as warnings, cautions, or notes. (See the section on “Italic and Boldface Type.”)

Use flush left, ragged right alignment for large bodies of text. Justified text alignment may be used for smaller documents.

A one-column format is preferred. A scholar’s margin may be used for some publications in which the section numbering or other identifying subheads are placed to the left of the body text. Avoid two- or more column formats. Exceptions are the Bridge books, which currently have a two-column format for text and its accompanying commentary.

Use lists set off with numbers or bullets. (See the section on “Lists.”)

To ensure ease of sustained reading, average line length for large bodies of text should be approximately 50 characters. Avoid using lines for body text that are more than 65 characters or fewer than 39 characters.

Reverse type or run type over a tinted background only for accent pieces, such as fact boxes, sidebars, or pull-quote boxes.

Headers and Footers

Use running headers or footers to provide reference information, i.e., chapter title, document title, technical section number, and page number.

In AASHTO technical publications, the header of the recto (odd-numbered, right-hand) pages should include the title of the chapter, set flush left if the page number is to be set on the outside corner. The verso (even-numbered, left-hand) pages should include the title of the publication, set flush right if the page number is to be set on the outside corner.

Headers and footers usually appear 0.5 in. from the edge of the page. In the case of headers, the paragraph should be followed with a minimum of 12 points of white space before the body text.

Headers or footers usually do not appear on the first page of the chapter. However, if the footer contains only the page number, the footer may appear on the first page of each chapter.

Headers and footers are often set in roman or italics typeface that is equal to or one point below the typeface of the body text.

Page Numbering

Page numbers usually appear in the outside corner of the header or footer of AASHTO technical publications.

Occasionally, the page number may be centered in the footer of the document.
In AASHTO technical publications, the page number may include the chapter number followed by a hyphen and then the page number. For example, the page number for page 9 of Chapter 3 would be written “3-9.”

Use small Roman numerals (i, ii, iii . . . v, etc.) for page numbers in front matter and Arabic numerals (1, 2, 3 . . . 5, etc.) for page numbers in the main body of the publication. For Bridge books, the tables of contents for each section include the section number, e.g., 4-ii would be the second page of the front matter for Section 4.

Page numbers on landscape-oriented pages must be rotated so that the text is readable when that page is printed with the rest of the book. See “Landscape pages” in “Formatting in Microsoft Word” for instructions on how to insert page numbers in headers or footers of landscape-oriented pages.

**Leading and Spacing**

Use only one space between a period or colon and the text that follows it.

To ensure ease of reading for large bodies of text, use enough white space that the page is not overwhelming, intimidating, or confusing. For example, add extra space between paragraphs or bulleted lists, or before and after section headings.

Also use white space to help emphasize special notices such as warnings, cautions, and notes.

Use nonbreaking spaces (hit “Control + Shift + Space bar”) in Word documents to keep numerals with their corresponding units of measurement.

Leading (space between the lines) is generally set at type size plus 1 or 2 points. For example, leading for a 10- or 11-point typeface would be 1.2 line spacing.

For Bridge books, the default paragraph style is as follows:

- Tab 0.25 in. first line
- Full justification (no ragged right margin)
- Single line spacing
- 0 pt before and after

**Widows**

Avoid widows (a single line of a paragraph at the top of a page).

Never leave an orphan (a line of type beginning a new paragraph at the bottom of the page).

**Formatting in Microsoft Word**

In addition to the formatting specifications previously listed, take the following preferences into consideration when formatting a document in Microsoft Word:

*Style tags*—Use the Styles and Formatting feature in Word to create style tags instead of formatting manually. Features such as boldface, italic, superscript, subscript, superscript italic, subscript italic, etc., should be set up as character tags, not paragraph tags. Keep the number of style tags as few as possible.

*Landscape pages*—If landscape pages must be used in a Word document, create a landscape page by clicking “Insert > Break > Section break types > Next page.” Hit “Enter” and repeat the insertion of a section break. Move back to the paragraph marker on the blank page. Click “File> Page Setup > Landscape.” Discontinue the header and footer, if any, for this section. Insert text boxes on the right or left sides, or both, of the landscape page in which to place header or footer text. The height
of the text boxes should equal the width of the text margins on portrait pages, and the width of the text boxes should be at least 0.25 in. The text boxes should be positioned so as to align with the header and footer of the portrait pages, e.g., 0.5 in. horizontal and 1 in. vertical from the page for a document with 1-in. margins all around. Place header information in the right-hand text box and footer information in the left-hand text box. Rotate the text accordingly.

**Graphics**—Figures should be inserted in Word documents as “pictures,” NOT as “drawing objects.” The file should be inserted in a paragraph style tag named “Figure Placeholder” that is immediately followed by a paragraph style tag named “Figure Caption.” Use the “Keep with next” style feature with the Figure Placeholder tag so that the picture does not get separated from its caption. Insert photographs as TIFF files (300 dpi minimum) and line art as EPS or TIFF files (0.35 line weight minimum). Revisions and touch-ups to graphics should be made in a graphics program before inserting the graphic in the Word file. Graphics should be inserted as close as possible to the place where they are cited in the text. **Separate graphic files must still be submitted even if the graphics have been inserted in the Word document.**

**Tables**—Similarly, tables should follow as closely as possible the place where they are cited in the text. Tables may be created directly in the Word file. See the section on tables for information regarding formatting tables.

**Equations and math symbols**—Create equations in MathType 5.0. Mathematical symbols should be inserted using the Symbols font. Create fractions by formatting the numerator as a superscript and the denominator as a subscript. Do not substitute commonly used fractions with those found in Word’s AutoCorrect options. (See “Mathematical Expressions” in the section on “Style Rules.”)

### 2.1.3 Color

The majority of AASHTO publications are printed in black-and-white. Full-color printing is generally reserved for policy documents, covers, and marketing pieces. (See the section on “Covers” for information regarding significance of certain colors associated with AASHTO publications.) Publications designed solely for CD-ROM or the website may be full color.

**Black-and-White**

Always scan your black-and-white photos in Grayscale mode. Do not use Halftone mode. Scan with software enhancements such as sharpening and descreening turned off.

**Full Color**

Use CMYK (cyan, magenta, yellow, and black) colors instead of RGB (red, green, and blue) colors for publication designs. Color photographs should be scanned in CMYK mode.

In order to keep costs low, choose four-process colors rather than Pantone colors in design work. Specify whether you want the printer to “use” a specific color (mixing the ink according to the formula in the swatch books) or to “match” a color (to look as close as possible to the color in the swatch book).

When printing color separations, always let the printer be responsible for “trapping” the colors. If a color is critical to the publication, ask the printer for a “drawdown” (the printer applies the specified ink to the exact paper chosen for the job) or color match prints.

**Spot Color**

In order to keep printing costs low, spot color is utilized for emphasis or as a design technique only when necessary. Publications designed solely for CD-ROM or the website may use spot color.
Reverses should be used only as accents or on covers. Keep screens between 20 percent and 60 percent.

2.1.4 Document Organization

In its technical publications, AASHTO adheres to the Modified Decimal Numbering System to show subordinate relationships and to simplify extensive cross-referencing. All technical documents consist of several primary “sections” or “divisions.” Assign primary sections of standards in sequential order beginning with the Arabic numeral “1.” (2)

Number secondary sections with a two-part number consisting of the number used for a primary section followed by a decimal point and then another consecutive serial number (e.g., 1.1, 2.1, 2.2, 2.3 . . . 5.5, 5.6).

Ternary and quaternary sections continue with this same process. Number ternary sections as 1.1.1, 1.1.2, 2.1.1, 2.1.2 . . . 3.1.1.1, etc., and quaternary sections as 1.1.1.1, 1.1.2.1, 1.1.2.2, 2.1.1.1, 2.2.2.1 . . . 3.1.1.1, 3.1.1.2, etc.

Supplementary Requirements follow a pattern of S1, S1.1, S1.1.1, etc., while Annexes and Appendixes follow a pattern of A1, A2, A2.1, A3, A3.1, A3.2, A3.2.1, B1, C1, C2, C 2.1, etc.

Cross-references within the text to other sections should be written as “(see Section 2.1)” if the reference is within a sentence or as “(See Sections 2.1 and 3.2.)” if the reference is a separate sentence.

Using the same system in AASHTO Bridge books, articles are numbered from general to specific, i.e., 5.1, 5.1.1, 5.1.1.1, and so on. In cross-references to an article, the word “article” is capitalized, but never abbreviated, as in “Article 7.5.1.”

Some technical publications also combine typographic progression with the Modified Decimal Numbering System as a secondary formatting feature to indicate subordination. In these instances, primary (first-level headings) are set in all capital letters and boldface type. Secondary subheadings are set in initial capital letters and boldface type. Third-level headings are set in initial capital letters and roman type. Subsequent headings may be set in initial capital letters, roman or italic type, and smaller font sizes. (1)

2.1.5 Figures

Figures may be either photographs or line art. Photographs show exactly how something looks to help readers recognize an object, design, or situation. Line art illustrates specific features of an object or shows how something works, is assembled, or is maintained.

AASHTO uses three basic graphics programs—Adobe Illustrator, Photoshop, and AutoCAD Light. All graphics files must be compatible with one of these programs. Please submit the graphics as TIFF, EPS, or DWG files. If you use Microstation drawings, please submit them as DXF or EPS files.

Figures should be inserted in Word documents as “pictures,” NOT as “drawing objects.” The file should be inserted in a paragraph style tag named “Figure Placeholder” that is immediately followed by a paragraph style tag named “Figure Caption.” Use the “Keep with next” style feature with the Figure Placeholder tag so that the picture does not get separated from its caption.

Captions

The figure caption should clearly distinguish its figure from other illustrations. The caption should provide a succinct noun or noun phrase that describes the figure, but does not provide unnecessary background information nor repeat information found in the text.
Figure captions should appear below the figure. Use a period between the figure number and the caption of figure, but not at the end of the figure caption. Figure captions are set in “Title” case, i.e., all nouns and verbs are capitalized while all conjunctions, prepositions, and articles are lowercase.

Avoid using articles, such as, “A,” “The,” etc., at the beginning of captions.

Capitalize both parts of hyphenated terms within the figure caption if the elements are nouns or adjectives or if the element is the final word of the caption. Hyphenated prefixes or suffixes are lowercase unless the element is the final word of the caption. Correct examples would be “State-of-the-Art Report”; “Four-Leg Intersection”; “Conditions Determined to Be Pre-Existing.”

Do not abbreviate “Figure.”

Font
Figure captions may be set in serif or sans serif fonts. (New Times Roman or Arial fonts are preferred because they are commonly used.) Figure captions are usually set in boldface type.

See the section on “Line Art” for a discussion of fonts used within the figures themselves.

Numbering
Figures should be numbered consecutively with Arabic numerals throughout the document of small publications or throughout the chapter/section of large publications. Figure captions should be numbered separately from table captions.

Figure captions of larger publications include the chapter number followed by a hyphen and then followed by the number of the figure within that chapter. For example, the figure caption for the fourth figure of Chapter 7 of the Green Book should be numbered as follows:

Figure 7-4. Climbing Lane on a Two-Way Rural Arterial

Figure captions in Word documents may be numbered automatically.

Photos
Photographs should support the information given in the text of the document. Photographs shall be considered figures in the manuscript and will be numbered and titled accordingly.

Original art and photographs will not be returned after publication of the paper unless requested by the author.

Original photographs are preferred to scanned images.

Digital Images
Graphics are acceptable in electronic files. However, DO NOT send a photo made with a digital camera at 72 dpi. Electronic files of photos must have at least 300 dpi in order to print properly; 600 dpi is preferred.

Always save your original photograph scans in a separate folder. Always submit these separate files along with your document files.

If you wish to show the position of the photograph in the document, place a copy of the scanned file in the wordprocessing document. Submit a hard copy of the document along with the electronic file.

Scanning Photographs as TIFF Files
Photographs submitted electronically should be scanned with a high-resolution scanner at a minimum of 300 dpi; 600 dpi is preferred.

Scan at 100 percent of the size to be used.
Use a 2 to 1 ratio when determining appropriate line screen values. Generally, a 133 to 200 line screen is best.

Include the name of the software used to create the graphic.

A scanned image should be cropped as closely as possible to the area that is to be shown in your finished project.

Always scan your black-and-white photos in Grayscale mode. Do not use Halftone mode. Scan with software enhancements such as sharpening and descreening turned off.

Color photographs must be scanned in CMYK mode.

**Scanning Photographs as PDF Files**

A PDF file is acceptable, but not preferred.

Choose a PostScript printer in the “Print Selection” and, instead of printing the document to the printer, print to file. This creates the source PostScript file.

Launch Acrobat Distiller.

In the window that comes up, you’ll see “Job Options” at the top and a menu bar from which to choose the type of PDF you want to create.

Select “Press Optimized” in order to make the file suitable for use on a printing press.

Go to the top menu bar and select “Settings/Job Options.” This opens up the screen that lets you dictate how the PDF is created.

Usually, you can just accept the default settings in the General, Compression, Color, and Advanced screens. Go to the “Fonts” screen, however, and make sure that “Embed All Fonts” is checked. Also, at the bottom right of the “Fonts” screen, remove all fonts from the “Never Embed” section. (Adobe defaults to having several “Windows Standard Fonts” in that box—including Times New Roman and Arial.) If you leave the Adobe default setting, your PDF will contain font errors that are difficult or impossible to remedy after the fact.

Go back to the main screen, choose “File/Open” and select the source PostScript file that you created earlier. Rename the output file if desired, and choose your output destination.

Click “Save.”

**Photographs**

Send the original photograph. Color or black-and-white photos are acceptable.

Photographs not submitted electronically should be glossy prints that are sharp with good contrast.

Slides and negatives will be accepted, but are not preferred. Photographs cut out of previous publications can not be used.

In the case of photographs of equipment, the photograph should not show a manufacturer’s name or logo on the equipment.

**Photographs that are not purchased as stock photography must be accompanied by the Photo Release Form and, if people are in the picture, a Model Release Form for each person.**
AASHTO Blanket Photo Release Form

Please complete a separate sheet for each photo submitted.

