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Part 1 - GENERAL

100 INTRODUCTION

100-1 Uniformity in Traffic Control Standards

100-1.1 General

Uniform traffic control standards throughout the country have long been recognized as necessary to meet the ever increasing demands of modern transportation. Once established, it is very important that standards are kept current. Developments in traffic control devices often lead to changes in the design or application of them. As improvements (or problems/concerns with existing devices) are identified, needed changes should be incorporated into the standards and the revisions disseminated in a way to assure that they are implemented.

100-1.2 National Standards

To meet the need for nationwide uniformity of standards for signs, signals, markings and other devices on or adjacent to streets and highways, the **Federal Highway Administration (FHWA)** publishes the **Manual on Uniform Traffic Control Devices (MUTCD)** ***(see Section 193-10***) and periodic revisions. Federal regulations **(23 CFR Part 655)**, as well as **Section 4511.09 of the Ohio Revised Code (ORC),** require that the **ODOT Director of Transportation** adopt a **State** manual of uniform traffic control devices.

The national **MUTCD** is available on-line ***(see Table 197-3)***. Proposed changes to the national standards in the **MUTCD** are published by **FHWA** using the **Federal Register Docket** system.

100-1.3 State Standards

The **Ohio Manual of Uniform Traffic Control Devices (OMUTCD)** is the **State** manual adopted by the **ODOT Director of Transportation** to establish standards for traffic control devices in **Ohio** in general conformance to the national manual. The **OMUTCD** standards apply to all public streets and highways regardless of type or the level of governmental agency having jurisdiction, promoting statewide uniformity in the design and application of traffic control devices.

100-1.4 Agency-Specific Standards

Each highway agency is responsible for applying the **State** standards on the streets and highways under its jurisdiction **(see ORC Sections 4511.10 and 4511.11)**.

For **ODOT**, the **Traffic Engineering Manual (TEM)**, **Traffic Standard Construction Drawings (Traffic SCDs)**, **Plan Insert Sheets (Traffic PISs)** and the **Construction and Materials Specifications (CMS)** establish traffic control policies, standards, guidelines and specifications which supplement the basic standards established in the **OMUTCD**. See ***Table 197-9*** for a complete list of publications from the **ODOT Office of Traffic Engineering (OTE)**.

100-2 Office of Traffic Engineering's Role/Responsibility

As required by law **(ORC Section 4511.09)**, the **Ohio Department of Transportation (ODOT)** is responsible for adopting a manual which establishes traffic control standards that apply to all public streets and highways in **Ohio**, regardless of facility type or the level of governmental agency having jurisdiction.

The **Office of Traffic Engineering (OTE)** is responsible for developing and maintaining the **Ohio Manual of Uniform Traffic Control Devices (OMUTCD)**, and any additional **ODOT** traffic engineering policies, guidelines, standards, etc.

The **OTE Standards Section** is also responsible for coordinating **ODOT's** review of proposed changes to the national **MUTCD** ***(see Section 193-10)***. Comments are solicited from related offices in **Central Office** and, time permitting, the **Districts** and others. The **OTE Standards Section** prepares **ODOT's** response.

The procedures for revising the **OMUTCD**, **TEM**, **SCDs**, **PISs** and the **CMS** are addressed in ***Sections 101-5, 102-5, 103-5, 104-4 and 105-3***, respectively.

100-3 Jurisdiction

The **OMUTCD** establishes standards for all public streets and highways in **Ohio**. Unless noted otherwise, all other **OTE** policies, guidelines, standards, manuals and handbooks apply only to highways under **ODOT's** jurisdiction, but are also recommended for use by local jurisdictions.

When referring to highways under **ODOT's** jurisdiction, generally this involves **State Routes** and **U.S. Routes** outside municipal limits and **Interstate Routes**.

100-4 OTE Contacts

General traffic engineering inquiries should be directed to the **Ohio Department of Transportation, Administrator**, **Office of Traffic Engineering ,** 1980 W. Broad St., P.O. Box 899, Columbus, Ohio 43216-0899.

Comments, questions and proposed revisions of this Manual should be submitted to the **Ohio Department of Transportation, Office of Traffic Engineering, Standards, Operations and Safety Section** at that same address. Forms for submitting proposed revisions as well as changes of address are included in ***Section 196***.

Comments or questions involving a specific area of concern handled by one of the **OTE** section supervisors or their staff, may be referred directly to the appropriate area. For your convenience in addressing questions or concerns related to specific topics, ***Table 197-2*** presents a list of key **OTE** contact personnel. In addition, a roster of **OTE** personnel is available on the **OTE** web site ***(see Table 197-3)***.

The **OTE Correspondence Manual** established guidelines for both written and e-mail correspondence. In part, the guidelines require that **OTE** employees obtain the **Administrator's** approval (signature or initial) prior to sending drafts or final versions of proposed policies, manuals, handbooks, specifications, standards or other such documents. This also includes correspondence regarding an interpretation of any of these documents, expressing an opinion regarding the adequacy of any of them, or discussing potential changes. However, this does not apply to informational copies of existing documents that may need to be sent to someone.

100-5 ODOT Organization

Figure 198-1 presents an overall organization chart for **ODOT**. The most current update of this information is available from the **ODOT** web site ***(see Table 197-3)***. ***Table 197-4 and Figure 198-2*** also provide information about the **ODOT Districts**, including addresses and phone numbers for contacting each **District**. Current information on the **Districts** and contact information for them can also be found on the web site.

100-6 Other Resource Reference and Contact Information

Table 197-3 provides information to help in locating various resource references and contacting agencies and organizations at the local, **State** (including **ODOT**) and national levels. In addition to mailing addresses, when available telephone and fax numbers, and web and e-mail addresses have been provided. Suggestions for additions to this list are welcome.

Intentionally blank.

101 OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES

101-1 Legal Authority

As noted in ***Section 100-1.3***, the **Ohio Manual of Uniform Traffic Control Devices (OMUTCD)** is the **State** manual adopted by the **ODOT Director of Transportation** to establish standards for traffic control devices in **Ohio** in general conformance to the national manual ***(see Section 193-10)***. This is also addressed in the **OMUTCD Introduction and in Section 1A.07**.

As noted in ***Section 100-1.4***, **ORC Sections 4511.10 and 4511.11** make **ODOT** and local authorities within their respective jurisdictions responsible for placing and maintaining traffic control devices that conform to this manual. The **OMUTCD** and subsequent revisions apply to all traffic control devices erected in **Ohio** after the date of their adoption.

101-2 Organization

The organization of the **OMUTCD** is very similar to that of the national manual and most of the text is the same. Currently, the **OMUTCD** is organized as follows:

- **Part 1** provides general information about the purpose of, and requirements for, traffic control devices, the legal authority of the manual, definitions and procedural information.
- **Part 2** provides information about traffic control signs.
- **Part 3** provides information about Markings, i.e., Pavement and Curb Markings, Object Markings, Delineators, Colored Pavements, and Barricades and Channelizing Devices. Information about traffic control islands is also located in Part 3.
- **Part 4** provides information about highway traffic signals.
- **Part 5** provides information about low-volume roads.
- **Part 6** provides information about temporary traffic control.
- **Part 7** provides information about traffic controls in school areas.
- **Part 8** provides information about traffic controls at highway-rail grade crossings.
- **Part 9** provides information about traffic control devices related to bicycle facilities.
- **Part 10** provides information about traffic controls at highway-light rail transit grade crossings.
- **Appendix A** provides information about federal legislation related to the national **MUTCD**.
- **Appendix B** provides a cross-reference to various related **ORC** sections, and provides actual reprints of some of the most often referenced sections.
- **Appendix C** is intended to provide a visual quick reference of sign cuts for signs addressed in the manual. Cross-referencing to related sections in the manual are also provided. Due to time constraints this was not included in the initial publication of the **2003 Edition of the OMUTCD**. Space has been reserved for it, with the actual artwork to be added in a later revision.

101-3 Format

101-3.1 General

For the convenience of those who may not be familiar with the **OMUTCD** (and as a record and reminder for those developing text for it), various format conventions used in that manual have been consolidated in this section.

101-3.2 Numbering/Labeling Conventions

Given the size of the publication and for convenience in handling future revisions, the following numbering conventions have been used for the text, figures and tables in the **OMUTCD**:

1. The page numbering has been formatted to include the Part number. Tables of Content are numbered separately, using a "TC" designation.

2. Section, Figure and Table numbers are a combination of numerical and alphabetical characters, with the first number relating to the Part number. The alphabetical portion of the section number is used to identify the chapter. For example, "2B" is used to identify the Regulatory Signs chapter and "2C" identifies sections and figures from the Warning Signs chapter.

3. The footer on each page has been used to identify it as being from the **OMUTCD 2003 Edition** and a note in the header provides a reminder of which Part of the manual the page is from and the general topic.

4. A note in the footer has also been used as a reminder that although metric and English units have been shown, English units are the preferred method in **Ohio**.

101-3.3 Text

The following formatting conventions have been used in the **OMUTCD**:

1. Numbers related to time and quantities are usually written out, but dimensions are generally shown as numbers.

2. Dimensions are shown in dual units, currently, with the metric number first followed by the English equivalent in parentheses.

3. For consistency, the terms "Standard," "Guidance," "Option" and "Support" are defined in the **OMUTCD Introduction**, and a general listing of definitions of other terms used in the manual are noted in **Part 1,** with others also noted in individual Parts.

4. To provide emphasis and to differentiate between Standard, Guidance, Option and Support text, the text has been separated using these titles.

5. The format of the text copied from the **MUTCD** has also been used to help differentiate between the type of information.

   a. Text addressing Standards information is in bold, 12 point Times New Roman font.
   b. Text addressing Guidance information is in 12 point Times New Roman font.
   c. Text addressing Option and Support information is in 11 point Times New Roman font.

6. The format of the text has also been used to help identify **Ohio** text, as opposed to that copied

from the **MUTCD**. The **Ohio** text is shown in Arial font (the same font used in the **TEM**).

7. In referring to a sign by name, if the name used is also the sign legend it will be shown in all capital letters, if not, just the initial letters will be capitalized, e.g., STOP sign and Winding Road sign.

101-3.4 Artwork

The following formatting conventions have been used in the **OMUTCD**:

1. The numbering format for the figures is described in ***Section 101-3.2***.
2. Dimensions are as described in ***Section 101-3.3***.
3. A gray background is typically used to depict the pavement.
4. Colors, conforming to the Federal Color Tolerance charts, are used in depicting the traffic control devices illustrated.
5. Sign cuts are currently shown in groupings of similar signs, as shown in the national **MUTCD**.
6. If there are "right" and "left" versions of a sign, although both are not typically shown, the one shown will include "R" or "L" with the sign code number.
7. Sign size tables have been included in signing related chapters showing groups of signs, instead of individual notations about sign sizes with the sign cuts.

101-4 Distribution

The **OMUTCD** is available electronically from the **OTE** and **Design Reference Resource (DRRC)** web sites ***(see Table 197-3)***. It is also currently available in paper format. Copies are distributed free to local jurisdictions, other government agencies and public libraries. Free copies are distributed by the **Office of Traffic Engineering**. For those that involve a charge, the **Office of Contracts** handles the invoicing and distribution.

An Address Verification Form ***(Form 196-4)*** is included with each manual. To avoid duplications, the mailing distribution list is not updated until this form is received in the **OTE Standards Section**.

It is also important to notify the **Publications Distribution Coordinator** in the **OTE Standards Section** of any change in address. ***Form 196-1*** can be copied and used for this purpose.

101-5 Revisions

For convenience in reviewing and updating the **OMUTCD**, the basic **OTE** policy (since publication of **OMUTCD Revision 13**) has been to adopt the corresponding related text from the national manual **(MUTCD)** when preparing a revision, unless it is determined that there is a good reason to be different.

Maintaining/updating of the **OMUTCD** is an ongoing **OTE** function. **OMUTCD Table I-1** depicts the evolution of the **OMUTCD**, listing the various editions and revisions. Comments and suggestions from users of the manual are anticipated and welcome. Please use ***Form 196-2***, the Traffic Engineering Publications Revision Proposal Form, to make comments and to submit requests for revisions. All revisions to this manual will be reviewed according to the following process:

1. All proposed revisions should be submitted to the **OTE Administrator**, using the Revision Proposal Form ***(Form 196-2)***. Preferably, a proposal for a revision of the text should include a marked-up

copy of the related manual text.

2. The **Standards Section** will review the proposal and circulate it within **OTE** for review and comment. For major revisions, a special task team, including representatives from the **ODOT** districts as well as agencies/organizations outside **ODOT**, may be established to review the matter and provide comments. If a change is recommended, a draft revision will be prepared.

3. If approved by the **OTE Administrator**, the draft revision will be circulated among the **Districts**, related offices in **Central Office**, and other agencies/organizations as appropriate for review and comment.

4. The **Standards Section** will coordinate review of comments received and preparation of revised text as needed. A final draft plus a list of any major technical difficulties, and proposed solutions, will be submitted to the **OTE Administrator** for approval.

5. If a revision of this manual is to be made, it will be prepared by the **Standards Section** and distributed with a cover letter signed by the **OTE Administrator** to all holders on the current distribution list. An e-mail announcement will also be sent to all those who have subscribed to the list service for the **OMUTCD** (on the **DRRC** web page).

102 TRAFFIC ENGINEERING MANUAL

102-1 General

Over the years, as a supplement to the information in the **OMUTCD**, a variety of policies, standards, procedures, guidelines, standard drawings, typical drawings and publications regarding **ODOT's** traffic engineering practices have been developed and disseminated in various ways. Many of these were originally published in the **ODOT Traffic Control Application Standards Manual (ASM)**; however, others were issued separately.

As noted in the Preface, the purpose of the **Traffic Engineering Manual (TEM)** is to assure, as much as possible, uniformity within **ODOT** regarding traffic engineering concerns by consolidating all this supplemental information into one manual. Some of this information can be critical in addressing the needs of our customers, and some may just be useful in simplifying or clarifying information published elsewhere. Hopefully, the **TEM** will become a useful tool in training personnel new to the subject, as well as providing a resource in addressing the wide range of inquiries from our customers, **ODOT** personnel, consultants, contractors, other government agencies and private citizens.

Except as noted in specific sections, the policies, guidelines, procedures and standards established in this Manual are applicable only to the **Ohio** state highway system and not local roads and streets. However, local jurisdictions may, and are encouraged to, use this publication.