Contact Information

Submitted by ________________________________________________________________

Company/Organization _______________________________________________________

Street Address ________________________________________________________________

City ___________________________________________ State/Province ___________________

Zip/Postal Code ________________________________________________________________

Phone Number __________________ Fax Number __________________________

E-mail Address ________________________________________________________________

Photo Information

Photo by (if different from above) _______________________________________________________

File Name ________________________________________ Format __________________________

Resolution ________________________________________ Medium _________________________

Date Taken ________________________________________ Model Release __________________

Description (subject, location, project, etc.)

_________________________________________________________________________________

_________________________________________________________________________________

_________________________________________________________________________________

Release

I hereby submit this photo belonging to me or my company/organization to the American Association of State Highway and Transportation Officials. AASHTO may display the image any number of times, in whole or in part, in any media, now or in the future.

Date ________________________ Signature ____________________________________________
MODEL RELEASE FORM

Photographer: _________________________________________________________________
Address: _____________________________________________________________________

Model: _______________________________________________________________________
Address: _____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

Regarding photographs taken by above-mentioned photographer on: ______________
at: ___________________________________________________________________________
____________________________________________________________________________

I hereby assign full copyright of these photographs to the above-mentioned photographer together with
the right of reproduction either wholly or in part. I agree that the Photographer, AASHTO, or licensees or
assignees can use the above-mentioned photographs either separately or together, either wholly or in part,
in any way, and in any medium.

The Photographer, AASHTO, and licensees or assignees may have unrestricted use of these for whatever
purpose, including advertising, with any reasonable retouching or alteration. I agree that the above-
mentioned photographs and any reproductions shall be deemed to represent an imaginary person, and
further agree that the Photographer, AASHTO, or any person authorized by or acting on his or her behalf
may use the above-mentioned photographs or any reproductions of them for any advertising purposes or
for the purpose of illustrating any wording, and agree that no such wording shall be considered to be
attributed to me personally unless my name is used. I waive any right to notice or approval of any use of
the above-mentioned photographs.

Provided my name is not mentioned in connection with any other statement or wording which may be
attributed to me personally, I undertake not to prosecute or to institute proceedings, claims, or demands
against either the Photographer, AASHTO, or his or her agents in respect of any usage of the above-
mentioned photographs. I agree that the above-mentioned photographs and the right to copyright the
same, shall be the sole property of AASHTO, with full right of lawful disposition in any manner. I have
read this model release form carefully and fully understand its meanings and implications.

Signed: _______________________________________________ Date: ______________

If the Model is under 18 year of age, a parent or legal guardian must also sign:

Parent/guardian: ___________________________________ Date: ______________
Preparing Photographs for Production

When submitted for production, photographs must be clearly labeled with the figure number and an indication as to which end is up.

Do not mark or tape captions or any other material on the front of photographs or write directly on the back.

For each photograph, use a label to provide the necessary identification, including author name and figure number.

Write on the label before attaching it to the reverse of each photograph, or mount the photograph on a labeled piece of heavy paper or mounting board.

Photographs should be cropped or masked to show only significant details. Crop marks should be shown on the mounting board rather than on the photograph to preserve the photo for future use.

Helpful Tips

If the photograph is of a single piece of equipment, shoot the photo indoors (if possible) using a white background (or one that will enhance contrast).

Make sure the lighting is adequate.

If the photograph is taken outdoors, make sure that the sun is behind you.

Line Art

In the technical publications, line art may be of two types: graphs and charts or diagrams and drawings. Bar graphs, line graphs, and pie charts are used to show relationships among data. Diagrams show detailed relationships among components while drawings (or illustrations) show the essential elements of an object, but may omit unnecessary details.

Examples of acceptable line art are as follows:

Bar Graph

Figure 2-1. Traffic Fatality Rate per Billion Vehicle Kilometers (Miles) by Year
Line Graph

![Line Graph](image)

Figure 2-2. Relation between Peak-Hour and Average Daily Traffic Volumes on Rural Arterials

Pie Chart

- **Mileage by Functional Class**
  - Primary: 35%
  - Secondary: 50%
  - Interstate: 15%

- **VMT by Functional Class**
  - Primary: 37%
  - Secondary: 10%
  - Interstate: 53%

Figure 2-3. Difference between Total Miles and VMT on Various Functional Classifications of Roadway
Diagram

Figure 2-4. Relationship of User Benefit Analysis with Other Analysis Areas

Illustration

Figure 2-5. Hardened Steel Cone
In technical publications line art is usually presented as black-and-white figures. Color is used only if it is absolutely necessary for comprehension. Fills, such as cross-hatching and patterned lines, or screens may be used as substitutes for color.

Line art may be submitted as Adobe Illustrator or AutoCAD Light files. MicroStation files must be submitted in a DFX or EPS format. Graphs and charts must be in a format editable in Microsoft Word or Adobe Illustrator. Figures should be able to fit within an 8 1/2-in. × 11-in. page, or constructed in such a way that they may be broken apart for placement on several 8 1/2-in. × 11-in. pages.

If original artwork must be scanned, the original drawings must have sharp, uniformly black lines. Images with fuzzy or broken lines, smudges, poor contrasts, delicate lines or fills, and stray marks or uncontained fills are not acceptable. Do not write text on the original artwork. Indicate on a photocopy of the line art what the text is and where it should be placed so that the text may be inserted after the figure is scanned and will, therefore, be consistent in size and font with other figures in the publication.

Make all fonts, symbols, abbreviations, dimension lines, text, fills, and line weights consistent for all line art of the same project, even if different software is used to produce individual graphics for the line art. For example, the same font in the same size should be used for all text or dimensions. Similarly, the dimensions should be indicated in the same manner, i.e., end lines or arrows, in all of the illustrations for the same project. Do not mix the use of decimals and fractions in U.S. Customary units. Fractions should be presented in the same way——1/2, 1/2, or 06′— not in a combination of ways, i.e., some using diagonal slashes and some with numerator directly over the denominator, etc.

Abbreviations and symbols must not only be consistent throughout the book, but must also be of an ASCII format that will not change if the graphic is converted to a PDF.

Because hairline weights will not print properly, lines must be at least 0.35 points thick. Similarly, shading and fills must be dark enough that they do not fade or disappear when printed.

As an example, instructions for the design of the Green Book figures included the following:

| Font:       | Arial                        |
| Size:       | Headings—10 points           |
|             | Text—8 points                |
| Style:      | Level 1 heading should be ALL CAPS; Level 2 heading should be Title Case. “Notes” should be removed from figures unless the note accompanies only a specific section of the figure. |
| Dimensions: | Center dimension measurements within the dimension lines if the space is adequate. Use arrowheads instead of dots or slashes as the terminators. Use extension lines for clarity as necessary. |
| Fractions:  | Express fractions with diagonal slash for U.S. Customary Units and as decimals for Metric Units. |
| Abbreviations: | Use “in.” and “ft” not ‘ or ” for U.S. Customary Units. Put periods after US in U.S. Customary Units. If “Max” or “Min” appears in metric units, then it must also appear in U.S. Customary units if they are written separately. For example, both “14.58 m Max [47.8 ft Max]” and “14.58 [47.8 ft] Max” are correct; “14.58 m Max [47.8 ft]” is incorrect. |
Symbols: ASCII
Use “Diameter” instead of Ø; also spell out “Radius.”
Use en dash (–) as minus sign.
Use ∈ instead of ε.
Use × instead of x for multiplication symbol.

Line weights: Minimum 0.35 points
Fills: Use ISO industry standard fills.
Fills or shading must be dark enough that they will print well.

2.1.6 Tables

Tables are used to present a large amount of detailed information in a minimum amount of space or to present quantitative or precise numerical values in a concise manner. (8)

In a Word document, the table itself should be inserted in a paragraph style tag named “Table Placeholder” that immediately follows a paragraph style tag named “Table Caption.” The Table Caption tag should utilize the “Keep with next” feature in order to avoid separation between the table caption and the table.

Avoid fills or shading in table cells. If gray shading is necessary to clarify the intended meaning, use a solid “Fill” of “25% Gray.”

Create tables according to the following specifications:

Captions
The table caption should clearly distinguish its table from other tables. The caption should provide a succinct noun or noun phrase that describes the information provided in the table, but does not provide unnecessary background information nor repeat information found in the text.

Table captions should appear immediately before the table. Use a period between the table number and the caption of table, but not at the end of the table caption. Table captions are set in “Title” case, i.e., all nouns and verbs are capitalized while all conjunctions, prepositions, and articles are lowercase.

Avoid using articles, such as, “A,” “The,” etc., at the beginning of captions.

Capitalize both parts of hyphenated terms within the table caption if the elements are nouns or adjectives or if the element is the final word of the caption. Hyphenated prefixes or suffixes are lowercase unless the element is the final word of the caption. Correct examples would be “State-of-the-Art Report”; “Four-Leg Intersection”; “Conditions Determined to Be Pre-Existing.”

Do not abbreviate “Table.”

Font
Table captions may be set in serif or sans serif fonts. (New Times Roman or Arial fonts are preferred because they are commonly used.) Table captions are usually set in boldface type.

Numbering
Tables should be numbered consecutively with Arabic numerals throughout the document of small publications or throughout the chapter/section of large publications. Table captions should be numbered separately from figure captions.

Table captions of larger publications include the chapter number followed by a hyphen and then followed by the number of the table within that chapter. For example, the table caption for the second table of Chapter 9 of the Roadside Design Guide is numbered as follows:
Table 9-2. Temporary Longitudinal Barriers

Table captions in Word documents may be numbered automatically.

Table Orientation
Set all tables vertical (portrait) if possible.

Table Margins
Make sure the tables do not exceed the limits imposed by the printed page.

Table Rules
Make rules at the top and bottom of the table one point wide. All other rules should be 1/2-point width. Vertical rules should not be used unless absolutely necessary.

Table Headings
Table headings, i.e., column heads, spanners, and cut-in heads, can be set in Times New Roman or Arial, 8–10 points (7 pt can be used if space must be conserved), boldface. Spanner heads and cut-ins must be centered over the columns they apply to.

When tabular matter demands two or more levels of headings, decked heads must be used. A decked head consists of a spanner head and two or more column heads to which it applies. A horizontal rule (called a spanner rule) is set between the spanner and column heads indicating the columns the spanner applies to. Decked heads should seldom exceed two levels.

Table Stub
The table stub is the far left column of the table that lists the items about which information is provided in the columns to the right. Use Times New Roman, 8–10 pt, initial caps for the stub row text. (Headings in the table stub are set as other headings are.)

In the stub, subheads should be in italics and are aligned flush left. Stub items are usually indented one em under the subhead. Runovers in stub items are indented one em from when the item begins.

With two or more levels of subheads in the stub, the top level may be centered and the second level flush left. Use cut-in heads for the top-level subheads with rules above and below extending all the way across the table.

Table Columns
Vertically align a column of figures on the decimal points. Numerals of 1,000 or more should have commas for U.S. Standard units only. Mathematical operation signs are aligned if they precede quantities in a column of figures. Also, in a column consisting of information expressed in words, make text flush left if longer items. If short, center them.

Table Editing
Use em dashes to indicate breaks.
Use en dashes to indicate ranges (2–4).
Use “%” to indicate percentages.
For equations, use a minus sign with a space on either side.
Table Footnotes

Footnotes are normally set one size smaller than the body of a table (e.g., 7 points with an 8 point table). The words “Source” and “Notes” are traditionally distinguished typographically from the note that follows.

In “Source:” or “Note:” do not italicize the punctuation (:). Make terms italic and initial caps followed by lowercase running text in roman style font.

Footnotes to a table are of four general kinds and should appear in this order: (1) source notes, (2) other general notes, (3) notes on specific parts of the table, and (4) notes on the level of probability. Leave extra space in between each note item.

Tables Continued on More Than One Page

Use continued lines as needed. Format in italics as follows:

“Continued on next page” should appear under the rule of the table at the bottom of the page. “Table 14—Continued” should appear above the top rule of the table on the next page.

Column heads should be repeated on each page, but the title is not.

Sample Tables

The following examples are tables taken from AASHTO’s Materials Book.

Table 2-1. Gradation of Glass Beads

<table>
<thead>
<tr>
<th>Sieve Designation</th>
<th>Standard, mm</th>
<th>Alternate No.</th>
<th>Mass Percent Passing</th>
<th>Type I</th>
<th>Type II</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.850</td>
<td>20</td>
<td></td>
<td>100</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>0.600</td>
<td>30</td>
<td></td>
<td>75–95</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>0.425</td>
<td>40</td>
<td></td>
<td>—</td>
<td>90–100</td>
<td></td>
</tr>
<tr>
<td>0.300</td>
<td>50</td>
<td></td>
<td>15–35</td>
<td>50–75</td>
<td></td>
</tr>
<tr>
<td>0.180</td>
<td>80</td>
<td></td>
<td>—</td>
<td>0–5</td>
<td></td>
</tr>
<tr>
<td>0.150</td>
<td>100</td>
<td></td>
<td>0–5</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

Table 2-2. Weight of Metallic Coating Type I or II Fabric

<table>
<thead>
<tr>
<th>Specified Diameter of Coated Wire</th>
<th>Weight of Coating of Uncoated Wire Surface&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class C, oz/ft&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Class D, oz/ft&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>in.</td>
<td>mm</td>
</tr>
<tr>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>0.192</td>
<td>6</td>
</tr>
<tr>
<td>1.148</td>
<td>9</td>
</tr>
<tr>
<td>0.120</td>
<td>11</td>
</tr>
</tbody>
</table>

<sup>a</sup> Based upon ASTM A 309.
Table 2-3. Selection of a Design Aggregate Structure (Example)

<table>
<thead>
<tr>
<th>Volumetric Property</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_b$ (trial)</td>
<td>4.4</td>
<td>4.4</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>$G_{mm_{trial}}$ (trial)</td>
<td>88.1</td>
<td>87.8</td>
<td>87.1</td>
<td></td>
</tr>
<tr>
<td>$G_{mm_{design}}$ (trial)</td>
<td>95.9</td>
<td>95.3</td>
<td>94.7</td>
<td></td>
</tr>
<tr>
<td>$V_a$ at $N_{design}$</td>
<td>4.1</td>
<td>4.7</td>
<td>5.3</td>
<td>4.0</td>
</tr>
<tr>
<td>VMA$_{trial}$</td>
<td>12.9</td>
<td>13.4</td>
<td>13.9</td>
<td></td>
</tr>
</tbody>
</table>

Adjustments to Reach Design Binder Content ($V_a = 4.0\%$ at $N_{design}$)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta V_a$</td>
<td>-0.1</td>
<td>-0.7</td>
<td>-1.3</td>
</tr>
<tr>
<td>$\Delta P_b$</td>
<td>0.0</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>$\Delta VMA$</td>
<td>0.0</td>
<td>-0.1</td>
<td>-0.3</td>
</tr>
</tbody>
</table>

At the Estimated Design Binder Content ($V_a = 4.0\%$ at $N_{design}$)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated $P_b$ (design)</td>
<td>4.4</td>
<td>4.7</td>
<td>4.9</td>
</tr>
<tr>
<td>VMA (design)</td>
<td>12.9</td>
<td>13.3</td>
<td>13.6</td>
</tr>
<tr>
<td>$G_{mm_{design}}$ (design)</td>
<td>88.2</td>
<td>89.5</td>
<td>88.4</td>
</tr>
</tbody>
</table>

Notes:
1. The top portion of this table presents measured densities and volumetric properties for specimens prepared for each aggregate trial blend at the initial trial binder content.
2. None of the specimens had an air void content of exactly 4.0 percent. Therefore, the procedures described in Section 9 must be applied to:
   (1) estimate the design binder content at which $V_a = 4.0\%$, and (2) obtain adjusted VMA and relative density values at this estimated binder content.
3. The middle portion of this table presents the change in binder content ($\Delta P_b$) and VMA ($\Delta VMA$) that occurs when the air void content ($V_a$) is adjusted to 4.0 percent for each trial aggregate blend gradation.
4. A comparison of the VMA and densities at the estimated design binder content to the criteria in the last column shows that trial aggregate blend gradation No. 1 does not have sufficient VMA (12.9 percent versus a requirement of >13.0 percent). Trial blend No. 2 exceeds the criterion for relative density at $N_{initial}$ gyrations (89.5 percent versus requirement of ≤89.0 percent). Trial blend No. 3 meets the requirement for relative density and VMA and, in this example, is selected as the design aggregate structure.

2.1.7 Equations

See “Equations” under “Mathematical Expressions” in the section on “Style Rules.”

2.2 Front matter

The front matter of AASHTO Publications should include the following:

<table>
<thead>
<tr>
<th>Page Number</th>
<th>Required Information</th>
<th>Wording/Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title Page</td>
<td>Title of Book</td>
<td>[title page may be a black-and-white version of front cover]</td>
</tr>
<tr>
<td>Year of Publication Published by</td>
<td></td>
<td>[If necessary, insert special wording for partnership information, such as, “in cooperation (in conjunction) with FHWA” or “Prepared by Joint Task Force on Segregation of the Subcommittee on Construction and the National Asphalt Pavement Association.”]</td>
</tr>
<tr>
<td>AASHTO logo</td>
<td>AASHTO address</td>
<td>American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W., Suite 249 Washington, DC 20001 (202) 624-5800 transportation.org</td>
</tr>
<tr>
<td>Page Number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copyright page</td>
<td>Required Information</td>
<td>Wording/Explanation</td>
</tr>
<tr>
<td>Copyright page</td>
<td>Copyright [Copyright may be moved along with ISBN number to Page ii. If so, move next three items forward by one page.]</td>
<td>Copyright [year], by the American Association of State Highway and Transportation Officials. All Rights Reserved. This book, or parts thereof, may not be reproduced in any form without written permission of the publisher. Printed in the United States of America.</td>
</tr>
<tr>
<td>ISBN: [number]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Page iii</td>
<td>AASHTO Executive Committee of year book is published</td>
<td></td>
</tr>
<tr>
<td>Page iv</td>
<td>Members of Task Force that Produced Book</td>
<td></td>
</tr>
<tr>
<td>Page v–[viii] [number will depend on size of subcommittee]</td>
<td>Members of Subcommittee that Sponsored Task Force</td>
<td></td>
</tr>
<tr>
<td>[next right-hand page]</td>
<td>Table of Contents (TOC)</td>
<td>[TOC may be followed by a List of Illustrations, a List of Tables, or both.]</td>
</tr>
<tr>
<td>[next right-hand page]</td>
<td>Foreword</td>
<td>[A foreword is a statement about the book that is usually written by an eminent person who is not an author or editor of the book.]</td>
</tr>
<tr>
<td>[next right-hand page]</td>
<td>Preface</td>
<td>[A preface is a statement by the author that may include reasons for undertaking the work, methods of research, scope of the work, background of the work, brief acknowledgments, or permissions granted for the use of previously published material.]</td>
</tr>
<tr>
<td>[Back of previous page]</td>
<td>Runover of Preface or Acknowledgments (if not part of Preface) or blank even-numbered page</td>
<td>[If the chairman of task force wants to acknowledge support from a large list of individuals, groups, or private companies (such as contractors), place the information in a separate section under the heading of Acknowledgments. Photo credits may be mentioned by using the phrase “Photographs [Cover photo] courtesy of _______. “]</td>
</tr>
<tr>
<td>Last right-hand page before text</td>
<td>Introduction (if not part of text)</td>
<td>[An introduction is general, but relevant material that should be read before the rest of the book. A short introduction that is not part of the text should be paginated with the front matter. A long introduction or one that actually begins the subject matter of the book should be paginated with the text.]</td>
</tr>
<tr>
<td>Back of previous page [or last right-hand page before text]</td>
<td>Special technical information</td>
<td>[An example of technical information that a user might need while reading the book would be a metric conversion chart, a list of uncommon abbreviations, or a pertinent chronology graph.]</td>
</tr>
</tbody>
</table>
2.3 **End matter**

2.3.1 **Glossary**

Glossary entries are arranged in alphabetical order on a letter-by-letter basis and are aligned with the left margin. (1)

Each definition begins with a lowercase letter, unless the term is a proper noun, and ends with a period.

The glossary term should be set in italic type, followed by an em dash and its definition set in roman type. Runover lines are uniformly indented.

Nouns are presented in their singular form and verbs in their infinitive form.

If a term has multiple meanings, the subject field or part of speech should be indicated in angle brackets before the definition.

Parentheses and square brackets should be used only if they constitute part of the written form of the word, as in “poly(vinyl) chloride.”

Complete the definition in one sentence. If two or more phrases are needed to state the meaning(s), connect them with semicolons.

A glossary follows the last chapter of the book, but precedes and index or bibliography or reference list if that list applies to the entire book.

2.3.2 **Index**

An index appears as the last element of a publication.

Index terms should be keywords that best represent the technical information presented in the standard. All selected keywords should be stand-alone terms, not incomplete phrases or unattached adjectives.

Index entries may be single spaced in a one- or two-column format.

Alphabetize index entries on a letter-by-letter basis.

Index entries are capitalized only for proper names.

Main entries are aligned flush left while subsequent entries are uniformly indented one em space for each level of modification.

Runover lines are indented one em deeper than the deepest subentry.

Cross-references may be used if warranted. In cross-references, *see* is used to guide the reader to related information; *see also* is used to guide the reader to additional information. In either case, the “see” or “see also” should be italicized. The *S* should be capitalized if the phrase follows a period or is set on a separate line. If the phrase is enclosed in parentheses, the *S* is lowercase. The cross-reference is not followed by a period.

If necessary to continue a listing from one page to the next, insert the main entry term again followed by “*(continued)*”.

2.3.3 **Keywords for Web**

Keywords are terms that best represent the technical information presented in the standard. All selected keywords should be stand-alone terms, not incomplete phrases or unattached adjectives. Keywords may be terms that were defined, words used in titles or headings, or words determined to be significant by the technical reviewer.
### 2.3.4 References
See “References” in the section on “Style Rules.”

### 2.3.5 Output
Depending upon the method of printing to be used, files may be output as
- Postscript
- PDF for press or CD-ROM
- Quark or Pagemaker

### 2.4 Covers

#### 2.4.1 Color
Traditionally AASHTO has used the following color-coding system associated with their publications depending upon which Subcommittee or Task Force produces the document. Covers are designed accordingly, e.g., Materials books are always a shade of red, Bridge books are a shade of blue, Design books are a shade of green, etc.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Committee(s)</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADMINISTRATION AND ECONOMICS</td>
<td>Standing Committee on Administration</td>
<td>Varies</td>
</tr>
<tr>
<td>BRIDGES AND STRUCTURES</td>
<td>SCOH’s Subcommittee on Bridges and Structures</td>
<td>Blue</td>
</tr>
<tr>
<td>CONSTRUCTION</td>
<td>SCOH’s Subcommittee on Construction</td>
<td>Brown</td>
</tr>
<tr>
<td>MAINTENANCE</td>
<td>SCOH’s Subcommittee on Maintenance; Winter Advisory Task Force</td>
<td>Orange</td>
</tr>
<tr>
<td>DESIGN AND TRAFFIC</td>
<td>SCOH’s Subcommittee on Design, Task Force on Geometric Design; Task Force on Roadside Design;</td>
<td>Green</td>
</tr>
<tr>
<td>HIGHWAY TRAFFIC SAFETY</td>
<td>Standing Committee on Highway Traffic Safety</td>
<td>Yellow</td>
</tr>
<tr>
<td>HIGHWAY TRANSPORT</td>
<td>SCOH’s Subcommittee on Highway Transport</td>
<td>Varies</td>
</tr>
<tr>
<td>JOINT TASK FORCES</td>
<td>AASHTO/ATSSA/ITE Joint Committee; joint publications with NAPA; AASHTO/AGC/ARTBA Joint Committee</td>
<td>Varies</td>
</tr>
<tr>
<td>MATERIALS</td>
<td>SCOH’s Subcommittee on Materials</td>
<td>Red</td>
</tr>
<tr>
<td>PLANNING AND ENVIRONMENT</td>
<td>SCOD’s Task Force for Environmental Design; Standing Committee on Planning; Task Force on Corridor Preservation; Center for Environmental Excellence</td>
<td>SCOD’s TFs use Green; others vary</td>
</tr>
<tr>
<td>REPORTS</td>
<td></td>
<td>Varies</td>
</tr>
</tbody>
</table>
2.4.2 Front Cover
The front cover design should include the following:

- Title of the book and any subtitle deemed necessary—in upper 1/3 of page
- Number of edition if other than the first
- Year of publication
- “American Association of State Highway and Transportation Officials” with the AASHTO logo to the left of the AASHTO name—toward bottom of page
- Pictures of people in transportation-related activities—very important

2.4.3 Back Cover
The back cover design should include the following, centered and placed in the bottom 1/3 of the page:

- Book code
- ISBN number
- AASHTO name and address, including web address

2.4.4 Spine
Spines generally include the title, “AASHTO,” year of publication, and sometimes a part or volume number.

Examples of covers include the following:

Full Spread for Saddle-Stitched Publications
Full Spread for Perfect-Bound Publications

Front Cover for Looseleaf Books

Back Cover for Looseleaf Books
2.4.5 Jewel Case Covers, Tray Card Inserts, and CD-ROM Labels

See “Design and Production of AASHTO CD-ROMs.”

2.4.6 Output for Bookstore

When the design of a book or CD-ROM cover is complete, create an image of the cover for the online bookstore according to the following specifications:

- Width: 150 pixels
- Format: JPEG
- Color Mode: RGB

The file should be no larger (and preferable smaller) than 20 KB. However, image quality must be set no lower than 8 (high).

2.5 Design and Production of AASHTO CD-ROMs

2.5.1 Jewel Case Covers

Jewel case covers are usually designed in Quark or Illustrator. The dimensions will be approximately 9 1/2 in. wide (9 5/8 in. with bleeds) and 4 3/4 in. tall (5 1/4 in. with bleeds). Use CMYK colors and a minimum resolution of 300 dpi.
2.5.2 Tray Card Inserts

Tray card inserts are set up similarly to jewel case covers. The Quark design should be set up on a 7 in. × 10 in. landscape page. The design should measure 5\(\frac{3}{8}\) in. wide and 4\(\frac{5}{8}\) in. tall. The design should use CMYK colors and be a minimum resolution of 300 dpi.

2.5.3 CD-ROM Labels

If the printer has been selected, use the printer’s template to create the CD-ROM labels. If the printer is not known, use the following general specifications to design the CD-ROM labels in Quark or Illustrator:
- Design should be a circle, 4\(\frac{5}{8}\) in. to 4\(\frac{3}{4}\) in. in diameter.
- Two labels per page can be set on an 8\(\frac{1}{2}\) in. \(\times\) 11 in. portrait page.
- Type size should be no smaller than 6 points.
- Minimum resolution is 300 dpi.
- Colors should be CMYK.
- Any halftones should have a minimum line screen of 85.

2.5.4 Splash Screens

Splash screens may be designed as Photoshop or bitmap files. The design should be 4\(\frac{3}{4}\) in. \(\times\) 4\(\frac{3}{4}\) in. The minimum resolution should be 72 dpi. Convert color to index using local settings for best results. Create two versions for submission—one 256-color and one 16-color version.

2.5.5 Encryption and Security

AASHTO uses FileOpen for encryption and security of its CD-ROMs.

2.5.6 Creating PDFs for CD-ROMs

Although specifications may vary depending upon the printer’s requirements and the project itself, the following job options for creating PDFs for AASHTO CD-ROMs and publications generally apply:

- Embed all fonts. If embedding fails, cancel the job.
- Resolution should be set at 600 dpi.
- Auto-rotate pages should be turned off.
- “Embed thumbnails” should be selected.
- “Optimize fast web view” should be selected.
- Bicubic downsampling should be set at 300 dpi for images above 450 dpi and 1200 dpi for images above 1800 dpi.
- Compression should be set as automatic (JPEG).
- Image quality should be set at maximum.
- Compatibility should be set to Acrobat 4.0 (PDF 1.4).
2.5.7 Care and Handling of CDs

(1) Handle discs by the outer edge or the center hole.
(2) Use a non solvent-based felt-tip permanent marker to mark the label side of the disc.
(3) Keep dirt or other foreign matter from the disc.
(4) Store discs upright (book style) in plastic cases specified for CDs and DVDs.
(5) Return discs to storage cases immediately after use.
(6) Leave discs in their packaging (or cases) to minimize the effects of environmental changes.
(7) Open a recordable disc package only when you are ready to record data on that disc.
(8) Store in a cool, dry, dark environment in which the air is clean.
(9) Remove dirt, foreign material, fingerprints, smudges, and liquids by wiping with a clean cotton fabric in a straight line from the center of the disc toward the outer edge.
(10) Use CD/DVD cleaning detergent, isopropyl alcohol or methanol to remove stubborn dirt or material.
(11) Check the disc surface before recording.