102-2 Organization

The **TEM** has been arranged generally in the sequence of topics addressed in the **OMUTCD**. The Manual includes fourteen parts, arranged in the following sequence:

- ***Part 1, General Provisions,*** provides information about the organization and use of this and other **OTE** publications. Detail information regarding the revision and distribution of **OTE** publications is included, as well as miscellaneous general information that should be useful.

- ***Part 2, Signs,*** provides information about traffic control signs that supplement information in **OMUTCD Part 2.**

- ***Part 3, Markings,*** provides information about markings and islands that supplement **OMUTCD Parts 3 (Markings)**.

- ***Part 4, Signals,*** provides information about traffic signals that supplements the basic standards in **OMUTCD Part 4**.

- ***Part 5, Low-Volume Roads,*** has been reserved to address additional information, as needed, supplementing **OMUTCD Part 5**.

- ***Part 6, Temporary Traffic Control,*** provides information about temporary traffic control devices and applications, supplementing information in **OMUTCD Part 6**.

- ***Part 7, School Areas,*** provides information about standards for traffic control in school areas, including school zone extensions, supplementing information found in **OMUTCD Part 7**.

- ***Part 8, Highway-Rail Grade Crossings***, provides information about traffic controls at railroad-highway grade crossings, supplementing information in **OMUTCD Part 8**.

- ***Part 9, Bicycle Facilities,*** provides information about traffic control devices related to Bicycle Facilities and supplements information found in **OMUTCD Part 9**.

- ***Part 10, Highway-Light Rail Transit Grade Crossings,*** has been reserved to accommodate additional information regarding traffic controls at highway-light rail transit grade crossing, as needed, supplementing **OMUTCD Part 10**.

- ***Part 11, Highway Lighting,*** provides information about highway lighting.

- ***Part 12, Miscellaneous,*** provides information about speed zones, parking zones and other miscellaneous related devices, procedures, etc. that are not directly related to any single topic discussed in one of the other chapters.

- ***Part 13, Appendix*** provides information about definitions for terms used in this Manual which are not already defined in the **OMUTCD** and an explanation of various acronyms. Information about other **ODOT** policies and guidelines is also provided, as well as copies of traffic-related items.

- ***Part 14, Index,*** is an overall index for the Manual.

102-3 Format

102-3.1 General

Various format conventions have been adopted. For convenience (and as a record and reminder for those developing text for the Manual), they have been consolidated in this section.

A Table of Contents has been provided for each chapter, listing each section, form, table or figure. An overall Table of Contents has also been provided in the front of the Manual; however, to conserve space, only the major headings (including the forms, tables and figures) and the underlined section headings are shown, not the subdivisions.

102-3.2 Numbering/Labeling Conventions

The following section numbering conventions have been used in this Manual to provide a consistent organization for the chapters. This is intended to help locate information and to simplify cross-references within the **TEM**:

1. The sections within each chapter are numbered based on the chapter, or Part, number. For example, in this chapter, Part 1, the section numbers start with 100. The major headings in each chapter are also identified with a slightly larger font shown in bold and all capital letters. In general, the major headings also begin a new page.

2. Material within each chapter is generally arranged in a set pattern, with the general standards and guidelines information presented first (for example, Section 100 through 129). Planning/Programming information generally starts with Section x30. Design Information starts with Section x40, with Plan Preparation / Production information in Section x41, with **Plan Note** information in Section x42, and a listing of related **CMS** items in Section x43. Construction material starts with Section x50 and is generally intended to include information used in inspecting installation of traffic control devices. However, this information may also be useful for **ODOT** force account installation of various devices. Maintenance/Operations information starts in Section x60, and it generally addresses preventive maintenance and other operational issues.

3. A section number using “95" as the last two digits of the primary number has been reserved for use in each chapter to incorporate discussion, as appropriate, about related, but separately published **OTE** publications. For example, although the **Standard Sign Design Manual (SDM)** has formally been “incorporated” into the **TEM** ***(Section 295-2)***, due to its size,

and the fact that some people will need it but not the rest of the **TEM**, it is being published separately. The title sheet and cover of that manual, and the other publications similarly "incorporated," reflect the fact that they are considered part of the **TEM**. To help avoid unnecessary reference to these other volumes, a brief description of each of these manuals is included in the **TEM** text, with an indication of how it relates to the other information in this Manual ***(see Sections 295-2)***.

4. In each chapter, the related forms, tables and figures have been consolidated into sections labeled x96, x 97 and x98, respectively, where x is the Part/chapter number. The figures may include charts.

5. Under the major headings in each chapter, subdivisions have been labeled with a hyphenated number based on the number of the major heading, e.g., ***Section 102-3***. The titles of these sections are bold and have been underlined.

6. If further subdividing of information is needed, decimals are used with the number, e.g., ***Section 102-3.2*** and ***Section 205-2.3.1***. The titles of these sections are bold, but not underlined.

102-3.3 Text

Text format in the **TEM** generally follows that used in the **OMUTCD**; however, a few additional conventions have also been used.

1. The type font used is Arial. The default font size is 10; however, 12 has been used for the major section headings and the titles for the Forms, Tables and Figures.

2. References to sections, forms, tables and figures within the **TEM** are highlighted using bold/italic text, e.g., ***Section 1305***.

3. References to organizations, titles, documents, etc. are highlighted using bold text, e.g., **OMUTCD**.

4. The **SCDs** are currently being updated to dual units, and metric **SCD** numbers are being changed as they are revised to eliminate the "M," **SCD** numbers in the **TEM** have been shown without the M suffix, even if the current drawing still has that designation.

102-3.4 Units of Measure

ODOT's policy is to use English units as the standard. The current standard for **OTE** publications is to provide dual units for dimensioning. Except in the **OMUTCD**, English units are shown followed by the metric equivalent in parentheses. A combination of "hard" and "soft" metric conversions may be used. Generally, "soft" conversions have been used unless consistency with the national **MUTCD** or manufacturing industry has indicated otherwise. "Soft" conversions are based on simply multiplying the English value by a conversion factor. The "hard" conversions are when a new value is established by forcing a rounding off of the converted number, not just to the nearest half unit, but to a new metric rounded value. For example, for the 6 foot dimension of the pavement marking letter R, the "soft" conversion for 6 foot is 1.82 or 1.8 meters, whereas a "hard" conversion would be 2 meters.

If metric equivalents are required on a particular project and they are not available herein or in the **OMUTCD** or related **SCDs**, the English units shall be converted to metric units using the English to SI (Metric) Conversion Factors provided in **Table 109.02-1 of the 2002 Construction and Materials Specifications**. The appendix of **ASTM E 380** shall be utilized for any additional conversion factors required. Conversions shall be appropriately precise and shall reflect standard

industry English values where suitable. The contractor and the project engineer are responsible for the accuracy of the conversions used for a construction project.

102-3.5 Definitions

As noted earlier, in addition to **OMUTCD Part 1**, ***Section 1301*** of this Manual provides definitions of terms (including acronyms) used in this and related document.

102-3.6 Artwork

Sign cuts for signs addressed in the **TEM** and not shown in the **OMUTCD** are included in the **TEM**. They are not in color in the paper version of the **TEM**, but they are accurate, proportional representations of the signs. The sign cuts shown in the electronic version posted on the web may be in color.

Each figure and table is individually numbered and appears in the Table of Contents. The index pages for the figures and tables includes cross-referencing information to the related text sections.

102-4 Distribution

This Manual is distributed free to state agencies. The charge to others is noted on the front page. Free copies are distributed by the **Office of Traffic Engineering (OTE)**. For those that involve a charge, the **Office of Contracts** handles the invoicing and distribution. The **TEM** is also available electronically from the **OTE** and **Design Reference Resource Center (DRRC)** web sites ***(see Table 197-3)***.

Revisions will be available from the **OTE and DRRC** web sites. As needed, they will be posted to the web on a quarterly basis (January, April, July and October). It is the responsibility of the individual receiving or downloading the Manual to update it as needed. A subscription service is available on the **DRRC** web site to allow interested individuals to receive e-mail notifications when updates and notices are posted.

The distribution policy and charge for this Manual is subject to change without notice; however, any changes should be reflected in the next quarterly revision.

102-5 Revisions

Maintaining/updating the **TEM** is an ongoing **OTE** function. The Publication Record documents the revisions of this Manual. Comments and suggestions from users of the Manual are anticipated and welcome. Please use the Revision Request Form ***(Form 196-2)*** or a similar format to make comments and to submit requests for revisions. All revisions to this Manual will be reviewed according to the following process:

1. All proposed revisions should be submitted to the **OTE Administrator**, using the Revision Proposal Form ***(Form 196-2)***. Preferably, a revision proposal should include a marked-up copy of the related Manual text.

2. The **OTE Standards Section** will review the proposal and circulate it within **OTE** for review and comment. For major revisions, a special task team, including representatives from outside **OTE**, may be established to review the matter and provide comments. If a change is recommended, a draft revision will be prepared.

3. If approved by the **OTE Administrator**, the draft revision will be circulated among the **Districts** and related offices in **Central Office** for review and comment.

4. The **Standards Section** will coordinate review of comments received and preparation of revised

text as needed. A final draft plus a list of any major technical difficulties, and proposed solutions, will be submitted to the **OTE Administrator** for approval.

5. If a revision of this Manual is to be made, it will be prepared by the **OTE Standards Section** and with the approval of the **OTE Administrator** will be posted to the **OTE** and **Design Reference Resource Center (DRRC)** web sites ***(see Table 197-3)***. An e-mail announcement will be sent to all those who have subscribed to the list service for the **TEM/SDM** (on the **DRRC** web page).

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103 STANDARD CONSTRUCTION DRAWINGS

103-1 General

Numbered **Standard Construction Drawings (SCDs)** published by **OTE** have been established to standardize inclusion of certain traffic control information in **ODOT** contract plans. The drawings are developed and published by **OTE**. In addition to contract plans, they should also be used by **ODOT** operational forces as directed in this Manual and at other times when considered appropriate.

Designer Notes have been developed to help define the intended use of **SCDs** ***(see Section 140-3)***.

103-2 Organization

The **OTE Standard Construction Drawings (SCDs)** set is composed of individual standard drawings, grouped in three general categories, Highway Lighting (HL), Maintenance of Traffic (MT) and other Traffic Control items (TC). The drawings in the Traffic Control group are also subdivided into the following groups:

- Overhead Sign Supports, beginning with **TC-7.65**;
- Overhead Sign Supports - Associated Details, beginning with **TC-21.10**;
- Signing Electrical Details, beginning with **TC-31.21**;
- Ground-Mounted Sign Supports and Signs, beginning with **TC-41.10**;
- Delineation and Pavement Marking, beginning with **TC-61.10**; and
- Traffic Signals, beginning with **TC-81.10**.

103-3 Format

103-3.1 ODOT SCDs in General

To promote uniformity within **ODOT**, CADD standards have been established for published documents. Generally, these standards should be used in all **MicroStation** drawings that are intended to be incorporated within the various publications. **L&D Manual Volume Three** establishes specific CADD standards for use in developing plan sheets, including plan detail sheets developed for individual plans.

At this time, there is not one set of CADD standards for all **SCDs**; however, each Office developing **SCDs** (e.g., **Roadway Engineering Services, Structural Engineering** and **Traffic Engineering**) has established general guidelines for its standard drawings which are, at least in part, based on the standards established in the **L&D Manual (Volume Three)** for the regular plan sheets.

The following standards are established to insure consistency for all **OTE SCDs**. Although no set of criteria can cover all the possible designs which may occur, these standards shall be followed as closely as possible to allow other users a reasonable expectation of what each drawing will contain. If, in developing an **OTE SCD**, there is a reason for the designer to vary significantly from these standards, the variations should be noted within the drawing itself or as an attachment.

Each person developing or creating **OTE SCDs** should use good graphical judgment in the arrangement and placement of both graphic objects and blocks of text. A drawing that is loaded

with text or too many highly detailed drawings may be overwhelming to the end user.

103-3.2 OTE SCD Format

The standard **OTE** title block and outline for all drawings ***(see Section 103-3.3)*** shall be used.

As noted in ***Section 102-3.4***, all drawings are to be developed in dual units. The English dimension is shown first, followed by the metric equivalent in parentheses. For the English dimensions, the inch (“) and foot (‘) symbols are used. Fractions, rather than decimals, should be used where needed.

To conserve space, metric units shall be shown numerically only, with a note stating that metric values are in millimeters (or meters, if more predominant), unless otherwise noted. Decimals should be used, where needed, and the decimal places should be limited to one, unless there is a specific design reason to show a greater tolerance.

A combination of “hard” and “soft” metric conversions is permitted. Use is determined by consistency with the manufacturing industry which supplies the material. A further explanation of “hard” and “soft” conversions is provided in ***Section 102-3.4***.

When multiple pages under a specific topic are required, they shall maintain the same title and drawing number with page numbering used. The page number is to appear in a rectangular block located in the lower right portion of the title block. The number to the left shall be the actual page number in consecutive order and the number on the right shall be the total pages. Occasionally, additional pages may need to be inserted in a given drawing that has already been numbered. These pages shall be labeled with the number of the preceding page followed by consecutive letters (e.g., 1A, 1B, etc.). It is not intended that a given drawing contain many different pages. As multiple pages are added, the designer should consider reorganizing the material into more specific topics.

Interim “dates of revision” may be shown on draft copies for review purposes, but they shall be removed and the official revision date will be added to the drawing after federal approval. The date shall use the month/day/year convention, with a two-digit year (e.g., 01/01/00).

The preparer’s initials are to be shown in the bottom right corner, just under the border.

103-3.3 Seed File

All **OTE SCDs** shall use the seed file trstdseed.dgn (i:\tr\trstd\seed). This file contains the template for all the **OTE SCDs** and includes the working units established in all **ODOT** seed files (i.e. MU/SU/PU = ft./12 in./1000). New drawings must begin by copying this file and then renaming it for the appropriate drawing.

103-3.4 Text

The fonts for all drawing items shall be as listed in ***Table 197-5***. If special characters or symbols not found in the FONT 32 library, such as π or θ, are needed they may be obtained using FONT 33. Examples of the these fonts can be found in **L&D Manual Volume Three, Appendix A 2**.

The text size and weight shall also be as specified in ***Table 197-5***.

The style shall be upper/lowercase for all items listed under the NOTES section. All other drawing items shall be all CAPS, except for metric designations (i.e., m and mm).

In general, spacing between text lines should equal the text height. The line weights and styles

(codes) shall be as specified in ***Table 197-6.***

The "Standard" should be used for all dimensioning lines, table lines (including border) and the construction of most drawing elements.

The designer may use other weights and one of the other line styles not assigned here for special design details, but such use should be limited.

Custom line styles are not to be used unless prior approval from the **OTE Standards Section** is obtained.