**Do not:**

(1) Touch the surface of the disc.
(2) Bend the disc.
(3) Use adhesive labels.
(4) Store discs horizontally for a long time (years).
(5) Open a recordable optical disc package if you are not ready to record.
(6) Expose discs to extreme heat or high humidity.
(7) Expose discs to extreme rapid temperature or humidity changes.
(8) Expose recordable discs to prolonged sunlight or other sources of UV light.
(9) Write or mark in the data area of the disc (area where the laser “reads”).
(10) Clean in a circular direction around the disc.
(11) Scratch the label side of a CD.
(12) Use a pen, pencil, or fine tip marker to write on the disc.
(13) Write on the disc with markers that contain solvents.
(14) Try to peel off or re-position a label.

General recommendations for long-term storage conditions include the following:

- For archiving recordable (R) compact discs, use discs that have a gold metal reflective layer.
- An archival storage facility for CDs should maintain a temperature of 64°F (18°C) and 40 percent relative humidity for long-term storage. The temperature should never exceed 68°F (20°C) or fall below 39°F (4°C). The relative humidity should always remain between 20 and 50 percent.
2.6 AASHTO Web Guidelines

2.6.1 Submission of Materials for Posting on Any AASHTO-Hosted Website

Submitters are strongly encouraged to attach documents to already existing pages in the appropriate subject-matter site, rather than creating new pages consisting of the content contained in the document.

Such documents will be converted to Adobe PDF (Portable Document Format) according to these publication guidelines. A PDF conversion allows the document to retain its formatting, graphic look, feel, and color, and is, in many cases, easier for the end-user to read and print.

When submitting documents for posting, the submitter must:

- **Provide the document in electronic form, if at all possible.** Acceptable formats include Microsoft Office (Word, PowerPoint, Excel), Adobe Portable Document Format (PDF). Web staff will convert the document to Adobe PDF (according to Publications guidelines) if necessary.

- **Provide the full title of the document to be posted.** If the document does not have a formal title (e.g., meeting minutes, meeting agenda, etc.), an appropriate title should be created consisting of the subject-matter area, main content and month/year of creation (e.g., “SCOH Meeting Minutes September 2004”).

- **Provide an executive summary of the document to be posted.** This summary should be no more than two sentences long (40–80 words). It will be used as an introduction to the document to be downloaded.

- **Provide the exact URL (Universal Resource Locator) and title of the page where the document is to be posted.** For example, Design Guidelines http://design.transportation.org/?siteid=59&pageid=742, AASHTO Home Page http://transportation1.org/aashtonew/. If additional placement instructions are needed (e.g., “Please place under the subheading titled ‘New News.’”), these should be provided.

- **Provide contact information for the submitter of the document.** If the document is submitted by a third party (not an AASHTO employee), full contact information (name, phone number, e-mail address) for that person or organization must be provided in case there are questions to be answered before posting.

When submitting graphics (photographs, illustrations, logos, etc.) for posting, the submitter must:

- **Provide the graphic in .jpg (JPEG: Joint Photographic Experts Group) or .gif (GIF: Graphics Interface Format).**

- **If a .jpg, the graphic must be in RGB (Red Green Blue) color mode. Some illustrations are exported by applications as CYMK (Cyan Yellow Magenta Black) and are unacceptable for use on web pages.**

- **Size does matter. Both formats of graphics should be submitted with resolution as high as possible and size as large as possible. This allows for web staff to size the graphic correctly for placement.**
Part 3: Style Rules for AASHTO Publications

3.1 Use of “May,” “Will,” “Shall,” and “Should” in Standards

“May” indicates that a provision is optional.
“Will” expresses futurity, but never indicates any degree of requirement.
“Shall” indicates that a provision is mandatory.
“Should” indicates that a provision is not mandatory, but is recommended as good practice.

3.2 Use of “And/Or”

Avoid using the expression “and/or.” Instead of “A and/or B,” write “A or B, or both.” Similarly, instead of “A, B, and/or C,” write “A, B, or C, or combination thereof.”

3.3 Spelling

Use The American Heritage College Dictionary, 4th edition, to check the correct spelling of words. If a dictionary provides more than one spelling, use the first spelling. For technical terms, AASHTO references the ASTM Dictionary of Engineering Science and Technology and the Civil Engineering Reference Manual.

Refer to the Chicago Manual of Style for a more in-depth discussion of the items mentioned here.

Use the “English” spelling of “liter” and “meter” when spelling out SI units.

Do not use simplified spellings, such as “lite,” “nite,” or “thru.”

Also see the section on “Compound Words.”

3.3.1 Plural Forms

Form the plurals of most nouns by adding s.

When the noun ends in soft ch or in s, sh, j, x, or z, the plural inflection is es, e.g., “searches, mixes, crashes.”

Plurals of nouns ending in y preceded by a consonant are formed by replacing the y with ies, as in “alkalinities.”

Nouns ending in o immediately preceded by a vowel add s, as in “bayous.” Nouns ending in o immediately preceded by a consonant add es, as in “dadoes” or “cargoes.” (Exceptions to this rule include “gumbos,” “magnetos,” “twos,” and “zeros.”

The plurals of some nouns, such as “men,” “leaves,” “algae,” “radii,” or “biota,” are formed irregularly.

Some singular words, such as “fish,” can be used as plurals.

Some words can be made plural in the usual way or can also be made plural without any change, as in the following:
Some words can be either singular or plural:

- aircraft
- chassis
- series
- species

In compound nouns, the significant word takes the plural.

- Significant word first: rights-of-way, notaries public
- Significant word in the middle: assistant chiefs of staff
- Significant word last: traveled ways, vice chairmen, stopping sight distances
- Both words equally significant: Bulletins Nos. 27 and 28, secretaries-treasurers
- No word significant in itself: jack-in-the-pulpits, hand-me-downs

When a noun is hyphenated with an adverb or preposition, the plural is formed on the noun, as in “passers-by.”

When neither word is a noun, the plural is formed on the last word, as in “run-ins.”

Nouns ending in *ful* form the plural by adding *s* at the end unless it is necessary to express the idea that more than one container was filled. For example,

- Five bucketfuls of the mixture (one bucket filled five times)
- Five buckets full of the mixture (five separate buckets)

Plural forms of letters, numbers, acronyms, or abbreviations are formed by adding *s* [but **not** an apostrophe].

- *xs* and *ys*
- the three Rs
- in twos and threes
- the 1990s
- State DOTs
- CODs

Use the “English” versions of plurals for such words as “appendixes,” “criteria,” “formulas,” “matrixes,” “strata,” and “vortexes.”

### 3.3.2 Possessive Forms

The possessive of singular nouns is formed by the addition of an apostrophe and an *s*, as in “puppy’s tail” or “an hour’s delay.”

The possessive of plural nouns is usually formed by adding an apostrophe only, as in “puppies’ tails” or “in three days’ time.”
The possessive of nouns with irregular plurals are usually formed by adding an apostrophe and an s, as in “the algae’s development” or “chairmen’s meeting.”

Closely linked nouns may be considered a single unit if forming the possessive when the entity possessed is the same for both, as in “my aunt and uncle’s house.” When the ownership is separate, however, both nouns take the possessive form, as in “my son’s and daughter’s friends.”

Form the possessive of compound nouns by adding the inflection at the end of the compound noun or phrase, e.g., “the mayor of Baltimore’s speech” or “the notary public’s signature.”

Possessive personal pronouns (“its,” “hers,” etc.) do not have an apostrophe, but indefinite pronouns (“one’s,” “another’s,” etc.) require an apostrophe.

3.3.3 Indefinite Articles

The use of the indefinite article a or an is always determined by the consonant or vowel sound of the word being modified. Consonant sounds require the use of a, vowel sounds require the use of an.

For example, a is used before a consonant and an aspirated h; an is used before a silent h and all vowels except u when pronounced with a consonant “y” sound and o when pronounced with a consonant “w” sound. Examples include

- a historic occasion
- a hotel
- a HUD directive
- a union
- a one-time application
- an honor
- an hour
- an H-U-D directive
- an undetected problem
- an onion

When an acronym or a group of initials begins with b, c, d, g, j, k, p, q, t, u, v, w, y, or z, each having a consonant sound, use the indefinite article a, as in

- a U.S. DOT report
- a BLM area
- a WWW search

When an acronym or a group of initials begins with a, e, f, h, i, l, m, n, o, r, s, or x, each having a vowel sound, use the indefinite article an, as in

- an FHWA report
- an ASTM standard
- an NHI course

Use of the indefinite article before a numerical expression is determined by the consonant or vowel sound of the beginning syllable of the numerical expression.

- a 6-ft radius
- a one-time application
- an 11-ft diameter
- an 8-ft hole
3.3.4 Preferred Spellings for AASHTO Publications

A  Home
air-entraining (adj.)
air hole (n.)
alignment
alloy-steel (adj.)
ambient-temperature (adj.)
appendices
Article (w/number)
asphaltic
assembly-marking (n.)
at-grade (adj.)

B  Home
backfill
bankfull
bevel (n./v.)
bevelled (adj.)
bicycle-safe (adj.)
bidirectional
blockout
bollard (n.)
bolthead (n.)
bolthole (n.)
bolt-tension (adj.)
broom (v.)
built-up (adj.)
bus-based
bushhammer (n.)
bus-oriented

cold-form (v.)
cold-roll (v.)
cold-swage (v.)
cold-weather (adj.)
complete-joint-penetration (adj.)
compressible-washer (adj.)
constant-amplitude (adj.)
continuous-beam (adj.)
contract-documents (adj.)
Constructor (contractual)
Contractor (contractual)
copper-alloy(ed) (adj.)
coplanar
countersink (v.)
crannar
cross section (n.)
cross-sectional (adj.)
crystallinity
cutoff

day (sp out)
dead-load (adj.)
debonding
decision maker (n.)
decision-maker (adj.)
decision making (n.)
decision-making (adj.)
degree(s) (sp out for angles)
decoring
delaminates
Designer (contractual)
desilvertize (v.)
detensioning
Direct Tension Indicator (DTI)
disc (for CD-ROM discs)
double-ply
drier (comp. of dry)
dryer (apparatus)
DTIs (pi)
durometer

e  Home
e.g., (w/comma)
elastomer
electromeric
electrolytically
e-mail
embed

to embrittlement
Engineer (contractual)
ensure
epoxy-bonded (adj.)
epoxy-bonding (adj.)
equidistant
eyebar (n.)

F  Home
Fabricator (contractual)
fabric-substrate (adj.)
factory-bonded
factory-treated
falsework
fatigue-critical (adj.)
fatigue-failure (adj.)
fatigue-load (adj.)
fatigue-test (adj.)
fatigue-tested
ferritic
field-connection (adj.)
field-splice (v./adj.)
field-welded (adj.)
finishable
five-sixths (etc.)
flame-cut (adj.)
floodwater
floorbeam (n.)
flow line
formwork
four-fifths (etc.)
fracture-critical (adj.)
ft (foot/feet)
full-length (adj.)
full-penetration (adj.)
full-size (adj.)
full-width (adj.)

G  Home
gage (measurement)
gauge (tempering plaster)
grey
grit-blast (v.)
ground cover
groundline

H  Home
heat-cure (v.)
heat-curve (v.)
heat-straighten (v.)
heat treat (v.)
heat-treated (adj.)
high-density (adj.)
high-occupancy (adj.)
high-range (adj.)
high-performance (adj.)
high-quality (adj.)
high-speed (adj.)
high-strength (adj.)
high-temperature
high-yield-strength (adj.)
highwater
horsepower
hot-bend (v.)
hot-bond (v.)
hot-weather (adj.)
hour (sp. out)
Hz (hertz)

I   Home
i.e., (w/comma)
in. (inch/inches)
indexes
in-service (adj.)
insofar
Inspector (contractual)
Internet
Interstate (highway)

J   Home
judgment

K   Home
kip
ksi

L   Home
lb (pound/pounds)
leakproof
line-of-sight (adj.)
liter
live-load (adj.)
load-carrying
load-indicating (adj.)
load-indicator (adj.)
load-test (v.)
lock-pin (n.)
long-distance (adj.)
long-duration (adj.)
long-lasting (adj.)
long-term (adj.)
low-alloy (adj.)
low-carbon (adj.)
low flow period
low-flow channel
low-friction (adj.)
low-occupancy (adj.)
low-stress (adj.)
low-temperature (adj.)
low-pressure (adj.)
low-water (adj.)
lubricant-adhesive (n.)
lubricant-sealant (n.)
lump-sum (adj.)

M   Home
machine-cut (adj.)
magnesia (MgO)
Manufacturer (contractual)
mass-unit-price (adj.)
match-cast (adj.)
match-casting (n.)
match-mark (v.)
meter
mid-depth
mid-length
mid-opening
midpoint
midrange
midspan
minute (sp. out)
mm
MPa
multiple-centerbeam
multiple-support-bar (adj.)
muriatic (adj.)

N   Home
N (newtons)
neoprene
nonabsorbing
noncoated
noncommute
noncritical
nongelled
nonmandatory
nonmotorized
nonparallel
nonporous
nonprestressed
nonreactive
nonredundant
non-sag
nonshrink
nonstop
nontransit
nonyielding
nonuser
numerically-controlled (adj.)

O   Home
off-peak (adj.)
off-site (adj.)
one-half (etc.)
on-ramp (n./adj.)
on-site (adj.)
on-street (adj.)
on-open-channel (adj.)
opening-movement-vibration
(adj.) (OMV)
orthotropic-deck (adj.)
out-of-round
overall (adj./adv.)
overhang (n./v.)
overlay (n.)
oversize (v.)
overlap (v.)
overturn (v.)
overturn (v.)
overweight (v.)
Owner (contractual)
oxide (adj.)