Thick line weights should not to be used in lieu of filling appropriate areas (e.g., pavement markings).

103-3.5 Color Table

Although color perception varies with each user, a standard color table should be used for the final drawing. This use insures that the pen tables specified will print as desired and that elements obtained from cell libraries display consistent characteristics throughout all drawings. Use of the standard color table will also assist future users in identifying those elements in a consistent manner. Therefore, the standard **ODOT** color table, odotcol.ctb (i:\std\ctb), shall be used, unless prior approval to use a different one is obtained from the **OTE Standards Section**.

103-3.6 Level Assignments

Whenever possible, the level assignment format established in **L & D Manual Volume Three, Figures 1206-4A to 1206-4O** shall be followed, except where modified by ***Table 197-7***.

103-3.7 Cell Libraries

Cells placed in drawings should retain their symbology (color, fill, line weight, line style and level) unless the designer has a specific reason to make changes. Any such changes should be noted.

The following cell libraries contain symbols which shall be used with these drawings, whenever possible:

1. featbl.cel (i:\std\cell): This library contains many of the existing and proposed symbols used in most **ODOT** highway plans. Graphic representations of these cells can be found in **L & D Manual Volume Three, Appendix A3**. To assist in placing cells from this library, an MDL Application (FEATBL) is available for use.

2. Fontz.cel (i:\tr\trstd\cell\signcutcells): This library contains individual letters for use in creating sign drawings. The cells are labeled where the first letter is the **FHWA** font series and the second letter (or number) is the letter (or number) desired. For example the cell entitled "C4" would be the number 4 in the C series lettering font.

3. signcuts.cel (i:\tr\trstd\cell\signcutcells): This library contains sign cuts based on the **Sign Design Manual**. It is not the same as the sign cell library used for **ODOT** highway plans (i:\std\cel\signs). The sign cuts are identified by the standard sign code number. If the designer needs a sign cut not appearing in this library, they shall contact the **OTE Standards Section**.

4. traf.cel (i:\tr\trstd\cell): This library contains a collection of standard cells used in many of the **OTE SCDs**. Graphic representations of these cells can be found in ***Table 197-8***.

5. Cells specifically created for a given drawing or set of drawings that the designer feels will be used in subsequent drawings, should be incorporated into the traffic standard cell library (traf.cel) upon approval of the drawing.

103-3.8 Plotting

All completed drawings shall be plotted as 11 x 17 inch drawings (i.e., quarter size) on **MicroStation** IPLOT using the "half.pen" pen table (i:\std\iplot). If full-size drawings (22 x 34 inches) are needed, they shall be plotted on **MicroStation** IPLOT using the "full.pen" pen table (i:\std\iplot).

All elements shall be plotted black, unless prior approval for a variation has been obtained from the **OTE Standards Section**.

103-4 Distribution

Traffic SCDs, and the index for them, are available for downloading, as **MicroStation** or .pdf files, from the **OTE** and **DRRC** web sites. The **MicroStation** files are also available from the **ODOT** common CADD network "I" drive, in the "std" directory.

The **Office of Contracts** handles distribution of paper copies of this publication; however, **OTE** handles posting of revisions of the drawing sets to the **ODOT** web site. Revisions are generally posted as needed on a quarterly basis. It is the responsibility of the individual receiving or downloading the drawings to update them as needed. A subscription service is available on the **DRRC** web site to allow interested individuals to receive e-mail notifications when updates and notices are posted.

103-5 Revisions

Comments or questions about the drawings should be directed to the **OTE Standards Section** or the **OTE Specialty Area** responsible for a particular drawing. ***Form 196-2*** may be used for this purpose. In general, the **OTE Traffic Control Section** is responsible for the drawings with a "TC" or "HL" in the number, and the **OTE Maintenance of Traffic Section** is responsible for those with "MT" in the number.

The **OTE Standards Section** maintains a log of work needed on the **Traffic SCDs**, assigns drawing numbers as needed, and generally coordinates development and approval of the drawings. The **OTE Traffic Control and Maintenance of Traffic Sections** develop new or revised drawings and submit them to the **Standards Section** for final processing. The **Standards Section** may make final editing changes as needed, and when considered complete, prepares a transmittal letter to submit the drawing(s) to the local **FHWA** office for review and approval. (For minor editorial type revisions, this **FHWA** review/approval process is handled by e-mail.) When approved by **FHWA**, the **Standards Section** adds the official "revision date" to the drawing and schedules it for distribution in the next quarterly revision. (The quarterly revision date is used as the official "revision date" for each drawing.)

If, based on **FHWA** comments additional changes are made, or if other needed changes are noted before publication of the **OTE SCDs**, revised drawings are submitted to **FHWA** for approval.

104 PLAN INSERT SHEETS

104-1 General

Plan Insert Sheets (PISs) are standardized drawings that may be included in plans, to modify standard details to more closely depict conditions for an individual location, to show methods of work that are not currently shown in an **SCD**, or to show a modification or variation of an existing **SCD**. They are drawings that are expected to be used in more than one plan, but for various reasons have not been developed into an official **SCD**.

OTE has created and will maintain a set of these drawings. **Traffic PISs** will be created only if the modification is widely used, or is intended eventually to evolve into an **OTE SCD**. For other situations a **Plan Detail Sheet** (prepared for the individual plan) should be used/created. As with **SCDs**, **Traffic PISs** should be developed using good graphical judgment in the arrangement and placement of both graphic objects, and blocks of text. A drawing that is loaded with text, or that is loaded with a lot of highly detailed drawings is undesirable in that it may be overwhelming to the end user.

104-2 Format

Traffic PISs shall follow the CADD standards described for **Traffic SCDs** ***(Section 103-3)***, except that:

1. They shall use the **OTE** seed file trpisseed.dgn (I:\tr\trstd\seed); and

2. They shall be numbered as noted in this section. The first two numerals of the drawing number shall be “20", and the next four (or five) digits shall be the number of the related **SCD** (minus any decimals), if applicable. For example, a drawing designated “209711" would be a **Traffic PIS** based on the **SCD MT-97.11**. The **Standards Section** will establish a **Traffic PIS** number if a related **SCD** does not currently exist.

104-3 Distribution

A log of approved **OTE PISs** is maintained by the **OTE Standards Section**, and like the **SCDs,** they have been published on the web with an index, as well as on the CADD network I:\std directory.

New and revised drawings are posted to the **ODOT** web site on a quarterly basis. They are available from either the **OTE** or the **DRRC** web site. It is the responsibility of the individual downloading the drawings to update them as needed.

104-4 Revisions

Comments or questions about the drawings should be directed to the **OTE Standards Section** or the **OTE Specialty Area** responsible for a particular drawing. ***Form 196-2*** may be used for this purpose. The drawings will be revised as needed by the responsible **Specialty Section** and submitted to the **Standards Section** for publication.

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105 CONSTRUCTION & MATERIAL SPECIFICATIONS

105-1 General

The general term construction and material specifications includes: the **Construction & Materials Specifications Book (CMS)**, **Supplemental Specifications (SS)**, **Supplements**, **Special Provision Specifications**, **Proposal Notes** and **Plan Notes**. As needed, these are addressed individually by number reference within the **TEM** Parts.

The **Construction and Material Specifications Book (CMS)** contains detailed provisions, which, together with the plans and the Proposal, constitute the Contract for the performance of required work. It is the official legal and technical document by which **ODOT** bids and constructs highway projects. Provisions within the **CMS** are numbered as individual items, and the reference format used herein is **CMS Item xx** when a specific bid item is involved, and **CMS xxx** when the referenced section does not involve a bid item. For convenience, as appropriate, ***Section x43*** (where x is the Part number) has been reserved in each chapter to provide a consolidation of information about specifications related to the chapter topic. For example, ***Section 443*** provides a summary of **CMS** sections related to traffic signal equipment.

Supplemental Specifications (SS) are individual numbered documents prepared in loose-leaf form describing the construction and material specifications for new items.

Special Provision Specifications are individual numbered specifications prepared in loose-leaf form describing the construction and material specifications for items whose requirements are not covered in the **CMS** or in **Supplemental Specifications**.

Supplements provide necessary information such as laboratory methods of test, and certification or pre-qualification procedures for materials.

Proposal Notes contain a wide variety of legal and technical requirements necessary for the proper bidding and sale of an individual project. These notes override all other requirements in the Plan, **CMS**, **Supplemental Specifications** and **Standard Construction Drawings**.

Plan Notes describe non-standard pay items that deviate from the **CMS**, **Supplemental Specifications** or **Standard Construction Drawings**. As appropriate, these notes are addressed in **TEM** chapters in the x42 sections, where x is the Part number.

105-2 Distribution

ODOT construction and material specifications are available from the **ODOT Office of Contracts**. The **CMS**, **Proposal Notes** and **Supplemental Specifications** are also available from the **Design Reference Resource Center (DRRC)** web site ***(see Table 197-3)***.

105-3 Revisions

The **Division of Construction Management** is assigned the responsibility and authority to develop, implement, maintain and update construction and material specifications. This is to ensure construction quality and a uniform and consistent administration of construction projects by all **Districts**.

Five specification committees process specifications in the major work items: Pavement Materials and Construction, Structures, Earthwork and Hydraulics, Contract Administration, Traffic and other miscellaneous work items. Each working committee will review existing specifications, and adopt new specifications.

An Executive Committee gives final review and approval of all **ODOT** specifications.

All specification and new product issues are to be addressed to the specific Committee Chairs. The Chair for Traffic is the **Administrator of the Office of Traffic Engineering**.

106 OTE TRAFFIC ENGINEERING PUBLICATIONS

106-1 General

It is intended that, as much as possible, all **ODOT** traffic engineering information will be incorporated into the **TEM**, eliminating separate publications, guidelines, standard operating procedures, etc. However, for various reasons some related **OTE** publications have not been physically incorporated into the text of this Manual. In some cases, they are expected to remain physically separate publications (the **SDM** for example). In others, this is expected to be a temporary situation. For example, some new publications may initially be developed separately and incorporated (physically or by reference) later.

Table 197-9 provides a consolidated list of all **OTE** publications and the following sections provide a brief review of **OTE** publications not addressed in ***Sections 101 through 105***. It is intended that all **OTE** publications (except the wallchart described in ***Section 195-2***) will be available electronically from the **OTE and Design Reference Resource Center (DRRC)** web sites ***(see Table 197-3)***.

106-2 Temporary Traffic Control Manual

Parts 1 (General), 5 (Low-Volume Roads) and 6 (Temporary Traffic Control) of the OMUTCD have been reprinted in a separate manual to provide a convenient size copy of this information. The formal title for the publication is the Temporary Traffic Control Manual; however, since the cover is orange, this publication is often referred to as the **"Orange Book."** Also see ***Section 695-2***.

106-3 Standard Sign Design Manual (SDM)

This manual contains **Standard Sign Designs**, design guidelines and letter spacing information, for standard traffic control signs and major Guide Signs addressed in the **OMUTCD** and this Manual, as well as some additional signs that are not presently addressed in either of these manuals. The manual is referenced in the **OMUTCD** and is used to assure uniformity in the design of standard traffic signs in **Ohio**. Because of its size, the **SDM** has been incorporated into the **TEM**, by reference only, in ***Section 295-2***. See that section for further information.

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120 TRAFFIC CONTROL DEVICES AND MATERIALS

120-1 General

In general, only traffic control devices addressed in the **OMUTCD** are approved for use on highways under **ODOT's** jurisdiction. However, as noted in **OMUTCD Part 1** and ***Sections 120-3 and 1220-2***, new devices are being developed regularly and the fact that they are not addressed specifically in the **OMUTCD** is not intended to exclude them from use.

In general, information about traffic control materials is located within each **TEM** chapter according to the type of material involved. Information that addresses more than one type of material, such as the guidelines for handling patented or proprietary materials, or the process whereby local agencies can purchase traffic control materials and equipment using federal funds, is addressed in ***Part 12, Miscellaneous***

120-2 Specifications

ODOT Policy No: 27-005(P), Construction and Materials Specification Development Policy assigns the responsibility and authority to develop, implement, maintain and update construction and material specifications to the **Division of Construction Management**. It also establishes five Specification Committees to process specifications. For a description of the various types of specifications, see ***Section 105-1***.

120-3 New Products

ODOT Standard Procedure 510-005(SP) establishes procedures for the development and implementation of new or modified specifications. The appropriate Specification Committee is assigned the task of reviewing and evaluating all new products and of reviewing and authorizing experimental project work plans to test products as required. Also see ***Section 1220-2***.

120-4 Patented or Proprietary Materials, Specifications or Processes

The use of patented or proprietary materials, specifications or processes is discussed in ***Section 1220-3***.

120-5 Purchasing Materials for Installation and Use by Local Agencies

To help encourage uniformity and provide a method whereby local agencies can buy traffic control materials and equipment using **State** and federal funds, a process has been established whereby local agencies can purchase such items through **ODOT**. The process is described in ***Section 1220-5*** and illustrated in ***Figure 1298-1***.

Political subdivisions may also purchase machinery, materials, supplies and other articles from the **ODOT** Annual Term Contracts and the **ODOT** Single Purchase Contracts with their own funds under the Cooperative Purchasing Program. A copy of this program may be obtained from the **Office of Contracts, Purchasing Services** or on the web ***(see Table 197-3)***. Also see ***Section 1220-4***.

120-6 Alternate Bids for Traffic Control and Lighting Items

The alternate bid procedure has been established to permit a local agency to obtain a specific brand, feature or design of a traffic control or lighting device for use on a project. The procedure is described in ***Section 1220-6***.

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130 PLANNING / PROGRAMMING

130-1 General

This section is intended to provide general background information in the planning and programming areas. Specific planning and programming concerns will be addressed as needed in the individual Parts.

130-2 Engineering Studies

130-2.1 General

OMUTCD Section 1A.09 states that "the decision to use a particular device at a particular location should be made on the basis of an engineering study or the application of engineering judgment." Therefore, while the **OMUTCD** and this Manual provide standards and policy information, neither manual can be a substitute for engineering judgment.

130-2.2 Scope of Studies

The scope of the study needed to determine what traffic control device to use, and how to use it, in a particular situation will depend on the specifics of the situation. As noted in ***Section 193-9***, the **ITE Manual of Transportation Engineering Studies** is useful in providing guidance on preparing and conducting traffic engineering studies. Additional information about specific types of studies (e.g., Safety Studies, Speed Studies and Ball Banking Studies) is provided in ***Part 12***.