P   Home
park-and-ride (adj.)
percent (sp. out in text)
pickup
pipet
plane (v.)
plaster of paris
plate-cut (adj.)
polychloroprene
polyethylene
polyisoprene
polymer
polymerization
polystyrene
polytetrafluoroethylene
polyvinyl
poly(vinyl) chloride
pond (v.)
popout
portland cement
post-tensioning
pourable
pozzolan
pozzolanic
pphm (parts per hundred
million)
ppm (parts per million)
presassembly
precast
preemption
preinstall (v.)
premolded
prepositioned
prequalify
prestress (n.)
pseudostress (v.)
Producer (contractual)
proof-load (adj.)
proved (past participle)
proven (adj.)
PTFE
pull-in
pullout
push-out
PVC (poly(vinyl) chloride)

Q Home
quality-assurance (adj.)
quality-control (adj.)
quenched-and-tempered (adj.)

R Home
rad. (radians)
radiant-heat (adj.)
rail-based
rail-oriented
ream (v.)
reinspect (v.)
relubricated (v.)
requench (v.)
resistivity
retremer (v.)
retest (v.)
retoque (v.)
rideability
rip-rap
rotational-capacity (adj.)
rotobroach cutters
runoff
run-out

S Home
Sandblasting
saw-cut (adj.)
scupper (n.)
seal-retaining
seal-weld (v.)
second (time; sp out)
Section (in book; contractual)
semilog (adj.)
service-limit (adj.)
service-load (adj.)
setback (n.)
set-up (n./adj.)
sheet flow
shop-splice (adj.)
shop-weld (adj.)
short-term (adj.)
silica (n.)
single-support-bar (adj.)
single-ply
sinter (v.)
Skidmore-Wilhelm Calibrator
slip-critical
S-N curve
snug (v.)
soffit (n.)
solid-shank (adj.)
solid-steel (adj.)
spall (n.)
Specifications (contractual)
State DOTs
still water (n.)
still-water (adj.)
stormwater
straightedge (n.)
straightedging
strain-gage (adj.)
strain-measuring
strength-failure (adj.)
strength-limit (adj.)
St. Venant’s
subarticlces
subassemblage (n.)
subbase
subdrill (v.)
subgrade
subpunch (v.)
substrate (n.)
sulfate
sulfur
supersede (v.)
support-bar (adj.)
swedge (v.)
swivel-joint (adj.)
swivel-joist (adj.)

T Home
Teflon® (w/registered trademark symbol)
temperature-dependent
temperature-sensing
tensile-strength (adj.)
tension-indicating
tension-indicator
tension-measuring
thermal-cut
thought-out
three-fourths (etc.)
time-consuming
time-dependent
tine (v.)
torque (v.)
torsional
traffic-calming
traffic-loading (n.)
transferable
transit-friendly
transit-supportive
tреми (n.)
troweled
troweling
Turner-Fairbank
turn-of-nut (adj.)
two-thirds (etc.)

U Home
unground (adj.)
usable
usage

V Home
vee (v.)
very-high-slump (adj.)

W Home
waterproof
waterstop (n.)
watertight
web/website
weldable
weld-repaired
weld-toe (adj.)
wheel-load (n.)
wheel path
width-to-thickness (adj.)
wire-brushed

X Home
X ray (n.)
x-ray (adj. or v.)

Y Home
[No entries so far.]

Z Home
[No entries so far.]

Other Home
μm
3.4 Compound Words (8, 9, 10)

A compound word is a group of two or more words or elements treated grammatically as a single term. The phrase may be used as a noun, adjective, adverb, or verb. Examples include

- **Nouns**: crosswalk, cross section, governor-elect
- **Adjectives**: up-to-date, self-sustaining, cross-referenced
- **Adverbs**: overzealously, all-inclusively, somewhat diffidently
- **Verbs**: crash-test, butt-joint, cross-check

Compound words may be either permanent compound words or temporary compounds.

- Permanent compound words have been generally accepted in the English language and, as such, are listed in the dictionary. Examples include “tradeoff” and “cost-effective.”
- Temporary compounds are a joining of words for a specific purpose. Examples include “cross-sectional” and “time-consuming.”

3.4.1 Types of Compounds

An **open compound** is a combination of separate words that are so closely related as to constitute a single concept. Examples include

- Lowest common denominator
- Portland cement concrete
- Traveled way

A **hyphenated compound** is a combination of words joined by one or more hyphens. Examples include

- Right-of-way
- State-of-the-art
- candela-hour

A **closed (or solid) compound** is a combination of two or more elements, originally separate words, now spelled as one word. Examples include

- Groundwater
- Recordkeeping
- Runoff

3.4.2 General Rules for Using Compound Words

Because spelling and hyphenation vary greatly among compound words, the first step to establish the correct spelling is to check the dictionary.

If the compound word is not listed in the dictionary, follow these general rules:

**For Compound Nouns**

When the elements of a compound word are of equal importance to the meaning, appear in regular order, and have no ambiguous meaning, then print the compound word open, as in “cross section,”
“decision maker,” “cost of living,” “carbon monoxide poisoning,” “attorney general,” and “New Yorker.”

If the elements of a compound word express a unit idea that would not be clearly expressed in unconnected succession, the compound word should be hyphenated. Examples include “right-of-way,” “Afro-American,” “self-knowledge,” and “author-critic.”

Fractions used as nouns are open, as in “one third of the shipment.” (Fractions used as adjectives or adverbs are hyphenated, as in “a one-third share” or “one-half empty,” respectively.)

Use a hyphen between a capital letter and a noun or participle, as in “I-beam” or “S-shaped.”

A compound word formed from two nouns, the first of which consists of only one syllable or one of which loses its original accent, should be written as a closed compound, e.g., “footnote” or “workman.”

If it does not interfere with comprehension, set as a closed compound nouns that consist of a short verb as the first element followed by an adverb as the second element, as in “pickup” or “cooldown” (but, hyphenate “run-in” or “cut-in”).

Refer to Sections 6.8–6.14 of the *GPO Style Manual* for a list of terms that are usually presented as closed compounds.

For Compound Adjectives

Hyphenate compound adjectives that precede the noun being modified, as in

- user-friendly product,
- decision-making policies,
- a three-foot-high wall,
- high-speed train,
- 3-week vacation,
- 3-to-1 ratio, or
- cost-of-living increase.

These hyphens help readers determine the relationship between the elements modifying the noun. Exceptions to this rule include

- compound adjectives comprised of chemical terms, such as “sodium chloride solution”;
- the modifier consists of a numeral followed by a possessive noun, as in “3 weeks’ vacation”;
- two-word modifiers in which the first element is a comparative or superlative, as in “better drained soil” or “highest level decision”; and
- color-term compounds in which the first element modifies the second element, as in “bluish green paint.”

If the compound adjective follows the noun being modified, do not use a hyphen, e.g., “a wall three feet high” or “The product is user friendly.”

Foreign adjectival phrases, such as “in situ soil,” and compounds consisting of a number followed by “percent,” as in “12 percent interest,” are written as open compounds.
Fractions that modify nouns are hyphenated, as in “one-half gallon.” (Fractions performing as
nouns, however, are written as open compounds, as in, “One half of the inventory disappeared.”)

Insert a hyphen between a number and unit of measure if the term is an adjective directly preceding
the noun being modified. (2, G14), (8, 3.88), (10, 6.15)

- Correct: 12-ft board, a board 12 ft long, a 12-ft-long board
- Correct: 2-in. diameter, a diameter of 2 in., 2-in.-diameter pipe
- Incorrect: a board 12-ft long, 2-in. diameter pipe

When two or more hyphenated compounds have a common element and this element appears only
after the last term, use a hyphen after each modifier, as in “10-, 20-, or 30-mm diameter” and “long-
or short-term plans.”

For Compound Adverbs
Adverbial compounds beginning with “over” or “under” are closed, as in “underhandedly.”

Compound adverbs consisting of spelled-out fractions are always hyphenated, as in “one-half
empty.”

Do not hyphenate compound adverbs that contain an adverb that ends in ly, as in “previously
known” or “highly developed.”

For Compound Verbs
Do not hyphenate compound verbs in which a preposition acts as an adverb, as in “burn off” or
“blow up.”

3.5 Prefixes and Suffixes (8, 9, 10)

Though not strictly compounds, words bearing prefixes or suffixes are treated similarly to
compound words—some of these are closed and some are hyphenated.

Consult a dictionary to determine whether or not to use a hyphen with a word containing a prefix
or suffix.

If the word is not listed in the dictionary, follow these general rules:

3.5.1 Prefixes
In general, do not use a hyphen with a word containing a prefix. However, use a hyphen

- After prefixes added to proper names or numbers, as in “un-American” or
  “mid-1990s”;
- If adding the prefix would repeat a letter or similar term, as in “non-native” or “sub-
  subcommittee”;
- If the omission of the hyphen would make the meaning unclear, as in “recreate” and
  “re-create”;
- With prefixes that stand alone, as in “pre- and postwar relations”;
- With prefixes ex- and self-, as in “ex-president” or “self-restraint”; and
- In compounds in which the second element consists of more than one word, as in
  “non-load-bearing beam.”
3.5.2 Suffixes

Words ending in a silent e usually drop the e before adding a suffix that begins with a vowel, e.g., “creating” or “forcible.” Exceptions to this rule include “dyeing,” “enforceable,” “knowledgeable,” “mileage,” and “singeing.”

If the silent e precedes a consonant, the e is usually retained, as in “movement” or “wholesome.” Exceptions to this rule include “judgment,” “wholly,” and “truly.”

Words with soft endings—ce or ge—retain the e before suffixes beginning with vowels, such as “advantageous” or “changeable.”

Most words ending in a vowel + y keep the y. However, when a consonant precedes the y, substitute an i for the y before adding the suffix, as in “drier” or “messiness.”

Many words that end in a single consonant preceded by a vowel double the final consonant, as in “controlled,” “occurring,” or “preferred.” Exceptions to this rule include “totaled,” “transferable,” and “traveled.”

Words ending in c often add a k to ensure proper pronunciation, e.g., “shellacked.”

“Supersede” is the only word in the English language that ends in “sede.”

Only three words—“exceed,” “proceed,” and “succeed”—end in “ceed.”

Other words with the same pronunciation end in “cede,” e.g., “precede.”

The GPO Style Manual lists words ending in the “ible” and “ise” suffixes in Sections 5.11 and 5.12, respectively (13). For further information, check the dictionary.

3.6 Capitalization

As a general rule, use initial caps for the following:

- proper nouns (such as John Doe, Park Avenue, or Massachusetts),
- formal titles or names (such as Senator Glad Hander),
- names of structures and public places (such as Statue of Liberty or the White House),
- names of organizations or government agencies (such as American Society of Civil Engineers or Federal Highway Administration),
- names of institutions or companies (such as Library of Congress or Transportation Research Board),
- trade names (such as Pyrex or Quickchange® Barrier System) (see Note),
- first word in a sentence, and
- titles of works.

Note: Exceptions to the rule of trade names include words that have become accepted as generic. These terms include such words as babbitt, bunsen, cellophane, diesel, kraft, neoprene, nylon, portland cement, and saran.

In capitalizing hyphenated compounds in titles of works, headings for sections, or table headings, adhere to the following rules:

- First elements are always capitalized (Twentieth-Century Transit Developments).
- Subsequent elements are capitalized unless they are articles, prepositions, or conjunctions (Non-Compact Section, State-of-the-Art Report 3).
If a compound comes at the end of the title, capitalize the final element regardless of the part of speech it is (Successful Safety Features in Vehicles Crashed Head-On, but Fatalities in Head-on Crashes).

In scientific terminology, the genus name is capitalized, but the species name is lowercased. Names of chemical elements and compounds are lowercased when written out, but the chemical symbols are capitalized and set without periods (as in sulfuric acid, $\text{H}_2\text{SO}_4$). Capitalize only the proper name associated with the names of laws, theorems, or principles, such as Newton’s law or Manning’s $n$.

Use initial caps in direct references to figures, tables, etc., such as Figure 2, Table 6, Section 3.3.4, Type 1, or Class B. Use lowercase in less direct references, such as .” . . is shown in the same table” or “This chapter discusses . . .”

### 3.7 Abbreviations and Acronyms

#### 3.7.1 General

**Acronyms**

An acronym is a shortened form of a compound term that uses the initial letters of the term to make a pronounceable word, e.g., AASHTO. Acronyms are usually written in full caps.

At its first appearance in the text, an acronym must be enclosed in parentheses and follow the spelled out terms, as in “American Association of State Highway and Transportation Officials (AASHTO).”

For Federal government agencies, use the acronyms listed in “Abbreviations and Acronyms of the U.S. Government” at http://www-lib.iupui.edu/subjectareas/gov/docs_abbrrev.html.

**Abbreviations**

An abbreviation is a shortened form of a compound word or phrase, such as “%” for percent or “assn.” for association.

Use the symbol “%” in equations, figures, and tables. Spell out “percent” in the text.

Spell out United States when the term stands alone. Always use periods in the abbreviation “U.S.” when used as an adjective, as in “U.S. highways.”

When following a city or other geographical term, use the two-letter abbreviation without periods for states, e.g., “AK” for Alaska or “DC” for District of Columbia. Spell out the name of the state if it stands alone.

Spell out days of the week and months of the year.

Capitalize the abbreviation for “not applicable,” i.e., “NA.” Do not include punctuation.

See section on “Mathematical Expressions” for list of abbreviations for units of measure.

### 3.8 Punctuation

Punctuation marks are used to clarify the meaning of the text and to make reading the text easier. In general, AASHTO prefers “close” punctuation in order to avoid any misinterpretations of the technical documents.

The following table provides a brief description of the most common uses for punctuation marks. Since most punctuation rules have qualifications, however, refer to Chapter 5 of The Chicago
Manual of Style or Chapter 8 of the GPO Style Manual for an in-depth discussion of the appropriate use of punctuation marks.

<table>
<thead>
<tr>
<th>Punctuation Mark</th>
<th>Reason for Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apostrophe</td>
<td>to replace letters omitted in contractions (Do not use contractions in technical writing.) to indicate possessive case (See the discussion regarding “Possessives Forms” in the section on “Spelling.”) to indicate plural forms of letters or abbreviations where the absence of an apostrophe would create confusion</td>
<td>can’t, don’t, isn’t ship’s bow, Tom’s planning, citizens’ interest, Virginia and Maryland’s border, Wisconsin’s and Alabama’s programs, someone else’s design, two hours’ delay a’s and b’s, Btu’s</td>
</tr>
<tr>
<td>Colon</td>
<td>to introduce words, phrases, or clauses in a series if the clause preceding the series is grammatically complete (Also see the section on “Lists.”) to separate two statements, the second of which amplifies the first after introductory phrases such as “the following” or “as follows” to introduce long quotations between the parts of ratios in bibliographic entries in expressions of the time of day after salutations in business letters</td>
<td>The procedures included three crash tests: front end crashes, side crashes, and off-center front end crashes. Serving in Congress is not a career: it is a responsibility and an honor. “. . . the following equation: ( a + b = c ).” As Hamlet said: “To be or not to be . . .” H1-V2, 1:15 Congressional Record. 1930, Vol. 72, Part 10: 10828–30. 6:30 p.m. Dear Mr. Smith:</td>
</tr>
<tr>
<td>Comma</td>
<td>to separate items in a series or lists (Note: Use a comma before the conjunction in order to avoid confusion about the meaning of the text.) (Also see “semi-colon” and the section on “Lists.”) to separate two or more adjectives in a series to separate compound sentences (Do not use a comma to separate compound predicates, e.g., “He drove to town but walked back.”) to separate dependent phrases or clauses from the main body of the sentence –introductory clauses –dependent clauses after a conjunction between two coordinate clauses –a nonrestrictive phrase or clause (Do not separate a restrictive clause, as in, “You will be more productive if you organize your work space.”) –adverbiaial phrases between the subject and verb</td>
<td>the devastation of hurricanes, tornados, and earthquakes a clean, dry, lint-free cloth He walked to town, but he rode the bus back home. In the late 1980s, the project . . . If the temperature exceeds 20°C, remove . . . Judging from the data, the project . . . When the program began, the staff . . . Let the mixture dry for at least two hours, or, if time allows, for seven hours. The Engineer, after reviewing the plans, decided to . . .</td>
</tr>
<tr>
<td>Punctuation Mark</td>
<td>Reason for Use</td>
<td>Example</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Comma (cont’d)</td>
<td>–appositions, complementary phrases, and contrasting phrases</td>
<td>The distance, $D$, equaled . . .</td>
</tr>
<tr>
<td></td>
<td>–transitional words, parenthetical expressions, and transposed terms that signify a break in the continuity of thought</td>
<td>This light, but surprisingly effective, pressure . . .</td>
</tr>
<tr>
<td></td>
<td>to separate elements such as <em>etc.</em>, <em>e.g.</em>, <em>i.e.</em>, <em>for example</em>, <em>that is</em>, <em>namely</em>, and similar expressions</td>
<td>Furthermore, the data . . .</td>
</tr>
<tr>
<td></td>
<td>to separate direct quotes from the main body of the sentence</td>
<td>The results were, generally speaking, not successful.</td>
</tr>
<tr>
<td></td>
<td>in dates</td>
<td>The movements, if any, were recorded.</td>
</tr>
<tr>
<td></td>
<td>in numbers [but not in SI unit numerals]</td>
<td>Sandstone, for instance, erodes quickly.</td>
</tr>
<tr>
<td></td>
<td>after a noun or phrase in direct address</td>
<td>The chairman said, “We plan . . .”</td>
</tr>
<tr>
<td></td>
<td>before and after indicative titles in a sentence</td>
<td>A report printed on July 19, 1999, indicated that . . .</td>
</tr>
<tr>
<td></td>
<td>between the title of a person and the name of an organization</td>
<td>312,684</td>
</tr>
<tr>
<td>Ellipses</td>
<td>to indicate an omission</td>
<td>Senator, what is your position on . . .</td>
</tr>
<tr>
<td></td>
<td>used in mathematical expressions</td>
<td>Hank Williams, Jr., sang . . .</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tom Jones, Ph.D., will be . . .</td>
</tr>
<tr>
<td>En dash</td>
<td>to separate inclusive numbers, such as a range of pages, dates, or measurements</td>
<td>Myths, Inc., offices . . .</td>
</tr>
<tr>
<td></td>
<td>in place of a hyphen in compound adjectives in which one of the elements is an open compound</td>
<td>New York–Paris flight</td>
</tr>
<tr>
<td>Em dash</td>
<td>to indicate an element added to give emphasis or explanation to the main clause</td>
<td>Division II—Construction</td>
</tr>
<tr>
<td></td>
<td>to introduce and, when necessary, to follow an enumeration or amplification</td>
<td>Measuring tools—rulers, yard sticks, and tape measures—must be accurate.</td>
</tr>
<tr>
<td></td>
<td>to precede a credit line</td>
<td>Black earth turned into yellow crocus</td>
</tr>
<tr>
<td></td>
<td>to mark a sudden or abrupt change of thought</td>
<td>Is undiluted hocus pocus.</td>
</tr>
<tr>
<td></td>
<td>to indicate “no data” breaks in tables</td>
<td>Neither rain, snow, nor sleet—unless it snows in Florida—will keep the postman from delivering the mail.</td>
</tr>
<tr>
<td>Exclamation point</td>
<td>to signify a vehement or ironical statement (Avoid using exclamation points in technical documents.)</td>
<td>The bomb is going to explode!</td>
</tr>
<tr>
<td>Hyphen</td>
<td>in non-inclusive numbers that have two or more elements</td>
<td>page 4-14</td>
</tr>
<tr>
<td>Punctuation Mark</td>
<td>Reason for Use</td>
<td>Example</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hyphen (cont’d)</td>
<td>in unit modifiers preceding nouns and consisting of a number followed by a unit of measure (See the section on “Units of Measure.”)</td>
<td>5-cm depth, ( \frac{1}{2} )-gallon container, 8-ft-long board, ( \frac{1}{2} )-in.-diameter pipe, 9- and 10-ft sections, 9-by-10-ft sections, ( 9 \times 10 )-ft sections, one-third share of the profits (but one third of the profits)</td>
</tr>
<tr>
<td></td>
<td>in some compound words (See the section on “Compound Words.”)</td>
<td>Compound words are more often written as separate words, e.g., “closed box girder,” but there are exceptions, e.g., “right-of-way” or “self-knowledge.”</td>
</tr>
<tr>
<td></td>
<td>–in compound nouns</td>
<td>I-beam, T-shaped</td>
</tr>
<tr>
<td></td>
<td>–between letter of alphabet and a noun or participle</td>
<td>high-speed train, up-to-date files, well-maintained equipment, decision-making role, long- and short-term plans</td>
</tr>
<tr>
<td></td>
<td>–in compound adjectives or unit modifiers that precede the noun being modified</td>
<td>re-create, 10-fold, non-load-bearing, pre- and postoperative examinations</td>
</tr>
<tr>
<td>Parentheses and Brackets</td>
<td>use parentheses to enclose an explanatory or other secondary comment not intended to be part of the main sentence, but important enough to be included</td>
<td>Chocolate and peanut butter (the two main ingredients of this recipe) make a delicious combination.</td>
</tr>
<tr>
<td></td>
<td>use parentheses to enclose acronyms or abbreviations that immediately follow the first use of the spelled-out term</td>
<td>The Transportation Research Board (TRB) publishes the Transportation Research Record. (By Harry Jones, research assistant)</td>
</tr>
<tr>
<td></td>
<td>to enclose bylines in Congressional documents</td>
<td>The three factors that weather reports usually include are (1) temperature, (2) precipitation, and (3) barometric pressure.</td>
</tr>
<tr>
<td></td>
<td>use parentheses to enclose numerals or letters in enumerated lists</td>
<td>The common needs of all people include (a) food, (b) shelter, and (c) clothing. See Section 19 of Reference (10).</td>
</tr>
<tr>
<td></td>
<td>use parentheses to enclose numbered references cited in the text</td>
<td>1 m (3.2 ft)</td>
</tr>
<tr>
<td></td>
<td>use parentheses to enclose U.S. Customary units for hard conversions (rounded metric units) in dual unit publications</td>
<td>1 m ( [3.281 \text{ ft}] )</td>
</tr>
<tr>
<td></td>
<td>use brackets to enclose U.S. Customary units for soft conversions (exact re-stating of metric measurements in conversions) in dual unit publications</td>
<td>1 m ( [3.281 \text{ ft}] )</td>
</tr>
<tr>
<td></td>
<td>use brackets to enclose editorial comments within the text</td>
<td></td>
</tr>
<tr>
<td></td>
<td>use brackets to enclose parenthetical remarks within parentheses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>use brackets in equations or other mathematical expressions to indicate that the enclosed matter should be treated as a unit</td>
<td>( [ a \times b ] + c = x )</td>
</tr>
<tr>
<td>Period</td>
<td>at the end of a complete declarative or imperative sentence</td>
<td>I came, I saw, I conquered. See if you can do better.</td>
</tr>
<tr>
<td>Punctuation Mark</td>
<td>Reason for Use</td>
<td>Example</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>Period (cont’d)</td>
<td>after numerals or letters in numbered or outline lists</td>
<td>1. chromium a. chromium</td>
</tr>
<tr>
<td></td>
<td>in abbreviations (but not for names of states or units of measurement abbreviations except for “in.”)</td>
<td>e.g., U.S., Mr., Mt. Everest, E. A. Poe, etc.</td>
</tr>
<tr>
<td></td>
<td>as decimal points in mathematical expressions</td>
<td>1.65 cm, $1.25, 65.5 percent</td>
</tr>
<tr>
<td>Question mark</td>
<td>to indicate a question</td>
<td>Is dinner ready yet?</td>
</tr>
<tr>
<td>Quotation marks</td>
<td>use double quotation marks to enclose direct quotations and single quotation marks to enclose quoted or emphasized material with a direct quotation</td>
<td>The student asked, “What do you mean by ‘outline numbering’?”</td>
</tr>
<tr>
<td></td>
<td>put quotation marks around words or phrases to indicate a new or special meaning at the first use of the term in the document</td>
<td>In this case, “gage length” means the distance over which the deformation measurement is made.</td>
</tr>
<tr>
<td></td>
<td>use quotation marks to enclose instructions or commands</td>
<td>Type “Control + Shift + Space Bar” to insert a nonbreaking space.</td>
</tr>
<tr>
<td></td>
<td>use quotation marks to enclose title of chapters/sections in text citations</td>
<td>See the section on “Text Citations.”</td>
</tr>
<tr>
<td>Semi-colon</td>
<td>between clauses of a compound sentence if they are not joined by a conjunction</td>
<td>The rain ended in the afternoon; the sun shone brightly.</td>
</tr>
<tr>
<td></td>
<td>to separate clauses of a compound sentence joined by a conjunction and containing commas within the clause</td>
<td>The cold, steady rain ended; but the clouds lingered on.</td>
</tr>
<tr>
<td></td>
<td>to precede transitional phrases that link clauses of a compound sentence</td>
<td>The rain ended; consequently, the rainbow disappeared.</td>
</tr>
<tr>
<td></td>
<td>to precede transitional terms that introduce an independent clause</td>
<td>Precipitation composed of liquid H₂O ceased to fall from the clouds to the earth; that is, the rain ended.</td>
</tr>
<tr>
<td></td>
<td>to separate elements in a series if the elements contain internal punctuation</td>
<td>The precipitation of water from the atmosphere can appear in the form of mist, including fog; rain; cold, icy sleet; hail, i.e., pellets of ice; and snow.</td>
</tr>
<tr>
<td>Slash (also called solidus, slant, or virgule)</td>
<td>to signify division in fractions, mathematical expressions, and units of measure</td>
<td>4/5 a/b 10 m/s</td>
</tr>
<tr>
<td></td>
<td>to indicate alternatives or alternative spellings</td>
<td>upstairs/downstairs, tradeoff/trade-off</td>
</tr>
<tr>
<td></td>
<td>to link two terms when a hyphen or en dash would be confusing</td>
<td>electrode/electrolyte interface</td>
</tr>
</tbody>
</table>

### 3.8.1 Placement of Punctuation Marks

**Colon**

A colon should **not** be used to introduce a list that is the object of an element in the introductory clause, e.g., “Care should be taken to (1) weigh the sample carefully, (2) determine that the sample is dry, and (3) ensure that the scale is accurate.”
Comma
Use a comma to separate compound predicates (two or more verbs having the same subject) only if three or more compound predicates constitute a series or enumerated list within the sentence. If a sentence includes only two compound predicates, do not use a comma to separate them.

Butch walked the dog around the park, fed him, and then brushed him.

Butch walked the dog around the park and fed him.

A comma should not separate an introductory adverbial phrase that immediately precedes the verb it modifies, e.g., “Out of the storm ran the five children.”

A comma should not separate an adverbial phrase, transitional word, parenthetical expression, or transposed term if the element creates no significant break in the continuity of thought, as in, “The test samples were therefore reexamined.” Use a comma (not a semi-colon), however, before the transitional adverbs “yet” and “so.”

Ellipses
Ellipsis points are periods set with nonbreaking spaces or em spaces between them and are used to indicate omission within quoted text.

If the omission occurs within a quoted sentence or fragment, add a space before and after the three ellipsis points.

If the omission occurs at the beginning of a quoted sentence, ellipsis points are not necessary. If, however, more than one paragraph is being quoted in block text, use ellipsis points at the end of the first paragraph and at the beginning of the second paragraph.

If the omission occurs at the end of a quoted text and what remains is a grammatically complete sentence, include punctuation for that sentence. If the omission occurs at the end of a quoted text and what remains is only a fragment, do not include punctuation in addition to the ellipsis points.

Correct examples of the use of ellipses include the following:

Original Paragraphs
Four score and seven years ago, our fathers brought forth upon this continent a new nation: conceived in liberty, and dedicated to the proposition that all men are created equal.

Now we are engaged in a great civil war testing whether that nation or any nation so conceived and so dedicated can long endure. We are met on a great battlefield of that war.

Within Sentence
Four score and seven years ago, our fathers brought forth upon this continent a new nation . . . dedicated to the proposition that all men are created equal.

End of Sentence
Four score and seven years ago, our fathers brought forth upon this continent a new nation. . . .

End of Fragment
Four score and seven years ago . . .
Between Paragraphs

Four score and seven years ago, our fathers brought forth upon this continent a new nation. . . .

. . . testing whether that nation or any nation so conceived and so dedicated can long endure. We are met on a great battlefield of that war.

Question Marks

When the question consists of a single word within a sentence, do not use a question mark nor capitalize the interrogative word, e.g., “He asked himself why.”

A question mark should not be used at the end of a request courteously disguised as a question, e.g., “Will you please pass the butter.”

A question mark should not be used at the end of a question that is stated indirectly, as in, “How to reduce stress is the question on everyone’s mind today.”