130-2.3 Assistance to Other Jurisdictions

For those jurisdictions without qualified engineering staff available, **OMUTCD Section 1A.09** indicates that they should seek such advice from others, including **ODOT**. Aside from the community service aspect, this sharing of experience and ideas will help encourage uniformity in the design and use of traffic control devices. Hopefully, this Manual will provide some help in supporting these jurisdictions. However, it is inevitable that questions will arise, and **ODOT** will continue to help other jurisdictions as much as possible within the constraints of **ODOT's** personnel and workload limitations. To help in this effort, **OTE** will continue to try to improve our communications systems to help disseminate information.

The Circuit Rider Program sponsored by **Ohio LTAP (Local Transportation Assistance Program)** is designed to provide free on-site training classes on subjects such as work zone traffic control and safety to local governments. **LTAP** also has other resources available to help local agencies, including a quarterly newsletters.

130-3 Design and Roadside Safety Issues

Generally, the **OMUTCD** addresses design and roadside safety issues only as they apply to application of specific traffic control devices. Additional detail information on such issues as clear zone, barriers, supports, impact attenuators and rumble strips are available in the **L&D Manual Volume One**, the **CMS**, and in the **Roadway and Traffic SCDs**.

130-4 Functional Classification

The Functional Classification System is a method of classifying streets and highways based on their general characteristics. This classification system has been used over the years to establish a systematic method of categorizing the range of facilities that make up the overall highway network. Historically, one of the most important and common uses of this tool has been to identify streets and

highways eligible for certain types of funding.

The Functional Classification System groups streets and highways in a hierarchy based on the type of highway service they provide. The manual **Highway Functional Classification - Concepts, Criteria and Procedures**, published by **FHWA**, basically established the current system in 1974. The different functional systems are defined in that manual, and general concepts and characteristics used to identify each are presented, as well as the procedure to follow in designating a system. The **Office of Urban and Corridor Planning** is responsible for administering this system.

In general, highways can be categorized as arterials, collectors or locals. However, depending on whether the route is considered urban or rural, the classifications are also broken down into smaller categories, e.g., rural principal arterial, rural minor arterial, rural major collectors and urban collectors. Additional information on this subject, as well as an inventory of the functional classifications of streets and highways in **Ohio** can be accessed from the **Office of Urban and Corridor Planning** web page. The **Office of Technical Services** is responsible for maintaining maps and road inventories of the system.

130-5 National Highway System (NHS)

The National Highway System (NHS) consists of interconnected urban and rural principal arterials and highways (including toll facilities) which serve major population centers, international border crossings, ports, airports, public transportation facilities, other intermodal transportation facilities and other major travel destinations. NHS routes meet national defense requirements and serve interstate and interregional travel. All routes on the Interstate System are a part of the NHS.

The NHS includes the Strategic Highway Corridor Network (STRAHNET) and its highway connectors to major military installations. The STRAHNET includes highways which are important to the **United States** strategic defense policy and which provide defense access, continuity, and emergency capabilities for the movement of personnel, materials and equipment in both peace time and war time.

The NHS includes all high-priority corridors identified in **Section 1105(c)** of the **ISTEA**. It is not permitted to exceed 286,983 kilometers (178,250 miles). Most of the state highway system is on this national network; however, to identify specific routes on this system, contact the **Office of Technical Services**.

130-6 Access Management

Access is critical to the usefulness of any transportation system. However, the combination of increasing travel demands and an increasing demand for access points (intersections and driveways) along the highways can result in increased congestion and delay, and can contribute to an increase in accidents. By controlling access to our highway system, a better balance can be achieved between these competing demands.

ODOT has developed an Access Management Program, based on the functional classification of roadways ***(Section 130-4)***, administered by the **Office of Urban and Corridor Planning** with input from the **Districts**. The **State Highway Access Management Manual** ***(see Section 194-17)*** was developed to support this program. It is maintained by the **Office of Urban and Corridor Planning** and is available from their web site. The purpose of this program and the manual is to establish uniform permit procedure for use in considering requests for new or revised highway access.

Access management involves many areas of concern, including planning, design, construction, maintenance and traffic operations. Anyone expected to address traffic operations concerns should become familiar with the permit procedures and best practice information contained in the **Access Management Manual**.

140 DESIGN INFORMATION

140-1 General

This section addresses information related to traffic control design in general. Design information related to specific areas of traffic control are located in the individual **TEM** chapters.

140-2 Traffic Control Plan Requirements

140-2.1 General

Submissions of traffic control plans shall conform to the requirements noted herein.

140-2.2 Base Plan Scale

The Base Plan shall consist of two parts:

1. Part A, to a scale of 1"= 200' (1:2000) or 1"= 100' (1:1000) continuous for the entire project, shall show all proposed roadways and connections to existing construction.

2. Part B of the Base Plan shall show supplemental coverage to a minimum scale of 1"= 50' (1:500) for all interchanged crossroads and mainline at-grade intersections, and for other critical at-grade intersections in urban areas.

On some projects, particularly in urban areas, it may be more efficient to show the entire project on one plan at 1"= 50' (1:500) or 1"= 20' (1:200) scale.

Information on traffic signal Base Plans is contained in ***Section 441-2***.

140-2.3 Plan Information

Base Plans shall contain the following design information:

1. Clearly defined pavement edges, speed change lanes, ramps, transitions, raised medians, islands and bridge structures on mainline, ramps and crossroads.

2. Number of lanes on each roadway, shown by directional arrows (one for each lane); and lane widths (plans should show all lane widths).

3. Pavement width at each overhead sign support spanning the roadway at a location not conforming to the typical roadway section.

4. Location of proposed traffic control devices, using the **OMUTCD** as a guide. Plan symbols, levels, weights and colors for CADD drawings shall conform to standards contained in **L&D Manual Volume Three**.

    a. Proposed sign legends at each sign location. All the Regulatory and Warning Signs proposed for the crossroads or at-grade intersections may be shown on Part B.

    b. For Part A show pavement marking at merging, diverging or intersecting roadways. Show painted gore stations for merging and diverging roadways. For Part B, complete pavement marking should be shown.

    c. Indicate "Signalized Intersection," if existing or proposed.

d. Other special devices that may be required.

140-2.4 Miscellaneous Data

Each submission should include:

1. Existing overhead electrical and communication lines, and underground utilities and culverts which might influence proposed traffic control structure locations, as required by **ORC Section 153.64** (any utilities which potentially could conflict with the installation or construction of foundations, driven supports or overhead devices).

2. Available power source service points and poles available.

3. Location of existing traffic control items and ownership in project area (this can be a separate plan and/or listing).

4. Corporation lines.

5. Right-of-way lines.

140-2.5 Supplemental Plan Information

Each submission shall be accompanied by one print of each of the following:

1. Roadway profiles for all roadways within the project showing vertical clearance at grade separations (i.e., copy of line and grade submission, as approved).

2. Typical sections for all roadways within project.

140-2.6 Supplemental Design Information

Each submission shall include a summary or checklist addressing the following items:

1. Signs.

   a. Level of signing proposed, ground mounted or overhead.

   b. Comment or indication on the Base Plan whether signs or other traffic control devices on adjoining projects under construction, or opened to traffic, should be revised to fit traffic pattern change resulting from proposed project.

2. Highway lighting.

   Extent of lighting to be installed for the proposed project, or status of determination; and type of voltages available.

3. Signals.

   a. A review of traffic volumes at each intersection shall be made to determine possible need for traffic signals.

   b. If the geometric design is predicated on signalization (submit statement to this effect) or review of volumes reveal the need, an analysis of traffic signal warrants **(OMUTCD Chapter 4C)** shall be made for the intersection, based on the traffic projected to the

estimated construction completion year.

c. If signals are warranted, a warrant analysis for each intersection shall be submitted along with capacity analysis.

d. Indication of location and reason for any temporary signalization that may be required for traffic control during construction.

e. If any existing traffic signals are affected by the proposed project, furnish complete information on the existing signal to the extent possible, including type of controller, location of poles, type of poles, ownership of poles, signal heads, detectors, etc.

4. Miscellaneous Data

a. Design Year, Design Speed, Legal Speed Limit and Directional Design Hourly Volume for all roadways. At intersections show all through and turning volumes.

b. A list of all design exceptions.

140-2.7 Reuse of Equipment

Any signs and/or overhead sign supports to be reused should be indicated on the plans. Ground-mounted supports may be reused in place, but shall not be removed and reerected. Any decision to reuse existing equipment must be based on a field check of the structural integrity and condition of the devices.

140-3 Designer Notes

As deemed necessary, **Designer Notes** are prepared to help define the intended use of **SCDs** and **Plan Notes**. The information is also addressed in ***Section x41*** (Plan Preparation / Production), where x is the related **TEM** Part number. **Designer Notes** related specifically to the use of the **Plan Notes** are located in this Manual with the individual **Plan Notes** ***(Section 140-4)***.

140-4 Plan Notes

Plan Notes for Maintenance of Traffic concerns and other traffic control items are currently in ***Section x42*** (where x is the Part number) in each Part.

140-5 Plan Detail Sheets

Plan Detail Sheets are similar to **Traffic Plan Insert Sheets**, but are prepared for use in only one specific plan ***(see Section 104)***.

140-6 Estimating

Compilations of previous Contract Bid Item information are available for use. The **Office of Estimating** should be contacted for any additional information needed on estimating.

140-7 Review Submissions

As part of the project development process, the following traffic control design submissions may be required:

1. Assessment of Feasible Alternatives - Step 6 (Major Projects).

a. Maintenance of Traffic Alternative Analysis ***(see Section 630-5)***.

b. Documentation of highway lighting considerations and warrants ***(see Section 1103)***.

2. Preferred Alternative Verification - Step 7 (Major Projects).

a. Queue analysis for lane closures on Interstate and other freeways.

b. Documentation of approval from the Maintenance of Traffic Exceptions Committee, if necessary per **Policy 516-003(P)** ***(see Section 601-2)***.

c. Signal warrants ***(see Section 402)***. This submission, based upon an analysis of traffic counts, traffic projections, pedestrian information, intersection geometrics and physical conditions, speeds, gaps, delay data and accident history is prepared according to the requirements of the **Ohio Manual of Uniform Traffic Control Devices (OMUTCD)**. It is intended to determine locations where traffic signals are justified. New traffic signals, or significant modifications to existing signals, will not be included in contract plans unless acceptably justified.

d. Documentation of Proprietary Bid Justification ***(see Section 1220-3)***.

e. Documentation of alternate bid considerations for signal and lighting equipment ***(see Section 1220-6)***.

f. Computer-Controlled Traffic Signal System Justification ***(see Section 403-5)***.

g. Preliminary Pavement Marking Plan ***(see Section 340-2)***.

3. Preliminary Engineering Study - Step 3 (Major Projects).

a. Maintenance of Traffic Alternatives Analysis – Interstates and Look-alikes Only ***(see Section 630-5)***.

b. Queue analysis for lane closures on Interstate and other freeways.

c. Documentation of approval from the Maintenance of Traffic Exceptions Committee if necessary per **Policy 516-003(P)** ***(see Section 601-2)***.

d. Signal warrants ***(see Section 402)***. This submission, based upon an analysis of traffic counts, traffic projections, pedestrian information, intersection geometrics and physical conditions, speeds, gaps, delay data and accident history is prepared according to the requirements of the **Ohio Manual of Uniform Traffic Control Devices (OMUTCD)**. It is intended to determine locations where traffic signals are justified. New traffic signals, or significant modifications to existing signals, will not be included in contract plans unless acceptably justified.

e. Documentation of Proprietary Bid Justification ***(see Section 1220-3)***.

f. Documentation of alternate bid considerations for signal and lighting equipment ***(see Section 1220-6)***.

g. Computer-Controlled Traffic Signal System Justification ***(see Section 403-5)***.

h. Priority control documentation ***(see Section 403-6)***.

i. Documentation of lighting considerations and lighting warrants ***(see Section 1103)***.

4. Stage 1 Detailed Design - Step 8 (Major Projects) / Step 4 (Minor Projects).

   a. Conceptual Maintenance of Traffic ***(see Section 640-6)***.

   b. Preliminary Pavement Marking Plan ***(see Section 340-2)***.

5. Stage 2 Detailed Design - Step 9 (Major Projects) / Step 5 (Minor Projects).

   This submission is intended to present a complete concept of how traffic control devices (signing, signals, markings, highway lighting and maintenance of traffic) will control traffic in relation to the roadway geometric design, physical conditions, traffic characteristics and the surrounding environment. These submissions portray the type, approximate locations, size, color, shape, legend and operational characteristics of the proposed traffic control devices. These concepts, applications and preliminary designs shall be in accord with the **OMUTCD**. They should also conform to the criteria and recommendations of the **ODOT Construction and Material Specifications**, **Standard Construction Drawings (SCDs)**, and **Traffic Engineering Manual (TEM)**, as well as other current publications dealing with the proper use of traffic control devices.

   a. Maintenance of Traffic sequence of operations and local alternated detour notes.

   b. Maintenance of Traffic Phasing Plans including:

      i. Location of proposed work, by phase.

      ii. Existing and maintenance of traffic signing and pavement marking.

      iii. Median crossovers.

      iv. Channelizing devices (e.g., barriers, drums).

      v. Work zone lane widths.

      vi. Pavement for maintaining traffic.

      vii. Sections showing existing and proposed pavement and lane widths.

      viii. Attenuator.

   c. Detour map.

   d. Pavement Marking and Signing Plan Sheets ***(see Sections 240-8, 340-2 and 341-2)***.

   e. Signal Plan sheets ***(see Section 440-7)***.

   f. Lighting Plan sheets ***(see Section 1141)***.

6. Stage 3 Detailed Design - Step 11 (Major Projects) / Step 7 (Minor Projects) / Step 2 (Minimal Projects).

   These are a complete set of construction plans, submitted as ready for **Contract Sales *(see Sections 240-8, 340-2, 440-7 and 1141)***. They contain, or properly refer to, all information and details necessary to furnish, erect and complete the required traffic control devices. They include notes, details, calculations, specifications, quantities and information on payment and other contractual obligations.

7. Scop, Schedule and Budget - Step 1 (Minimal Projects).

   a. Queue analysis for lane closures on Interstates and other freeways.

   b. Documentation of approval from the Maintenance of Traffic Exceptions Committee if necessary per **Policy 516-003(P)** ***(see Section 601-2)***.

150 CONSTRUCTION

150-1 General

The **CMS**, together with the plans and Proposal, constitute the contract for the performance of required work. It is the legal and technical document by which **ODOT** bids and constructs highway projects. Traffic control provisions in these documents are required to be in conformance with the **OMUTCD**.

Temporary traffic control issues are addressed in **Part 6** of this Manual. Other construction issues that are related to specific areas of traffic engineering are addressed in the applicable **TEM** chapters.

Although the related information provided in individual **TEM** chapters is intended to serve as a guide for construction personnel where the contractor furnishes and installs traffic control devices, it may also be useful for maintenance personnel performing the same functions. Typically, inspection procedures for the various types of traffic control devices are outlined to assist project personnel in performing their duties. The information points out the various important features of each device and references the applicable specification or standard drawing. Illustrations are often used for easy recognition of the devices or feature being discussed.

150-2 Pre-Construction Conference

During the Pre-Construction Conference held for the project the following items relative to traffic control devices may be reviewed:

1. Inspection of signs, supports and traffic control devices.
2. Traffic control devices for maintaining traffic.
3. Certifications of sign and signal supports.
4. Approval requirements for catalog cuts of traffic control devices.
5. Delivery schedule of traffic control devices.
6. Storage and special care for traffic control devices.
7. Plan for maintenance of traffic.
8. Staking of foundations for sign and signal supports and pull boxes.
9. Location of overhead utilities and underground facilities.
10. Coordination required with utilities for necessary relocations and attachments to their facilities.
11. Sequence of construction for traffic control devices.
12. Coordination required with local agencies for erection of new devices and removal or relocation of existing devices.
13. Work by other contractors and agencies.
14. Layout procedure for pavement markings.
15. Visibility inspection of traffic control devices.

16. Partial and final acceptance and opening to the motoring public.

160 MAINTENANCE / OPERATIONS

As needed, specific operational issues will be addressed in the related **TEM** Parts. In general, it is the intended that, when included, these issues will be addressed in sections numbered in the x60s, where x is the **TEM** Part number.

Although the construction information provided in the individual chapters (in sections numbered in the x50s, where x is the **TEM** Part number) is intended to serve as a guide for construction personnel where the contractor furnishes and installs traffic control devices, it may also be useful for maintenance personnel performing the same functions. Typically, inspection procedures for the various types of traffic control devices are outlined to assist project personnel in performing their duties. The information points out the various important features of each device and references the applicable specification or standard drawing. Illustrations are often used for easy recognition of the devices or feature being discussed.

ODOT personnel performing work involving signing, traffic signals, lighting, markings and/or maintenance of traffic are required to comply with the requirements of the **OMUTCD**. Other requirements, such as **ODOT** policies, standards, procedures, etc. that are related to specific areas of traffic engineering will be addressed in the applicable **TEM** Parts.

The **CMS** and the **SCDs** should be used by **ODOT** operational forces as directed by this Manual and at other times when considered appropriate. They provide a wealth of information on construction requirements, materials and details that should prove helpful in the performance of maintenance, upgrading, removal and inspection of traffic control devices. However, it should be recognized that the information in the **CMS** and the **SCDs** is designed for contract work and does not necessarily provide the only acceptable method or materials to achieve a given objective.

ODOT has established statewide practices and procedures to provide acceptable operating conditions for preventive maintenance. **Policy 22-007(P), Preventive Maintenance Policy** addresses many activities, including raised pavement markers, electrical traffic control devices, signing and highway lighting ***(see Section 1312)***.

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170 OTHER CONSIDERATIONS

Depending on the specifics of a particular location, various special considerations, such as pedestrians, bicycles, motorcycles, public transit vehicles, commercial vehicles, airports and waterways, may have to be addressed in developing traffic control standards. As needed, we will incorporate information on these concerns within the individual Parts of this Manual.

180 RESEARCH

This area in each **TEM** Part has been reserved to document pertinent research information. Information will also be incorporated herein as to the procedures for requesting research related to traffic engineering concerns.

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193 NATIONAL REFERENCE RESOURCES

193-1 General

This section provides a brief description of related national publications, and how they apply to **ODOT** projects and work. A copy of many of these publications can be found in **OTE** and the **ODOT Library**. Copies of these publications can be ordered by contacting the agency or organization publishing the document. For documents published by **FHWA**, contact the **Government Printing Office (GPO)**. See ***Table 197-3*** for contact information for the **GPO** and other resource agencies and organizations.

The following publications have been listed generally in alphabetical order; however, for convenience later additions to the list may be added to the end of the group, rather than renumbering all other entries.

193-2 AASHTO Design Guide (A Policy on Geometric Design of Highways and Streets)

A Policy on Geometric Design of Highways and Streets, published by the **American Association of State Highway and Transportation Officials (AASHTO)** and commonly known as the **AASHTO Design Guide** or the "Green Book," discusses the nationwide policies, practices and criteria for the geometric design of highways and streets. It is intended to present a consensus view on the most widely accepted approach to the design of a variety of geometric design elements including design speed, horizontal and vertical alignment, cross section widths, intersections and interchanges.

The geometric design treatments addressed in the **ODOT L&D Manuals** are based, at least in part, on the **AASTHO Design Guide**.

193-3 ADA Accessibility Guidelines for Buildings and Facilities

The **ADA Accessibility Guidelines for Building and Facilities**, published by the **U.S. Architectural and Transportation Barrier Compliance Board**, presents the nationwide accessibility criteria to buildings and facilities for individuals with disabilities. The basic objective of this document is to establish the criteria mandated by the **Americans with Disabilities Act (ADA) of 1990**. It provides accessibility criteria for both interior and exterior facilities, including parking spaces, sidewalks, hallways, doorways, curb ramps, ramps, stairs, telephones, drinking fountains, rest rooms, elevators, etc.

The **Code of Federal Regulations (CFR) 49 Transportation** contains the most current version of **ADA Accessibility Guidelines**.

193-4 An Informational Guide for Roadway Lighting

An Informational Guide for Roadway Lighting, published by **AASHTO**, presents guidance on warrants and criteria for highway lighting along streets, in rest areas and for signs. It provides information on the illuminance techniques that may be used in the design of roadway lighting, warrants for freeway and interchange lighting, and design criteria for freeway facilities, non-freeway facilities, pedestrian and bicycle facilities, underpasses, tunnels, rest areas and signing.

The **TEM** addresses highway lighting in ***Part 11.*** The highway lighting criteria in that chapter are based on this **AASHTO** publication and other documents, and tailored to the prevailing practices and conditions in **Ohio**. Also, the **TEM** is intended to clarify, where needed, the issues presented in this **AASHTO** publication and to discuss lighting information not included in it.

193-5 Guide for the Development of Bicycle Facilities

The **AASHTO Guide for the Development of Bicycle Facilities** is designed to provide information on the development of facilities to enhance and encourage safe bicycle travel. The majority of bicycling will take place on ordinary roads with no dedicated space for bicyclists. Bicyclists can be expected to ride on almost all roadways, as well as separated shared-use paths, and even sidewalks, where permitted to meet special conditions. This guide provides information to help accommodate bicycle traffic in most riding environments. It is not intended to set forth strict standards, but, rather, to present sound guidelines that will be valuable in attaining good design sensitive to the needs of both bicyclists and other highway users.

Both metric and English units are included.

193-6 Guidelines For The Use of Portable Changeable Message Signs

The **ATSSA** publication entitled **Guidelines For The Use of Portable Changeable Message Signs** is recommended as guidance for use in determining how to make use of portable changeable message signs (PCMSs) to inform road users of traffic conditions due to construction activity.

193-7 Highway Capacity Manual (HCM)

The **Highway Capacity Manual (HCM)**, published by the **Transportation Research Board (TRB)**, presents the nationwide criteria for capacity analyses for highway projects. The **HCM** includes methodologies for freeways, weaving areas, freeway/ramp junctions, two-way two-lane facilities, signalized intersections, non-signalized intersections, etc. The basic objective of the capacity methodologies in the **HCM** is to aid in determining the necessary configuration and dimensions of a specific highway element to accommodate the projected traffic volumes at a given level of service. An **HCM** software program is available.

ODOT uses the **HCM** for capacity analyses with some adjustments for local factors. Contact the **Office of Technical Services** for further information.

193-8 Manual of Traffic Signal Design

The **Manual of Traffic Signal Design**, published by the **Institute of Transportation Engineers (ITE)**, presents fundamental concepts and standard practices related to traffic signal design commensurate with the state of the art. It contains information on operational requirements, signal display and design configuration, traffic signal controllers, detectors, wiring, cabling, signal timing, etc.

This manual may be used by designers for additional guidance on design elements not addressed in the **TEM**.

193-9 Manual of Transportation Engineering Studies

The **Manual of Transportation Engineering Studies**, published by **ITE**, provides guidance on how to prepare, conduct and analyze different types of traffic studies including spot speed studies, traffic impact studies, parking studies, pedestrian studies, speed studies, etc. This **ITE** manual also provides guidance on statistical analyses and presentation of data for reports, meetings and hearings.

Sections 130-2, 1212-3 and 1213-3 of the **TEM** address engineering studies. For additional guidance on the actual procedures for conducting these studies, the designer may reference the **ITE** manual.

193-10 Manual on Uniform Traffic Control Devices (MUTCD)

193-10.1 General

As noted in ***Section 100-1.2***, the **Manual on Uniform Traffic Control Devices (MUTCD)**, published by **FHWA**, in coordination with the **National Committee on Uniform Traffic Control Devices (NCUTCD)**, presents nationwide criteria for the selection, design and placement of signs, pavement markings, traffic signals, maintenance of traffic in work zones, traffic control devices in school areas, traffic control devices for highway-rail grade crossings, and traffic control devices for bicycle facilities. The basic objective of the **MUTCD** is to establish effective means to convey traffic control information to the driver for uniform nationwide application.

ORC Section 4511.09 requires **ODOT** to adopt a manual which conforms as much as possible with this national **MUTCD**. The **OMUTCD** is that manual (***see Section 101***). In **Ohio**, the **MUTCD** is basically a resource manual which supports the **OMUTCD**.

193-10.2 MUTCD Review Process

Proposed changes to the national standards in the **MUTCD** are published by **FHWA** using the **Federal Register Docket** system. The **OTE Standards Section** is responsible for coordinating **ODOT's** review of these proposals. Comments are solicited from the **Districts** and related offices in **Central Office** and others outside **ODOT**, as appropriate. A response is prepared by the **Standards Section**.

Proposed changes to the national standards are also reviewed by the **National Committee on Uniform Traffic Control Devices (NCUTCD)**. As a member of this committee, **AASHTO** periodically circulates **Ballots** to its member agencies, including **ODOT**, to solicit comments on proposed changes that have been posted in the **Docket**, as well as other proposed changes its technical subcommittees may be reviewing. As with the **Docket** proposals, the **OTE Standards Section** is responsible for coordinating **ODOT's** review and preparing the response to the **AASHTO Ballots**.

193-11 Railroad-Highway Grade Crossing Handbook

The **Railroad-Highway Grade Crossing Handbook**, published by **FHWA**, presents guidelines for prioritizing improvements to highway-rail grade crossings and information on the various types of improvements that can be made to the crossing. This handbook provides formulas which can be used to determine the risk at the crossing, to identify locations in need of improvement and to prioritize hazardous locations which are scattered throughout the **State**. Also, various types of at-grade crossing improvements are described including:

1. Closing the crossing,
2. Grade separation,
3. Active warning devices,
4. Passive warning devices,
5. Sight distance improvements,
6. Operational improvements, and
7. Crossing surface improvements.

In addition, the handbook provides guidelines to determine which crossing improvement is the most cost effective for the site.

193-12 Roadside Design Guide (RDG)

The **Roadside Design Guide (RDG)**, published by **AASHTO**, presents the nationwide policies, practices and criteria for roadside safety along highways and streets. It is intended to present a consensus view on the most widely accepted approach to providing a reasonably safe roadside for run-off-the-road vehicles. The **Roadside Design Guide** discusses clear zones, sign and luminaire supports, drainage appurtenances, roadside barriers, median barriers, bridge rails, crash cushions and roadside safety within temporary traffic control zones. The overall objective of the **Roadside Design Guide** is to recommend an appropriate roadside safety treatment for specific sites considering the consequences of run-off-the-road accidents, specific roadway features (e.g., traffic volumes, design speed, roadside topography) and construction/maintenance costs.

The **OMUTCD**, the **TEM** and the **L&D Manuals** address roadside safety issues. The roadside safety criteria are generally based on the criteria presented in the **Roadside Design Guide**.

193-13 Roadway Lighting Handbook

The **Roadway Lighting Handbook**, published by **FHWA**, presents guidance in the planning, design, operation and maintenance of roadway lighting systems. It is intended to present a consensus view on the most widely accepted approach to providing a reasonable roadway lighting system. The **Roadway Lighting Handbook** discusses warrants for roadway lighting, selecting lighting equipment, selecting lighting system configurations, designing the lighting system using both the illuminance techniques, designing the lighting hardware, operating and maintaining the lighting system and analyzing its economics.

The **TEM** addresses highway lighting in ***Part 11.*** The lighting criteria in it are based on the criteria presented in the **Roadway Lighting Handbook** and other documents. They are tailored to meet the prevailing practices and conditions in **Ohio**.

193-14 Standard Alphabets for Highway Signs and Pavement Markings

The **Standard Alphabets For Highway Signs and Pavement Markings**, published by **FHWA**, presents criteria for determining the width, height, spacing and stroke widths for letters and numerals for use on highway signs and pavement markings. It is to be used in conjunction with the **MUTCD**. The letters and numerals are shown on grids to allow the designer to easily enlarge or decrease the letter sizes while still presenting them in proper proportion. Values for signs are provided for letter Series B, C, D, E, E(M) and F. In addition to the alphabet and numerals, the Standard Alphabets provides guidelines for pavement marking symbols including turn arrows, freeway/ramp arrows, preferential lane symbols, railroad crossing symbols and bicycle symbols.

ODOT has adopted the **FHWA Standard Alphabets for Highway Signs and Pavement Markings** for all of its signs and pavement markings. ***Parts 2 and 3*** of the **TEM** and the **SCDs** provide additional guidance on the application of letters and numerals on the highway signs and pavement markings.

193-15 Standard Highway Signs (SHS)

The **Standard Highway Signs (SHS)** manual, published by **FHWA**, presents criteria for presenting and laying out information on highway signs. It is to be used in conjunction with the **MUTCD** and the **Standard Alphabets of Highway Signs and Pavement Markings**. Dimensions are provided for the borders, symbols, words and overall sign outline based on the sign size. Symbols which are used on signs are provided on grids to allow the designer to change the symbol size and yet present it in proper proportion.

In **Ohio**, the **Standard Highway Signs** manual is currently used as a reference resource for the design and layout of all signs. Designs shown in the **Sign Design Manual (SDM)** ***(see Section 295-2)*** include some which are basically duplicates of the ones in the **Standard Highway Signs** manual and others developed by **ODOT**.