Quotation Marks

Place quotation marks after commas and periods, but before colons, semicolons, and footnote reference numbers.

Place quotation marks after question marks and exclamation points if these punctuation marks are part of the quotation. If they are not part of the quoted text, place the question mark or exclamation point outside the quotation marks.

Quotation marks always appear within a closing quote when they are part of the quoted text, as in

Mary said, “Tom was right when he said, ‘We’ll never make the deadline!’”

Use a thin space or expanded kerning of the font to separate adjacent double and single quotation marks and between adjacent superscripts (including fractions) and quotation marks.

Parentheses

When the text enclosed within parentheses or brackets stands alone as a separate sentence, set the terminal punctuation inside the parentheses or brackets, e.g., “The statistical data can be found in Table 6 of this report. (Also see Figure 5)”

Do not place a period inside the closing parenthesis if the sentence within parentheses is located within another sentence, as in, “The statistical data can be found in Table 6 (also see Figure 5) of this report.”

If all of the material enclosed in parentheses or brackets is in italic style font, then the parentheses or brackets in running text (but not equations) should be italic. If part of the enclosed material is in roman text, then the parentheses or brackets should be in roman text.

Terminal Punctuation

If a colon, question mark, or exclamation point immediately follows italicized text but is not part of the italicized text, then the punctuation mark should be set in roman type. For example,

Has anyone seen my copy of the Roadside Design Guide?

Have you read Who Moved My Cheese?
3.9 Lists

Lists may be used to organize and present material in a concise manner that makes the information easily understood. The information may be run into the text of a sentence or displayed as a vertical list.

3.9.1 Lists as Running Text

Listings run into the text of a sentence are usually lowercased, such as, “. . . consist of (1) food, (2) water, and (3) shelter.”

For a long, complex list within a sentence or if preferred for a simple list within a sentence, number the list with numerals or lowercase italic letters in parentheses.

Simple items listed within the sentences should merely be separated by commas.

If the phrases or clauses comprising the list contain commas or other punctuation, then the items of the list should be separated by semi-colons; for example, “The precipitation of water from the atmosphere can appear in the form of mist, including fog; rain; cold, icy sleet; hail, i.e., pellets of ice; and snow.”

3.9.2 Vertical Lists

**Capitalization in Vertical Lists**

If items in a vertical list complete a sentence begun in the introductory clause and are separated by commas or semi-colons, then the items in the list begin with lowercase letters (9, Sections 5.10 and 8.76). For example,

Requirements consist of

- food,
- water, and
- shelter.

If the preceding introductory clause is grammatically complete, the items in vertical lists are usually capitalized. For example,

Requirements consist of three items:

- Food
- Water
- Shelter

If the preceding introductory clause is grammatically complete and one of the list items is a complete sentence, then all items should begin with a capital letter and end in a period. For example,

Requirements consist of

- Food (provided by the campers).
- Water (provided in large coolers) at the camp sites.
- Shelter will be four-person tents.
Punctuation of Vertical Lists
If the items complete the preceding introductory clause, punctuate the vertical lists as if the items were running text.

- Use commas to separate the list items and a period after the final item.
- If the items are long and complex or contain their own punctuation, separate the items by semicolons instead of commas.
- If the list items are complete sentences themselves, use a period at the end of each item.
- If one of the items is a complete sentence, then all sentence fragments should end in periods as well.

Use a colon to introduce vertical lists if

- The introductory clause preceding the vertical list is grammatically complete on its own;
- The introductory clause contains an introductory phrase, such as “as follows” or “the following.”

If the introductory clause preceding the vertical list is not grammatically complete, do not use a colon.

Use numbers or letters with vertical lists in which the items indicate order of importance or sequence. Use bullets for all other vertical lists.

If numerals or letters used to enumerate items in a vertical list are not enclosed in parentheses, place a period after the numeral or letter.

Format of Vertical Lists
Items in vertical lists may be aligned either flush left or indented in an outline style.

If items in the vertical lists are enumerated or bulleted, the paragraph should be set with a hanging indent so that all lines of the paragraph align.

If enumerated lists are subdivided, the numerals or letters for the top three levels are set off by periods, and those for the lower levels are enclosed in parentheses.

For Bridge Books:

- Primary bullets are round and bullet points are indented 0.25 in.
- Secondary bullet points are discouraged in light of the two-column format but when used, should be the round, open type.

3.10 Italic and Boldface Type
Highlighting techniques help readers find important or special text.

Use italic type to indicate

- Titles of books—Roadside Design Guide
- Foreign phrases—in situ
- Legal cases—Roe v. Wade
- Scientific names—Streptococci
Reference citations—Reference (9)
Variables in mathematical expressions—\(a + b = c\)
New terms at first use
Minor headings

Use boldface type to indicate

- Major headings
- Captions
- Cautions or warnings

If all of the material enclosed in parentheses or brackets is in italic font, then the parentheses or brackets in running text (but not equations) should be italic. If part of the enclosed material is in roman text, then the parentheses or brackets should be in roman text.

If a question mark or exclamation point immediately follows italicized text but is not part of the italicized text, then the punctuation mark should be set in roman type. For example,

Has anyone seen my copy of the *Roadside Design Guide*?

Have you read *Who Moved My Cheese*?

### 3.11 Numerals in Text

Use Arabic numerals.

Spell out any numeral that is the first word of a sentence. If a unit of measurement begins a sentence, spell out both the numeral and the unit of measurement.

Spell out numerals one through nine except when they

- are followed by a unit of measure or percentage, such as “3 ft” or “5 percent”;
- are part of a mixed number, such as “1.5” or “3/2”;
- specify a mathematical expression, such as “square root of 4” or “divide by 6”;
- are part of inclusive numbers expressed with en dashes, such as “2–4 days”;
- express ratios, as in “1 to 4” or “1:15”;
- appear in a statement containing two or more numbers, one of which is greater than nine, such as “2 to 10 hours”; or
- follow an abbreviation, such as Vol 2.

It is also recommended to spell out numerals in expressions such as “twenty 30-mm rods” in order to avoid confusion.

A spelled-out number should not be repeated with a numeral in parentheses.

For clarity in large numbers, spell out “million” or “billion” as in “$12 billion.”

Place a zero before the decimal point if the unit is less than one, as in “0.03 in.”

Omit zeros after the decimal point unless they report a significant digit, such as “10.0 ft.”
3.12 Signs and Symbols in Text
Symbols must be of an ASCII format that will not change if the graphic is converted to a PDF. The preferred typeface for AASHTO documents is Symbols.

3.13 Mathematical Expressions
Above all, be consistent. Do not mix symbols and names of units. Do not express fractions in a mixture of styles.
Express ratios as “1 to 4” or “1:4” but not as “1-4.”

3.13.1 Numerals in Mathematical Expressions
Use Arabic numerals.
Place a zero before the decimal point if the unit is less than one, as in “0.03 in.”
Omit zeros after the decimal point unless they report a significant digit, such as “10.0 ft.”

3.13.2 Signs and Symbols
Symbols must be of an ASCII format that will not change if the graphic is converted to a PDF. The preferred typeface for AASHTO documents is Symbols.
Do not substitute the letter O for zero, a hyphen for a minus sign or a negative number symbol, or the letter x for a multiplication sign.
Use the symbol “%” in equations, figures, and tables. Spell out “percent” in text.
Set mathematical expressions with a space on each side of a mathematical symbol between two quantities, such as “\(a + b = c\),” “\(15 \div 5 = 3\),” or “\(32^\circ \pm 2^\circ\) (8).”
Set a one-space separation on each side of the abbreviations “sin, cos, tan, sinh, cosh, tan, log, ln,” etc., such as “2 cos \(\theta\)” or “log p.”
If the symbol expresses a degree of the number, set the symbol close to the numeral, as in “\(-4^\circ C\)” or “\(\leq 25\)” or “\(\pm 6\) mm.”
Use closed spacing between a symbol or numeral and its associated subscript or superscript.
Any symbol set close to a numeral should be repeated after each numeral in a series or group, such as 32° ± 2° or 15% to 30%. The exception to this rule is specified temperatures, which should be set as “45 to 50°F” instead of “45° to 50°F.”
When presented in a list, symbols, abbreviations, and acronyms should appear in the following descending order:
- Roman (English) alphabet capital letters,
- Roman (English) alphabet lowercase letters,
- Greek alphabet capital letters,
- Greek alphabet lowercase letters,
- Subscripts,
- Superscripts,
- Special notes.
If a symbol, abbreviation, or acronym has more than one definition, the explanations are separated by a semicolon, and each definition is explained at its first use in the report.

### 3.13.3 Decimals and Fractions

Do not mix the use of decimals and fractions in expressing U.S. Customary units.

Be consistent! Fractions should be presented in the same way—$\frac{1}{2}$, $\frac{1}{2}$, or $\frac{0}{6}$—not in a combination of ways, i.e., some using diagonal slashes and some with numerator stacked directly over the denominator, etc.

Mixed numbers, i.e., whole number plus a fraction, are always expressed in numbers.

Fractions that are followed by “of a” or “of an” are generally spelled out.

Place zeros before decimal points if there is no whole unit, as in 0.03 in.

### 3.13.4 Equations

1. **Numbering**

   Just as figures and tables, equations are numbered relative to the chapter/section number, i.e., “Eq. (2-3)” would be the third equation in the Chapter/Section 2.

   Equation numbers are enclosed in parentheses at the right-hand margin. There should be a minimum of one quarter of an inch between the equation number and the last term in the equation.

   The equation number appears on the same line of a single-line equation and on the last line of a multiline equation.

2. **Formatting**

   All variables are italicized throughout.

   All equations, no matter how small, are typeset in MathType 5.0.

   Variables within the text are set in Word using a TrueType font and italicizing to be consistent with those set in MathType.

   Except for special symbols, the font is 11 pt. Times New Roman Regular (10 pt. Times New Roman for Bridge books). Subscripts or superscripts should be 7 or 8 pt. Times New Roman.

   Standard mathematical notation is used throughout, including italicizing variables, except as noted below.

   Fences/enclosures are used in the preferred order listed in *The Chicago Manual of Style*:

   $\{ \[ ( ) ] \}$

   The negative-value symbol and the subtraction operator are both represented by an en dash (–).

   Individual equations are centered. Formulas with multiple lines are aligned at the equal sign.

   Be careful to use the correct symbol for “prime” and not an apostrophe or single-quote:

   - **Correct:** ‘
   - **Incorrect:** '
   - **Incorrect:** '
If used when working through formulas, the “therefore” symbol, \( \therefore \), appears at the start of a new line.

The degree symbol, °, should be used for both temperature and angle. Usage will be clear from the context. There should be no spaces within the temperature, as in “30°C” or “67°F.”

A short equation in the text should not be broken. If the text before the equation is short, simply set the equation on a separate line.

If an equation that is too long for one line, the order of preference for splitting the equation is

- before an equal sign (=)
- before a plus or minus sign (+, –)
- before a multiplication sign (×)
- after a group of parentheses, brackets, or braces
- before an integral, summation, or product sign

Do not break equations within bracketed items.

In split equations, the first line of the equation should be set flush left. Subsequent lines should be indented in such a way that the last line ends at the right margin.

Extra line space may be used between the lines of a split equation in order to make the equation more legible.

Two or more equations in a series are aligned on the equal signs, centered on the longest equation in the group.

(3) Definition list

A “where” list may define the symbols or variables used in an equation.

Insert a lowercase “where” flush left on the line immediately following the equation.

On the next line, insert flush left the symbols or variables followed by an equals sign and then the definition of that symbol or variable.

The equal signs in the list should align.

Units of measure, if any, should be included at the end of the definition.

The end of each line is punctuated with commas orsemi-colons as warranted, and the final line is punctuated with a period. (8)

An example of an equation and its definitions is:

\[ r = \frac{Sbd^2}{L} \]

where

\[ r = \text{loading rate, MN/min (lb/min)}, \]
\[ S = \text{rate of increase in extreme fiber stress, MPa/min (psi/min)}, \]
\[ b = \text{average width of specimen mm (in.)}, \]
\[ d = \text{average depth of specimen mm (in.)}, \]
\[ L = \text{span length, mm (in.)}. \]
3.13.5 Units of Measure

Do not mix symbols and names of units. For example, write “km/h” instead of “km per hour.” Combine numerical values written in figures with unit symbols, e.g., “5 m.” Use a nonbreaking space (hit “Control + Shift + Space bar”) between the numerical value and the unit abbreviation.

If a unit of measurement begins a sentence, spell out both the numeral and the unit of measurement. Do not use the symbols ′ and ″ for feet and inches in the text. Use “ft” and “in.” in the text.

Units of measure are abbreviated identically in the singular and the plural, i.e., write “5 lb” not “5 lbs.” The exception is “kip,” which is treated as a word, i.e., no period and the plural form “kips.”

Except for expressions of percent, place a hyphen between numbers and measurement units if the term is a modifier that precedes a noun, such as, “6-ft board” or “3-in. diameter” (but “diameter of 3 in.”)

Do not hyphenate a modifier consisting of a number followed by a possessive noun (“two months’ work,” not “two-months’ work”).

Units derived from proper names are abbreviated in initial caps (Hz or N) but are lowercase when spelled out (hertz or newtons).

3.13.6 SI and U.S. Units

In AASHTO publications with dual units, metric units appear first and are followed by U.S. Customary units in parentheses.

Use “liter” and “meter” when spelling out SI units.

Use only numbers between 0.1 and 1,000 to express the quantity of SI units. For example, 12,000 meters is preferably written as 12 km, not 12 000 m. Similarly, it would be preferable to write 0.003 cubic centimeters as 3 mm$^3$ rather than 0.003 cm$^3$.

Abbreviate “inches” as “in.” to avoid confusion with the word “in.” (§, Sections 3.72 and 7.43)

Unit of measure abbreviations follow the primary recommendations from The Chicago Manual of Style for U.S. Customary Units and AASHTO R 1 (IEEE/ASTM SI 10-2002) for SI Units.