193-16 Traffic Control Devices Handbook (TCDH)

The **Traffic Control Devices Handbook (TCDH)**, published by **ITE**, is primarily intended to supplement the **MUTCD** by providing guidelines for implementing the standards and applications contained in the **MUTCD**. It does not attempt to detail basic engineering and design techniques. For these, the reader is referred to standard textbooks.

The handbook provides information related to the fundamental concepts of traffic regulation and control, traffic control devices, current application practices, and promising traffic engineering techniques of the future. The materials used to develop this handbook reflect the experience of State, county and city agencies. The handbook summarizes future directions and developments as reported in recent research and by industry's technical representative. Although intended for use by various levels of design, traffic and maintenance engineering personnel, the handbook may also prove valuable to consulting engineers, educators, students and others.

193-17 Traffic Engineering Handbook

The **Traffic Engineering Handbook**, published by **ITE**, provides guidance on traffic engineering practices, including driver, pedestrian and vehicular characteristics, traffic studies, accident analyses, highway safety, highway capacity, geometric design, parking, signs, pavement marking, traffic signals, highway lighting, freeway surveillance and control, intelligent vehicle-highway systems, traffic regulations, traffic management, public relations, administration and legal liabilities. In general, the handbook summarizes the major highway and traffic engineering elements found in other references used by the designer.

This handbook may be used by the designer for additional guidance on design elements not addressed in the **TEM**.

193-18 Trip Generation

Trip Generation, published by **ITE**, provides guidance for various types of traffic generators. It contains data from nearly 3000 studies and provides information on multi-use projects and pass-by trips. It includes trip generation data for commercial development, office development, residential, etc.

Unless local data is available or where a developer can substantiate its basis, **ODOT** requires that all traffic impact analyses use the **ITE Trip Generation** data.

193-19 Tunnel Lighting ANSI Approved (RP-22-96)

The information in the **Illuminating Engineering Society's** Recommended Practice **Tunnel Lighting (RP-22-96)** assists engineers and designers in determining lighting needs, recommending solutions, and evaluating resulting visibility at tunnel approaches and interiors. The designer's task is not simple, particularly for a new tunnel, when only partial information about the portal and about the approach roads is available. Important variables include geographic orientation, geometric design, traffic volume and speed, service levels, light source used and modes of light application. The design criteria and procedures included in this Recommended Practice (RP) are based on theory and on information drawn from practical experience and engineering judgment.

193-20 American National Standard Practice for Roadway Lighting (RP-8--00)

This Recommended Practice (RP) for **Roadway Lighting (RP-8-00)** provides the design basis for lighting roadways, adjacent bikeways and pedestrian ways. It deals entirely with lighting and does not give advice on construction. It is not intended to be applied to existing lighting systems until such systems are redesigned. Roadway lighting is intended to produce quick, accurate and comfortable seeing at night that will safeguard, facilitate, and encourage vehicular and pedestrian traffic. The proper use of roadway lighting is also associated here with certain economic and social benefits including a reduction in nighttime accidents, aid to the police, facilitation of traffic flow, and the promotion of business during nighttime hours. Following an introduction that covers background material on the design criteria, there are three general subject areas discussed in this RP: classification definitions that carefully define key words/concepts as they are used in the RP, with caveats regarding alternate definitions found elsewhere; design criteria that thoroughly analyzes and illustrates the design process involving illuminance, luminance and small target visibility (STV); and design considerations that identify major roadway issues (rural and urban) affecting driver visibility, discuss design aesthetics (coordination of light poles with landscaping), and address public scrutiny of glare and sky glow that can lead to lighting ordinances.

194 ODOT REFERENCE RESOURCES

194-1 General

ODOT traffic engineering information and publications have been addressed in ***Sections 101 through 106 and 195***. **ODOT** also has various other publications which may provided needed or useful information for traffic engineering projects/studies. This section briefly discusses these **ODOT** publications maintained by Offices other than **OTE**.

ODOT's design-related publications are also listed on the **Design Reference Resource Center (DRRC)** web site available from the **ODOT** home page. When posted electronically, the references are also available by hyperlink from the **DRRC** web site ***(see Table 197-3)***.

These publications can be ordered through the responsible Office or the **Office of Contracts**. ***Table 197-10*** provides pricing and ordering information for the publications available from the **Office of Contracts** at the time of this publication. This information is also available from the **DRRC** web site ***(see Table 197-3)***. Since the pricing information is subject to change without notice, individuals purchasing publications, may want to contact the **Office of Contracts** by phone first to confirm the prices, using one of the numbers provided in ***Table 197-10*** or on the **DRRC** web site.

The following publications have been listed generally in alphabetical order; however, for convenience later additions to the list may be added to the end of the group, rather than renumbering all other entries.

194-2 9 Step Transportation Development Process

The **9 Step Transportation Development Process** is an interdisciplinary, systematic and reproducible process developed by the **Office of Environmental Services (OES)** to comply with the **National Environmental Policy Act (NEPA)** of 1969. **ODOT's** 9 step transportation development process breaks down the process into identifiable parts that follow a logical sequence:

1. Planning and Programming.
2. Purpose and Need.
3. Environmental Scoping.
4. Selection of Corridors.
5. Development of Feasible Alternatives.
6. Identification of the Preferred Alternative.
7. Approval of Environmental Document.
8. Issuance of FONSI/ROD.
9. Final Design and Construction.

194-3 Bridge Design Manual

The **Office of Structural Engineering** publishes the **Bridge Design Manual**. The purpose of this manual, and its addendum, is to provide general guidelines, procedures and instructions, for the design and preparation of bridge plans and specifications for **ODOT**. The manual includes information

on preliminary and detail design, structure rehabilitation and repair, general and detail **Plan Notes**, temporary structures, noise barriers and bridge structure ratings.

194-4 Construction and Materials Specifications

The specifications used in **ODOT** contract plans are contained in the **CMS** and **Supplemental Specifications** published on the web site and discussed earlier in ***Section 105***.

194-5 Consultant Contract Administration Manual

The **Consultant Contract Administration Manual** is intended to provide uniform guidelines for **ODOT** employees to follow in administering contractual agreements between **ODOT** and consultants who are hired to provide technical services. These services include, but are not limited to environmental studies, design and plan preparation, construction inspection, bridge inspection and right-of-way acquisition.

194-6 L&D Manual Volume One - Roadway Design

The purpose of **L&D Manual Volume One**, published by the **Office of Roadway Engineering Services**, is to consolidate and document **ODOT** design policies, standards, guidelines and practices. Criteria included in the manual closely conform to the **AASHTO** publications **A Policy on Geometric Design of Highway and Streets**, **A Policy on Design Standards** and **Roadside Design Guide**.

This manual is intended to establish uniform procedures for implementing design decisions, assure quality and continuity in design of state highways, and assure compliance with Federal criteria. The manual is considered a primary source of reference by **ODOT** roadway design personnel; however, as noted in the Preface of the manual "it must be recognized that the practices suggested in it may be inappropriate for some projects because of fiscal limitations or other reasons." Also, design standards adopted by city, county or other local agencies must by taken into considerations on projects under their jurisdiction.

194-7 L&D Manual Volume Two - Drainage Design

The purpose of **L&D Manual Volume Two - Drainage Design**, published by the **Office of Structural Engineering**, is to provide guidance for the hydraulic design of highway drainage features. As noted in the Preface of the manual, adhering to the recommended design procedures and controls outlined in the manual should result in drainage facilities that will not cause: "a) damaging flooding of private property; b) undue inconvenience to the motorist during moderate to heavy rainfall; [or] c) undue disturbance to the environment."

This manual is intended to establish uniform procedures for implementing drainage design decisions, assure quality and continuity in design of state highways, and assure compliance with Federal criteria. The manual is considered a primary source of reference by **ODOT** roadway design personnel; however, as noted in the Preface of the manual "it must be recognized that the practices suggested in it may be inappropriate for some projects because of fiscal limitations or other reasons." Also, design standards adopted by city, county or other local agencies must by taken into considerations on projects under their jurisdiction.

194-8 L&D Manual Volume Three - Highway Plans

The purpose of **L&D Manual Volume Three - Highway Plans**, published by the **Office of Production**, is to standardize the form and process for **ODOT** highway plan preparation. However, it is also recognized that many projects will involve unusual circumstances requiring deviations from the manual guidelines.

194-9 Manual of Procedures for Construction Inspection

The manual addresses procedures in various areas of construction, e.g., concrete, earthwork, flexible pavement, rigid pavement, structures and pipe. It is intended to serve as a guide to the Engineer and Inspector during construction. Personnel need to have a thorough knowledge of the plans, specifications, proposal notes, and standard drawings. The manuals do not in any manner alter or replace these governing regulations, but are a supplement to them. The normal sequence of inspection procedures are outlined to assist project personnel in performing their duties.

194-10 Pavement Design & Rehabilitation Manual

The purpose of the **Pavement Design & Rehabilitation Manual** is to bring all pavement design and rehabilitation procedures together in one document, reduce the selection of design variables to those most appropriate for **Ohio**, to document **Ohio's** interpretation of various policies and to include design criteria which may be unique to **Ohio**.

Information had been taken from and based on the results of the **AASHTO** Road Test, the **AASHTO Guide for Design of Pavement Structures**, **FHWA** guidelines and technical advisories, various training course manuals, as well as the experience of the authors. In addition, the application of other studies, experiences and engineering judgment have been included to fit **Ohio's** conditions.

The pavement engineering concepts described are intended for use with all new or reconstruction projects, major and minor maintenance projects, and with all preventative maintenance projects, which are under the jurisdiction of **ODOT**.

194-11 Specification for Consulting Engineers

The **ORC** authorizes the **Director of Transportation** to "employ consulting engineers and with the consent of the controlling board may enter into contracts for consulting engineering services..." The **Specifications for Consulting Engineers** is written from the standpoint of a contractural relationship between **ODOT** and a consultant. It includes definitions, general conditions, auditing and bidding aspects of all agreements, the consultant selection process, the agreement modification process, requirements for price proposals and explains preparation of consultant cost data for supporting documentation. The specifications are included by reference in each agreement, thereby substantially reducing the agreement text ***(also see Consultant Contract Administration Manual, Section 194-5)***.

194-12 Specification for Subsurface Investigations

The purpose of the **Specifications for Subsurface Investigations** is to prescribe the policies, procedures and guidelines governing the performance of subsurface investigations of soil and rock related to highway design and construction for the **State of Ohio**.

The specifications define the scope of the various investigations, the engineering services to be rendered, and the responsibility for the direction and performance of the work. Guidelines are given for types of equipment utilized, methods of drilling and sampling, test procedures, presentation of field and laboratory information, and development of findings and recommendations.

194-13 Standard Bridge Drawings

Bridge standard drawings are published by the **Office of Structural Engineering**. They consist of **SCDs**, **Plan Insert Sheets** and **Design Data Sheets**. They include details for bridge railings abutments, vandal protection, fence and approach slabs, etc. and are available in English and in metric units.

194-14 Standard Roadway Construction Drawings

Roadway Standard Construction Drawings (Roadway SCDs) are published by the **Office of Roadway Engineering Services**. These drawings cover two specific areas: Roadway Design Features and Roadside Development. On the **Office of Contract's** list, these drawing are currently referenced as "Standard Construction Drawings."

194-15 Standard Pavement Construction Drawings

Pavement Standard Construction Drawings (Pavement SCDs) are maintained by the **Office of Pavement Engineering**. These drawings cover Pavement Design Features (BP Series). The drawings are available in dual units.

194-16 Standard Hydraulic Construction Drawings

Hydraulic Standard Construction Drawings (Hydraulic SCDs) are maintained by the **Office of Structural Engineering**. These drawings cover Drainage Design Features. The drawings are available in dual units.

194-17 State Highway Access Management Manual

The purpose of the **State Highway Access Management Manual**, maintained by the **Office of Urban and Corridor Planning**, is to establish statewide uniform, equitable standards and procedures, prolong the service life of the state highway system, reduce public maintenance costs, promote orderly development, and maintain accessibility to adjacent land uses, and to accomplish all of this while preserving traffic mobility. The manual establishes access classes, uniform permit application procedures, variance and appeal procedures, and change of use conditions. It provides for monitoring access construction. The manual also encourages local jurisdictions to develop access control plans consistent with **ODOT** and/or local access policies. See ***Section 130-6*** for additional information.

194-18 Straight Line Mile Diagrams (SLDs)

A **Straight Line Diagram (SLD)** is a two dimensional graphic representation of the physical roadway characteristics of a highway as if it had no turns or curves. Mileage is based on the centerline of the roadway as measured from the western or southern county line or other true beginning. All routes on the **Interstate, U. S. and State Route Systems** are shown on these diagrams.

194-19 Supplemental Specifications

As noted in ***Section 105-1***, **Supplemental Specifications** are part of **ODOT's** construction and materials specifications. They are individual numbered documents prepared in loose-leaf form describing the construction and material specifications for new items.

194-20 Supplements

As noted in ***Section 105-1***, **Supplements** are part of **ODOT's** construction and materials specifications. They provide necessary information such as laboratory methods of test, and certification or pre-qualification procedures for materials.

195 OTHER OTE PUBLICATIONS

195-1 General

Table 197-9 provides a consolidated list of all **OTE** publications. This section and ***Section 106*** provide brief descriptions of **OTE** publication not discussed in detail in the earlier sections of this chapter.

This section is intended to address **OTE** publications other than the technical traffic engineering material discussed earlier. From time to time various publications have, and will be, developed by this office. However, at this time, the wallchart described in ***Section 195-2*** is the only publication in this category.

195-2 Ohio Uniform Traffic Control Signs Wallchart

The **Ohio Uniform Traffic Control Signs Wallchart** (typically referred to as the **Signs Wallchart** or poster), although not a standard, provides a visual sampling of traffic signs. At this time it is provided free as a service. It has proved to be popular tool for teaching children in school and for drivers' training classes.

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196 FORMS INDEX

196-1 Change of Address Form

Form 196-1 should be used to advise the **OTE Standards Section** of any changes of address/ contact information.

196-2 Revision Proposal Form

Form 196-2 should be used to submit requests/suggestions for revisions to **OTE** publications. When submitting a proposed change of text, it is helpful to include a marked-up copy of the existing text. See ***Sections 101-5, 102-5, 103-5 and 104-4*** for further details.

196-3 Publications Order Form

Form 196-3 may be used by a local jurisdiction or public agency to order **OTE** publications.

196-4 Address Verification Form for OTE Publications

Form 196-4 is a sample Address Verification Form included with those **OTE** publications for which a mailing/distribution list is currently maintained. This form serves to verify receipt of the publication, and when returned to the **OTE Standards Section**, is then used to update the mailing/distribution list used to distribute notices and revisions of the publications.

Intentionally blank.

Form 196-1. Change of Address Form

In order for us to properly maintain our mailing list database for distribution of future notices/revisions, please notify the Standards Section of the Office of Traffic Engineering of any changes in your address. To avoid duplications, if you have been receiving copies of revisions, please attach a copy of the last mailing label, or print your name and address as it appears on the current mailing label, unless that is incorrect.

PUBLICATION(S):_____

_____

Old Address —

Name: _____

Organization: _____

Street Address: _____

City: _____ **State:** _____ **Zip Code:** _____

Phone: _____ **Fax** _____

E-mail: _____

New Address – (show changes only)

Organization: _____

Street Address: _____

City: _____ **State:** _____ **Zip Code:** _____

Phone: _____ **Fax** _____

E-mail: _____

Please return the completed form by fax to (614) 644-8199, or by mail to:

Ohio Department of Transportation
Office of Traffic Engineering - Standards, Operations and Safety Section
Attention: Publications Distribution Coordinator
1980 West Broad Street
P.O. Box 899
Columbus, Ohio 43216-0899

Form 196-2. Revision Proposal Form

Name: _____ **Date:** _____

Organization: _____

Street Address: _____

City: _____ **State:** _____ **Zip Code:** _____

Phone: _____ **Fax:** _____

E-mail: _____

Publication: _____

Section No./Title/Pg. Nos.: _____

Description and Justification for Proposed Revision:_____

_____

_____

_____

_____

Continue on additional page(s) as necessary. Attach drawings, schematics, tables or other information as needed for clarification and/or support of your proposed revision.

Check here ☐ **If additional items are attached.**

List Other Sections of this Manual or Other ODOT Manuals and/or Drawings that will be affected by the proposed revision:

_____

_____

Please return the completed form by fax to (614) 644-8199, or by mail to:

Ohio Department of Transportation
Administrator, Office of Traffic Engineering
Attention: Traffic Standards Section
1980 West Broad Street
P.O. Box 899
Columbus, Ohio 43216-0899

Form 196-3. OTE Publication Order Form

Date _____

OTE PUBLICATION ORDER FORM
FOR
LOCAL JURISDICTIONS AND PUBLIC AGENCIES

Publication (free except as noted)	**Quantity**
Ohio Manual of Uniform Traffic Control Devices	_____
Temporary Traffic Control Manual (cost: $10.00) **(Reprint of OMUTCD Parts 1, 5 and 7, orange cover)**	_____
Traffic Engineering Manual (TEM) (cost: $50.00) **(not including the SDM)**	_____
Standard Sign Design Manual (SDM) (TEM Section 295-2)	_____
Ohio Uniform Traffic Control Signs Wallchart	_____

Name _____

Title _____

Organization _____

***Address** _____

City _____ **State** _____ **Zip Code** _____

Telephone _____

*** If available, please provide street address, not a P.O. Box. Whenever possible we use UPS to ship our publications.**

For questions about traffic standards you may contact Juanita Elliott, P.E., Traffic Standards Engineer, at 614-644-8143; to order the free manuals, you may contact Gerri Parker directly at 614-466-4700; and those manuals for which there is a charge may be ordered directly from the Office of Contracts at 1-800-459-3778.

Please return the completed form by fax to (614) 644-8199, or by mail to:

Ohio Department of Transportation
Office of Traffic Engineering - Standards, Operations and Safety Section
Attention: Publications Distribution Coordinator
1980 W. Broad Street
P.O. Box 899
Columbus, OH 43216-0899

Form 196-4. Address Verification Form for OTE Publications

OTE Publications

ADDRESS VERIFICATION FORM

Please return this form to verify receipt of this manual and to assure that the correct information is added to our mailing list so that you will receive future revisions of this publication.

Also, please advise this office of any future changes in address.

Name of the Manual: _____

_____

Name: _____

Title: _____

Organization: _____

Address: _____

City: _____ **State:** _____ **Zip Code:** _____

Telephone No.: _____ **Fax:** _____

E-mail: _____

We use UPS to ship our publications whenever possible. If available, please provide a street address instead of a P.O. Box.

Please return the completed form to:

Ohio Department of Transportation
Office of Traffic Engineering, Standards, Operations and Safety Section
Attention: Publications Distribution Coordinator
1980 W. Broad Street
P.O. Box 899
Columbus, OH 43216-0899

197 TABLES INDEX

197-1 Publication Distribution Coordinators

As part of the **ODOT** internal publication distribution process, individuals have been identified in each **District** to help in coordination of distribution of **OTE** publications. ***Table 197-1*** is the list of contacts for distribution within **ODOT** for **OTE** publications ***(see Sections 101-4, 102-4 and 103-4)***.

197-2 OTE Organization and Key Contacts

As noted in ***Section 100-4***, an **OTE** contacts list is provided to facilitate contacting persons within the **Office of Traffic Engineering**. This is not a list of all **OTE** personnel, just those designated as contacts for certain subjects. A full, current list of **OTE** personnel is available on the **OTE** web site.

197-3 Resource Reference/Contact Information

As noted in ***Section 100-6***, ***Table 197-3*** provides contact information for various agencies and organizations (including **ODOT**), and other resource references that may be useful.

197-4 Ohio Counties and ODOT Districts

As noted in ***Section 100-5***, ***Table 197-4*** lists the eighty-eight counties in **Ohio** with the three-letter designation used in **ODOT** records, and cross-referencing the related **Districts**.

197-5 SCD CADD Standards - Text Weight, Size and Font

As noted in ***Section 103-3.4***, ***Table 197-5*** presents information on the text weight, size and font set as CADD standards for the **OTE SCDs**.

197-6 SCD CADD Standards - Line Weight and Style

As noted in ***Section 103-3.4***, ***Table 197-6*** presents information on the line weight and style set as CADD standards for the **OTE SCDs**.

197-7 SCD CADD Standards - Traffic Level Assignments

As noted in ***Section 103-3.6***, ***Table 197-7*** presents information on the levels set as CADD standards for the **OTE SCDs**.

197-8 SCD CADD Standards - Traf.cel Elements

As noted in ***Section 103-3.7***, ***Table 197-8*** presents information on the elements set as CADD standards for the **OTE SCDs**.

197-9 OTE Publications

The ***Table 197-9*** presents a consolidated list of all **OTE** publications. It is intended that all **OTE** publications listed, except for the **Signs Wallchart**, will be available for viewing and downloading from the **OTE** and **DRRC** web sites. Those that are posted will be noted in the comments column of this table.

OTE design related publications are also listed on the **Design Reference Resource Center (DRRC)** web site, available from the **ODOT** web site. When posted electronically, the references will be available by hyperlink from the **DRRC** as well as the **OTE** web site.

197-10 Office of Contracts Publication List

Table 197-10 depicts the listing provided by the **Office of Contracts** for publications distributed through that office, with a price list for those publications for which there is a charge. This information can also be accessed from the **Design Reference Resource Center (DRRC)** web site ***(see Table 197-3)***.

Table 197-1. Publication Distribution Coordinators

District / C. O. Office	Contact Person
	OMUTCD and TEM
1	Eric Pfenning, Planning
2	Tricia Hines, Planning
3	Cindy Reynolds, Production
4	Ken Greene, Production
5	Jean Burgess, Roadway
6	Sandy Freshour, Production
7	Susan Eaton, Highway
8	Shelly Green, Traffic
9	Richard Chaffin, Planning
10	Tom Hamilton, Production
11	Shane Locke, Production
12	Travis Bonnett, Roadway
Chief Legal	Tom Pannett
Construction Admin.	Gary Angles
Environmental Services	Tim Hill
Estimating	Steve Trendy
Highway Management	Keith Swearingen
Legislative Services	Sue Bausch
Library	Janet Bix
Local Programs	Carla Cefaratti
LTAP	Mike Fitch
Planning	Leonard Evans
Production	Julie Donovan
Real Estate	David Seasly
Roadway Eng. Services	Dean Focke
Safety	Miles Kouskouris
Structural Engineering	Sean Meddles
Technical Services	Jim McQuirt
Traffic Engineering	Gerri Parker

Table 197-2. OTE Organization and Key Contacts

Administration		**Area Code 614**
David Holstein, P.E.	**Administrator**	**466-3601**
Dushon Johnson	Executive Secretary	466-3601
	FAX	644-8199
Standards, Operations & Safety		
Mohammad M. Khan, P.E.	**Section Head**	**644-8177**
Juanita D. Elliott, P.E.	Policies, Standards, OMUTCD, TEM, AASHTO Ballots, FHWA Dockets	644-8143
Lisa A. McConnell	Signing, SDM, SCDs	728-9361
Albert Antoine, P.E.	Safety Studies	644-6624
Roger U. Dunn	Recycled RPM Coordinator	644-8179
Geraldine Parker	Publication Requests, Web Site	466-4700
Maintenance of Traffic		
Kenneth E. Linger, P.E.	**Section Head**	**466-0139**
McCarthy Braxton	Maintenance of Traffic	752-8829
Steven H. Barbour, P.E.	Maintenance of Traffic	752-8846
Michael Keller	Time-Lapse, Video Production	644-8273
Arthur J. Garrett	Audio/Visual	644-8159
Traffic Control		
Homer A. Suter, P.E.	**Assistant Office Administrator / Section Head**	**752-9995**
Satya N. Goyal, P.E.	Signal Electrical Engineer	644-8107
William L. James	Signal Design and Specifications	466-1290
Donald R. Snyder	Signal Agreements and Permits	466-4263
John D. Binns. P.E.	Lighting Engineer	466-5255
James M. Roth, P.E.	Signing Engineer	752-0438
Sign & Signal Shop		
Paul A. Trapasso	**Assistant Administrator**	**351-2850**
	FAX	351-2854
	Automated Directory Assistance	351-2898

Table 197-3. Resource Reference/Contact Information

Resource Name / Mailing Address	Telephone / Fax / Web Address
Aggressive Driving (NHTSA)	Web site: www.nhtsa.dot.gov/people/injury/enforce/adsped.htm
American Association of State Highway and Transportation Officials (AASHTO) 444 North Capitol St., NW, Suite 249 Washington, D.C. 20001	Telephone: 202-624-5800 Fax: 202-624-5806 Web site: www.aashto.org
American Traffic Safety Services Association (ATSSA) 15 Riverside Parkway, Suite 100 Fredericksburg, VA 22406-1022	Telephone: 540-368-1701 Toll Free 1-800-272-8772 Fax: 540-368-1717 Web site: www.atssa.com
American National Standards Institute (ANSI) 1819 L Street, NW Washington, D.C. 20036	Telephone: 212-293-8020 General Inquiries: 212-642-4900 Fax: 202-293-9287 Web site: www.ansi.org
Bureau of Transportation Statistics U.S. Department of Transportation 400 7th Street, SW, Rm 3430 Washington, D.C. 20590	Telephone: 202-366-1270 Fax: 202-366-3640 Web site: www.bts.gov/
Corps of Engineers, U.S. Army Huntington District 502 Eighth Street Huntington, West Virginia 25701-2070	Telephone: 304-529-5487 Web site: www.usace.army.mil/index.html
County Engineers Association of Ohio 37 West Broad Street, Suite 660 Columbus, OH 43215	Telephone: 614-221-0707 Fax: 614-221-5761 Web site: www.ceao.org/
Design Reference Resource Center (ODOT)	Web site: www.dot.state.oh.us/drrc/
Docket Management System (DMS)	Web site: http://dms.dot.gov/
Federal Emergency Management Administration (FEMA) Region V 536 South Clark St., 6th Floor Chicago, Illinois 60605	Telephone: 312-408-5500 Fax: 312-408-5234 Web site: www.regions.gov/regions/v/
Federal Highway Administration (FHWA) 400 7th Street, SW Washington, D.C. 20590	Telephone: 202-366-0537 Web site: www.fhwa.dot.gov/

Resource Name / Mailing Address	Telephone / Fax / Web Address
Federal Highway Administration (FHWA) Ohio Division Office (HDA-OH) 200 North High Street, Room 328 Columbus, Ohio 43215	Telephone: 614-280-6896
FHWA - other web sites: ▸ **Directives and Policies** ▸ **Links to other states** ▸ **MUTCD** ▸ **Rumble Strips** ▸ **Roadside Hardware (includes NCHRP 350 information)** ▸ **Safety**	 www.fhwa.dot.gov/legsregs/elecdirs.htm www.fhwa.dot.gov/webstate.htm http://mutcd.fhwa.dot.gov/ http://safety.fhwa.dot.gov/programs/rumble.htm http://safety.fhwa.dot.gov/programs/roadside_hardware.htm http://safety.fhwa.dot.gov/
Federal Register information	Web site: www.gpoaccess.gov/index.html
Government Printing Office Superintendent of Documents P.O. Box 371954 Pittsburgh, PA 15250-7954	Telephone: 202-512-1800 Toll Free 1-866-512-1800 Fax: 202-5122-2250 Web site: www.gpo.gov/
Government Printing Office (GPO) Bookstore Room 1653, Federal Building 1240 E. 9th Street Cleveland, OH 44199	Telephone (216) 522-4922 Fax: (216) 522-4714 Web site: http://bookstore.gpo.gov/index.html
Government Printing Office (GPO) Bookstore Room 207, Federal Building 200 N. High Street Columbus, OH 43215	Telephone: 614-469-6956 Fax: 614-469-5374 Email: columbusbks@gpo.gov Web site: http://bookstore.gpo.gov/lindex.html
Illuminating Engineering Society of North America (IESNA) 120 Wall Street, Floor 17 New York, N.Y. 10005	Telephone: 212-248-5000 Fax: 212-248-5017/8 Web site: www.iesna.org
Institute of Transportation Engineers (ITE) 1099 14th St, SW, Suite 300 West Washington, D.C. 20005-3438 USA	Telephone: 222-289-0222 Fax: 202-289-7722 Web site: www.ite.org/
McTrans Center for Microcomputers in Transportation University of Florida P.O. Box 116585 Gainesville, Florida 32611-6585	Telephone: 352-392-0378 Fax: 352-392-3224 Web site: www-mctrans.ce.ufl.edu
MUTCD (Manual on Uniform Traffic Control Devices)	Web site: http://mutcd.fhwa.dot.gov/