In dual unit publications, use parentheses to enclose U.S. Customary units for hard conversions (rounded metric units, such as “1 m (3.2 ft)”) and brackets to enclose U.S. Customary units for soft conversions (exact re-stating of metric measurements in conversions, such as “1 m [3.281 ft]”).
Except for Bridge books, acceptable abbreviations of commonly used terms are as follows:

<table>
<thead>
<tr>
<th>U.S. Customary Units</th>
<th>SI Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length</strong></td>
<td></td>
</tr>
<tr>
<td>in.</td>
<td>inch</td>
</tr>
<tr>
<td>ft</td>
<td>foot</td>
</tr>
<tr>
<td>yd</td>
<td>yard</td>
</tr>
<tr>
<td>mi</td>
<td>mile</td>
</tr>
<tr>
<td>rd</td>
<td>rod</td>
</tr>
<tr>
<td><strong>Area</strong></td>
<td></td>
</tr>
<tr>
<td>in.²</td>
<td>square inch</td>
</tr>
<tr>
<td>ft²</td>
<td>square foot</td>
</tr>
<tr>
<td>yd²</td>
<td>square yard</td>
</tr>
<tr>
<td>mi²</td>
<td>square mile</td>
</tr>
<tr>
<td>rd²</td>
<td>square rod</td>
</tr>
<tr>
<td>acre</td>
<td>acre</td>
</tr>
<tr>
<td>ha</td>
<td>hectare</td>
</tr>
<tr>
<td><strong>Volume</strong></td>
<td></td>
</tr>
<tr>
<td>in.³</td>
<td>cubic inch</td>
</tr>
<tr>
<td>ft³</td>
<td>cubic foot</td>
</tr>
<tr>
<td>yd³</td>
<td>cubic yard</td>
</tr>
<tr>
<td><strong>Weight/Mass</strong></td>
<td></td>
</tr>
<tr>
<td>oz</td>
<td>ounce</td>
</tr>
<tr>
<td>lb</td>
<td>pound</td>
</tr>
<tr>
<td>ton</td>
<td>ton</td>
</tr>
<tr>
<td>kip</td>
<td>kip</td>
</tr>
<tr>
<td><strong>Liquid Measure</strong></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>cup</td>
</tr>
<tr>
<td>pt</td>
<td>pint</td>
</tr>
<tr>
<td>qt</td>
<td>quart</td>
</tr>
<tr>
<td>gal</td>
<td>gallon</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td></td>
</tr>
<tr>
<td>s</td>
<td>second</td>
</tr>
<tr>
<td>min</td>
<td>minute</td>
</tr>
<tr>
<td>h</td>
<td>hour</td>
</tr>
<tr>
<td>yr</td>
<td>year</td>
</tr>
<tr>
<td><strong>Velocity</strong></td>
<td></td>
</tr>
<tr>
<td>ft/s</td>
<td>foot per second</td>
</tr>
<tr>
<td>ft/min</td>
<td>foot per minute</td>
</tr>
<tr>
<td>ft/h</td>
<td>foot per hour</td>
</tr>
<tr>
<td>mph</td>
<td>miles per hour</td>
</tr>
<tr>
<td>rpm</td>
<td>revolutions per minute</td>
</tr>
<tr>
<td><strong>Acceleration</strong></td>
<td></td>
</tr>
<tr>
<td>ft/s²</td>
<td>foot per second squared</td>
</tr>
<tr>
<td><strong>Force</strong></td>
<td></td>
</tr>
<tr>
<td>kip (lbf)</td>
<td>pound force</td>
</tr>
<tr>
<td>kip-in.</td>
<td>pound force per inch</td>
</tr>
<tr>
<td>kip-ft</td>
<td>pound force per foot</td>
</tr>
<tr>
<td>kip/ft</td>
<td>N/kg</td>
</tr>
<tr>
<td>U.S. Customary Units</td>
<td>SI Units</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Pressure or Stress</strong></td>
<td></td>
</tr>
<tr>
<td>bar</td>
<td>Pa</td>
</tr>
<tr>
<td>ksi</td>
<td>kPa</td>
</tr>
<tr>
<td>psi</td>
<td>kPa</td>
</tr>
<tr>
<td>lb-ft²</td>
<td>kPa</td>
</tr>
</tbody>
</table>

| **Torque** |         |
| in.•lbf     | N•m     |
| ft•lbf      |         |

| **Energy, Heat, or Power** |         |
| A                        | A       |
| Ω                        | Ω       |
| V                        | V       |
| W                        | W       |
| kW                      | kJ      |
| cal                     | J       |
| E                       | E       |
| Btu                     | K       |

| **Light** |         |
| cp        | cd      |
| cd/in.²   | cd/m²  |
| fc        | lx      |
|           | lm      |

| **Frequency** |         |
| Hz           | Hz      |
| mHz         | mHz    |

<table>
<thead>
<tr>
<th><strong>SI Prefixes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
</tr>
<tr>
<td>M</td>
</tr>
<tr>
<td>k</td>
</tr>
<tr>
<td>h</td>
</tr>
<tr>
<td>da</td>
</tr>
<tr>
<td>d</td>
</tr>
<tr>
<td>c</td>
</tr>
<tr>
<td>m</td>
</tr>
<tr>
<td>n</td>
</tr>
</tbody>
</table>
3.14 References

3.14.1 General

AASHTO technical publications usually include a bibliography or reference list at the end of each chapter or section. If, however, the bibliography or reference list applies to the entire book, the bibliography or reference list should be placed after the Glossary but before the Index.

A single bibliography at the end of the chapter or book must include all references—sources with and without in-text citations.

All bibliographic or reference lists must be organized alphabetically by the last name of the author.

If an author has more than one entry, list the items in chronological order with the earliest copyright first.

However, list a single-author entry before a multi-author entry beginning with the same name.

In the case of multiple types of entries by the same author, list the single-author works in chronological order, then the multi-author works in chronological order.

For example:


If the author is not known, use the name of the sponsoring organization as the author. If the sponsoring organization is not known, begin the entry with the title of the work.

Always list the name of the author(s). Do not use “Ibid” or dashes to replace the author’s name.

When specific page numbers are cited, follow the date with “p. x” or “pp. x–xx.” If the volume is specified, follow the volume number with a colon and then the page numbers.

Number the bibliography or reference entries in sequential order.

Citations in the text appear as the reference’s number enclosed in parentheses at the end of the sentence or clause in which the work is referenced. Italicize the reference’s number and its enclosing parentheses, but not the punctuation that follows it. For example, the following text references entry 2 above, *Discharge Ratings at Gaging Station*:

Discharge measurements at various stages at a site or gaging station provide data for developing a rating curve (2).

3.14.2 Elements to Be Included

The following information should be included in all bibliography or reference lists:

- Author, last name first (for the first author of multi-author works);
- Title, including subtitle if necessary;
- Editor, compiler, or translator, if any;
3.14.3 Books

**Single Author**

Author’s last name, first name or initials (use a space between initials). *Title of book*. Volume or series number or edition (if not the first edition). Publisher, city, state, date.


**Two Authors**


**Three or More Authors**


**Books within a Series**

(Set title of book in italics; set title of series in italics only if the complete series is grouped under a specific title.)


**Editor, Compiler, or Translator**


**Parts of a Book**

(2) Dalrymple, T. and M. A. Benson. Measurement of Peak Discharge by the Slope-Area Method. 

**Group such as Organization, Association, or Corporation as Author**


**Government Agency as Author**

(1) USDA, National Resources Conservation Service. *Computer Program for Project 

### 3.14.4 FHWA Publications

**FHWA Reports**

(Set report title in italics.)

(1) FHWA. *Guide for Selecting Manning’s Roughness Coefficients for Natural Channels and 
Flood Plains*. FHWA-TS-84-204. Federal Highway Administration, U.S. Department of 

**FHWA Circulare**

(1) FHWA. *Hydrology*. Hydraulic Engineering Circular No. 19. Federal Highway Administration, 

**FHWA Series**

(1) FHWA. *Highway Hydrology*. Hydraulic Design Series No. 2, FHWA-02-001. Federal 

### 3.14.5 TRB Publications

**Special Report**

(No quotes around paper title; set series and report title in italics.)

(1) Ross, D. Ridesharing—Where Does It Go from Here? In *Special Report 60: Ridesharing 
Needs and Requirements: The Role of the Private and Public Sectors*. TRB, National Research 

**Record**

(No quotes around paper title; set series in italics. Do not include Record title.)

(1) Baker, V. R., Paleoflood Hydrologic Techniques for the Extension of Streamflow Records. In 
*Transportation Research Record 922*. TRB, National Research Council, Washington, DC, 
1983.

**State-of-the-Art Report**

(No quotes around paper title; set series in italics.)

(1) Kieselbach, R. Safety of Flawed Seamless Gas Cylinders. In *State-of-the-Art Report 3*. TRB, 

**Circular**

(Set series and title in italics.)


**NCHRP Report**

(Spell out NCHRP Report, follow by the report number and a colon, then follow with the title of the report.)


**3.14.6 Periodicals**

(Include the author’s name (last name first), title of article in roman type, title of periodical in italic type, issue information (volume, issue number, date), and page reference.)


**3.14.7 Technical Reports**


**3.14.8 Government Documents**

(See also the sections on FHWA and TRB publications.)
Executive Orders


Congressional Record

Hearings
(1) U.S. House Science Committee, 108th Congress. Hearing on H.R. 2551, Surface Transportation Research and Development Act of 2004. [Follow with the citation to the Congressional Record if possible.]

Bills and Resolutions

Federal Register

(1) 21 F.R. 623.

Code of Federal Regulations
(1) 43 CFR 192.1.

U.S.C.


3.14.9 Court Cases
(1) In Jones v. Robinson, 122 U.S. 329 (1929).

3.14.10 Theses and Dissertations
(No quotes or italics.)

3.14.11 Others

Proceedings
(Indicate where the conference was held, the publisher (association), location, and date; no quotes for the paper title; set proceedings title in italics.)


**Conference Presentation**

(Indicate where the conference was held, the publisher (association), location, and date; no quotes or italics for paper title.)


### 3.14.12 Nonprint Materials

**Slides and Films**


**Computer Programs**


**Websites**

(Referencing only the year the document was cited is acceptable if the year of publication is not provided.)


### 3.15 Request to Cite from Other Sources

Citing other sources of information is the responsibility of the author, i.e., whichever task force or subcommittee member, technical reviewer, or consultant is writing the text for a particular chapter, section, or book. By citing other sources, the author is able to relate his work to supporting information and to provide a valuable resource for the reader. Properly citing sources maintains the intellectual integrity of the document and satisfies legal requirements pertaining to copyright issues. Most organizations will grant permission if they get referenced as the source (for example, a note placed under the table or figure stating where it came from). Keep in mind that AASHTO does not typically pay for copyright permissions.

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- figures, photos, charts, or graphs that were taken directly from another publication;
- an equation or procedure developed by someone that is unique to a certain publication (if it is not widely used);
- any text, tables, photos, or charts taken directly from publications that are not in the public domain (i.e., not from a government source like FHWA or a state DOT);
any information from an organization such as ITE, ASTM, IESNA, etc.;
private sector publications.

Samples of items that probably do NOT need copyright permission include:
- summaries or descriptions that the task force wrote of research studies or procedures as long as they don’t use a direct quote or contain a chart or graph;
- Federal agency documents, such as those of FHWA, EPA, DOE, etc.;
- State agency documents, such as those of State DOTs;
- Local government publications, such as those of City of Los Angeles.

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[Address]

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Approximate number of pages:

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Title of document:

Text:

Figure(s):

Table(s):

Photo(s):

Equation(s):

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Name (please print) _____________________________________________________
[Title] ________________________________________________________________
[Agency or Firm] _______________________________________________________
Credit and/or copyright notice to appear:

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Contact Author Name and Full Address:________________________________________________________________________________
__________________________________________________________________________________________________________________

Copyright to: ______________________________________________________________________________________________________
__________________________________________________________________________________________________________________

By: _______________________________________________________________________________________________________________

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__________________________________________________________________________________________________________________

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__________________________________________________________________________________________________________________

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______________________________________________________________ _________________________________________________
Signature (of author or employer) Name (please print)

______________________________________________________________ _________________________________________________
Agency or Firm Title

Date

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Please return by fax to +1 202-508-3835. (Rev. 3/16/2005)
3.15.1 Trade Names
Avoid propriety trade names (i.e., trade marks) for a particular product.

If use of a trade name cannot be avoided, the product name should be immediately followed by a registered trademark symbol, superscripted, as in Brakemaster®.

Note: Exceptions to the rule of trade names include words that have become accepted as generic. These terms include such words as babbitt, bunsen, cellophane, diesel, kraft, neoprene, nylon, portland cement, and saran.

3.16 Endnotes and Footnotes
AASHTO prefers endnotes placed at the end of each chapter or article. Footnotes will be accepted, however.

Notes shall be numbered consecutively within each chapter or article. (Notes to tables or figures are numbered separately.)

Superscript reference note numbers should be placed at the end of the sentence outside all punctuation marks except a dash.

3.16.1 Text Citations
AASHTO employs the reference number system for citations of references within the text. In this system, the reference items are listed alphabetically by authors’ last names and numbered sequentially. The reference number cited within the text is placed at the end of the sentence but before the period. Both the reference number and the enclosing parentheses are italicized.

If the full title of the work is cited, italicize the title. If a chapter or section of that work is cited, enclose the title of that section in quotation marks. For example,

Recommendations can be found in AASHTO's Roadside Design Guide.

See the section on “Mathematical Expressions” under “Style Rules” in Style Manual for AASHTO Publications.

3.17 Appendixes and Other Attachments
Additional information may be included in supplementary requirements, annexes, or appendixes. If used, supplementary requirements precede annexes, annexes precede appendixes, and appendixes precede glossaries, references, or indexes.

(1) Supplementary Requirements—Requirements that apply only when specified within a contract

(2) Annexes—Mandatory information, e.g., detailed information, list of symbols that were used, instructions for operating or calibrating equipment

(3) Appendixes—Nonmandatory information that amplifies statements made in the text, e.g., calculations of equations, charts, data forms

Attachment sections are numbered separately from the text of the chapter or section. Supplementary Requirements are numbered S1, S1.1, S2, S2.1, etc. Annexes and Appendixes are numbered A1, A1.1, A2, A2.1, etc. Tables and figures in these attachments, however, may be numbered consecutively with those of the text in documents formatted in Microsoft Word.
Bibliography for Style Manual for AASHTO Publications


(2) ASTM. Form and Style for ASTM Standards. ASTM International, West Conshohocken, PA, September 2002.