Resource Name / Mailing Address	Telephone / Fax / Web Address
National Highway Institute Arlington Center Building 4600 North Fairfax Drive, Suite 800 Arlington, VA 22203	Telephone: 1-877-558-6873 Web site: www.nhi.fhwa.dot.gov/
National Highway Traffic Safety Administration (NHTSA) 400 7th St., SW Washington, D.C., 20590	Toll Free 1-800-424-9393 Web site: www.nhtsa.dot.gov/
National Transportation Safety Board 490 L'Enfant Plaza, SW Washington, D.C., 20594	Telephone: 202-314-6000 Web site: www.ntsb.gov/default.htm
NCHRP 350 (FHWA web site)	Web site: http://safety.fhwa.dot.gov/programs/roadside_hardware.htm
ODOT – Also see **Ohio Department of Transportation (ODOT)**	Telephone: 614-466-7170 Fax: 614-644-8662 Web site: www.dot.state.oh.us/default.htm
Ohio (State of)	Web site: www.state.oh.us/
Ohio Building Authority 30 East Broad Street, Suite 4020 Columbus, OH 43215	Telephone: 614-466-5959 Fax: 614-466-6478 Web site: www.state.oh.us/oba/
Ohio Contractors Association 1313 Dublin Road P.O. Box 909 Columbus, Ohio 43216	Telephone: 614-488-0724 or 800-229-1388 Fax: 614-488-0728 Web site: www.oca.columbus.oh.us/
Ohio Department of Development 77 S. High Street P.O. Box 1001 Columbus, OH 43216-1001	Telephone: 800-848-1300 or 614-466-2480 Fax: 614-644-5167 Web site: www.odod.state.oh.us/
Ohio Department of Natural Resources (ODNR) 1930 Belcher Drive, Building D Columbus OH 43224-1387	Telephone: 614-265-6565 Web site: www.dnr.state.oh.us/ and www.dnr.state.oh.us/divisions.htm
Ohio Department of Natural Resources **Division of Engineering** 1889 Fountain Square Court, Building F3 Columbus OH 43224-1331	Telephone: 614-265-6948 Web site: www.dnr.state.oh.us/engineering/
Ohio Department of Natural Resources **Division of Forestry** 1855 Fountain Square Court, Building H Columbus OH 43224-1327	Telephone: 614-265-6694 Web site: www.dnr.state.oh.us/forestry/

Resource Name / Mailing Address	Telephone / Fax / Web Address
Ohio Department of Natural Resources **Division of Water** 1939 Fountain Square, Building E Columbus, Ohio 43224-1385	Telephone: 614-265-6717 Web site: www.dnr.state.oh.us/water/
Ohio Department of Natural Resources **Division of Wildlife** 1840 Belcher Drive, Building G Columbus OH 43224-1329	Telephone: 614-265-6300 Web site: www.dnr.state.oh.us/wildlife/
Ohio Department of Public Safety (ODPS) Charles D. Shipley Building 1970 W. Broad Street P.O. Box 182081 Columbus, Ohio 43218-2081	Telephone: 614-466-2550 Fax: 614-752-8410 Web site: www.state.oh.us/odps/default.htm
Ohio Department of Public Safety **Bureau of Motor Vehicles (BMV)** 1970 W. Broad Street P.O. Box 16520 Columbus, Ohio 43216-6520	Telephone: 614-752-7500 Web site: www.state.oh.us/odps/division/bmv/bmv.html
Ohio Department of Public Safety **Ohio Emergency Management Agency (EMA)** 2855 West Dublin-Granville Road Columbus, Ohio 43235-2206	Telephone: 614-889-7150 Fax: 614-889-7183 Web site: www.state.oh.us/odps/division/ ema/index.htm
Ohio Department of Public Safety **Ohio State Highway Patrol (OSHP)** Charles D. Shipley Building 1970 W. Broad Street P.O. Box 182074 Columbus, Ohio 43218-2074	Web site: www.state.oh.us/ohiostatepatrol/
Ohio Department of Transportation (ODOT) 1980 W. Broad Street P.O. Box 899 Columbus, OH 43216-0899	Telephone: 614-466-7170 Fax: 614-644-8662 Web site: www.dot.state.oh.us/default.htm
ODOT Construction & Materials book	Web site: www.dot.state.oh.us/spec/
ODOT Design Reference Resource Center	Web site: www.dot.state.oh.us/drrc/
ODOT **Office of Contracts - Purchasing Services**	Web site: ftp://www.dot.state.oh.us/pub/contracts/purchase/ coop/cooppgm.pdf

Resource Name / Mailing Address	Telephone / Fax / Web Address
ODOT **Office of Traffic Engineering** 1980 W. Broad Street Columbus, Ohio 43223	Telephone: 614-466-3601 Fax: 614-466-8199 Web site: www.dot.state.oh.us/traffic/default.asp
ODOT - Ohio Transportation Information System (OTIS)	Web site: www.odotonline.org/otis/
ODOT Table of Organization	Web site: www.dot.state.oh.us/info/orgtable.asp
Ohio Environmental Protection Agency 122 South Front Street P.O. Box 1049 Columbus, Ohio 43216-1049	Telephone: 614-644-3020 Web site: www.epa.state.oh.us/
Ohio Historical Society 1982 Velma Avenue Columbus, Ohio 43211	Telephone: 614-297-2300 Web site: www.ohiohistory.org/
Ohio Legislation	Web site: www.legislature.state.oh.us/
Ohio Local Technical Assistance Program (LTAP) The Ohio State University 2070 Neil Avenue, Room 470 Hitchcock Hall Columbus, OH 43210-1275	Telephone: (800) 552-6891 Fax: (614) 292-0449 Web site: www.ohioltap.org/ltap/
Ohio Revised Code	Web site: http://onlinedocs.andersonpublishing.com/revisedcode/
Ohio State Agencies	Web site: www.state.oh.us/ohio/agency.htm
The Ohio Turnpike Commission Office of the Executive Director 682 Prospect Street Berea, Ohio 44017	Telephone: 440-234-2081 Web site: www.ohioturnpike.org/
PC Trans KU Transportation Center Room 2011 Learned Hall 1530 W 15th St. Lawrence, Kansas 66045	Telephone: 785-864-5655 Web site: www.ukans.edu/~kutc/pctrans/index.html
Public Utilities Commission of Ohio (PUCO) 180 E. Broad Street Columbus, Ohio 43215-3793	Telephone: 614-466-3292 Toll Free (Ohio) 1-800-686-7826 Web site: www.puc.state.oh.us/
Rumble strips web site	Web site: http://safety.fhwa.dot.gov/programs/rumble.htm
State Agencies in Ohio	Web site: www.state.oh.us/ohio/agency.htm

Resource Name / Mailing Address	Telephone / Fax / Web Address
State Library of Ohio	Web site: winslo.state.oh.us/
State of Ohio web site	Web site: www.state.oh.us/
States web sites (links to other states)	Web site: www.fhwa.dot.gov/webstate.htm Web site: www.ai.org/dot/otherstatedot.html
Transportation Research Board (TRB) The National Academies 2101 Constitution Avenue, NW Washington D.C. 20418	Telephone: 202-334-2934 Web site: www.trb.org
U.S. Department of Transportation 400 7th Street, SW Washington, D.C. 20590	Telephone: 202-366-4000 Web site: www.dot.gov/
US DOT agencies	Web site: www.dot.gov/DOTagencies.htm

Table 197-4. Ohio Counties and ODOT Districts

County	Code	Dist.	County	Code	Dist.	County	Code	Dist.
Adams	ADA	9	Hamilton	HAM	8	Noble	NOB	10
Allen	ALL	1	Hancock	HAN	1			
Ashland	ASD	3	Hardin	HAR	1	Ottawa	OTT	2
Ashtabula	ATB	4	Harrison	HAS	11			
Athens	ATH	10	Henry	HEN	2	Paulding	PAU	1
Auglaize	AUG	7	Highland	HIG	9	Perry	PER	5
			Hocking	HOC	10	Pickaway	PIC	6
Belmont	BEL	11	Holmes	HOL	11	Pike	PIK	9
Brown	BRO	9	Huron	HUR	3	Portage	POR	4
Butler	BUT	8				Preble	PRE	8
			Jackson	JAC	9	Putnam	PUT	1
Carroll	CAR	11	Jefferson	JEF	11			
Champaign	CHP	7				Richland	RIC	3
Clark	CLA	7	Knox	KNO	5	Ross	ROS	9
Clermont	CLE	8						
Clinton	CLI	8	Lake	LAK	12	Sandusky	SAN	2
Columbiana	COL	11	Lawrence	LAW	9	Scioto	SCI	9
Coshocton	COS	5	Licking	LIC	5	Seneca	SEN	2
Crawford	CRA	3	Logan	LOG	7	Shelby	SHE	7
Cuyahoga	CUY	12	Lorain	LOR	3	Stark	STA	4
			Lucas	LUC	2	Summit	SUM	4
Darke	DAR	7						
Defiance	DEF	1	Madison	MAD	6	Trumbull	TRU	4
Delaware	DEL	6	Mahoning	MAH	4	Tuscarawas	TUS	11
			Marion	MAR	6			
Erie	ERI	3	Medina	MED	3	Union	UNI	6
			Meigs	MEG	10			
Fairfield	FAI	5	Mercer	MER	7	Van Wert	VAN	1
Fayette	FAY	6	Miami	MIA	7	Vinton	VIN	10
Franklin	FRA	6	Monroe	MOE	10			
Fulton	FUL	2	Montgomery	MOT	7	Warren	WAR	8
			Morgan	MRG	10	Washington	WAS	10
Gallia	GAL	10	Morrow	MRW	6	Wayne	WAY	3
Geauga	GEA	12	Muskingum	MUS	5	Williams	WIL	2
Greene	GRE	8				Wood	WOO	2
Guernsey	GUE	5				Wyandot	WYA	1

Table 197-5. SCD CADD Standards - Text Weight, Size and Font

Item	Weight	Size*	Font
Drawing Title	2	.4"	70
Drawing Number	3	.7"	70
Revision Date	1	.2"	70
Preparer's initials:	1	.2"	32
Labels, Dimensions and Notes	1	.2"	32
Major Heading	2	.4"	32
Sub-heading	1	.2"	32

* height of the text on a full size (22" x 34") plan sheet

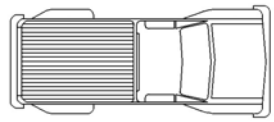
Table 197-6. SCD CADD Standards - Line Weight and Style

Item	Weight	Style (Code)
Standard	1	0
Cross-Section Match Line	2	0
Hidden line	1	2
Centerline (in structure)	1	7

Table 197-7. SCD CADD Standards - Traffic Level Assignments

Level	Item Description	Cell Name
1	Template (trimline, border and title block), Preparer's initials	
39	General Notes	
52	All Traffic SCD elements not assigned to another level.	
53	Sign cuts	signcuts.cel
59	Dimensioning (includes dimension line, terminator, dimension text and extension line)	

Table 197-8. SCD CADD Standards - Traf.cel Elements

Item	Description	Symbol	Symbology		
			Weight	Style	Color
DTA	Direction of Traffic Arrow		1	0	43
PVT	Protection Vehicle		1	0	43

Note: These are only examples of items which comprise this library.

Table 197-9. OTE Publications

Publication Name	Audience	Comments
Ohio Manual of Uniform Traffic Control Devices (OMUTCD)	state, county officials and other local jurisdictions, contractors, consultants, public	Revisions provided free. Available in paper and on-line from the **DRRC** and **OTE** web pages.
Ohio Uniform Traffic Control Signs Wallchart	state, county officials and other local jurisdictions, contractors, consultants, schools, public	
Standard Sign Design Manual (SDM) - TEM Section 295-2	state, county officials and other local jurisdictions, contractors, consultants	Incorporated by reference into the **TEM**. Available in paper (through 2004) and on-line from the **DRRC** and **OTE** web pages.
Standard Construction Drawings (SCDs)	state, county officials and other local jurisdictions, contractors, consultants	Contact the **Office of Contracts** for copies. Available in paper (through 2004) and on-line from the **DRRC** and **OTE** web pages.
Temporary Traffic Control Manual	state, county officials and other local jurisdictions, contractors, consultants, public	Reprint of Part 7 of the **OMUTCD**. Available in paper and on-line from the **DRRC** and **OTE** web pages.
Traffic Engineering Manual	state, county officials and other local jurisdictions, contractors, consultants	Revisions published only on the web site. Available in paper (through 2004) and on-line from the **DRRC** and **OTE** web pages.

Table 197-10. Office of Contracts Publications List with Pricing and Ordering Information

Publication			Pricing
Bridge Design Manual			$29.00
Construction and Material Specifications			$12.00
County Maps on CD			$15.00
Handbook for the Removal of Regulated Waste			$5.00
Handbook for Sediment and Erosion Control			$5.00
Location & Design Manuals			
	Vol. 1 - Roadway Design		$38.00
	Vol. 2 - Drainage Design		$42.00
	Vol. 3 - Highway Plans		$34.00
	Vol. 3 Supplement: Sample Plan Sheets		$24.00
Manual for Abandoned Underground Mine Inventory and Risk Assessment			$10.00
Construction Inspection Manual			$12.00
Ohio Manual of Uniform Traffic Control Devices			$60.00
Pavement Design Manual			$10.00
Specification for Consulting Engineers			$3.50
Specification for Subsurface Investigations			$8.00
Standard Drawings			
	Bridge	Standard Bridge Drawings	$17.00
	Construction	Standard Construction Drawings	$19.00
	Traffic	Standard Construction Drawings	$27.00
Summary of Contracts Awarded			$4.00
Supplemental Specifications			available on the ODOT website
Temporary Traffic Control Manual			$10.00
Traffic Engineering Manual			$50.00

Publication	Pricing
Orders for these publications can be placed by telephone by calling 1-800-459-3778 or 614-466-3200 or by writing to: **Ohio Department of Transportation** **Office of Contracts** **1980 W. Broad St., 1st floor** **Columbus, Ohio 43223** **Make checks or money orders payable to the "Treasurer of the State of Ohio." Prices are subject to change without notification.** **----------** **For AASHTO Manuals, place orders with:** **AASHTO** **444 N. Capitol Street SW, Suite 225** **Washington, D.C. 20001** **(202) 624-5800**	

198 FIGURES INDEX

198-1 ODOT Table of Organization

Figure 198-1 is a reproduction of the overall Table of Organization for **ODOT** that is posted on the **ODOT** website.

198-2 ODOT Districts - Locations and Addresses

Figure 198-2 presents a map of **Ohio** showing the **ODOT Districts** and contact information (addresses and phone numbers) for each of them.

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Figure 198-1. ODOT Table of Organization

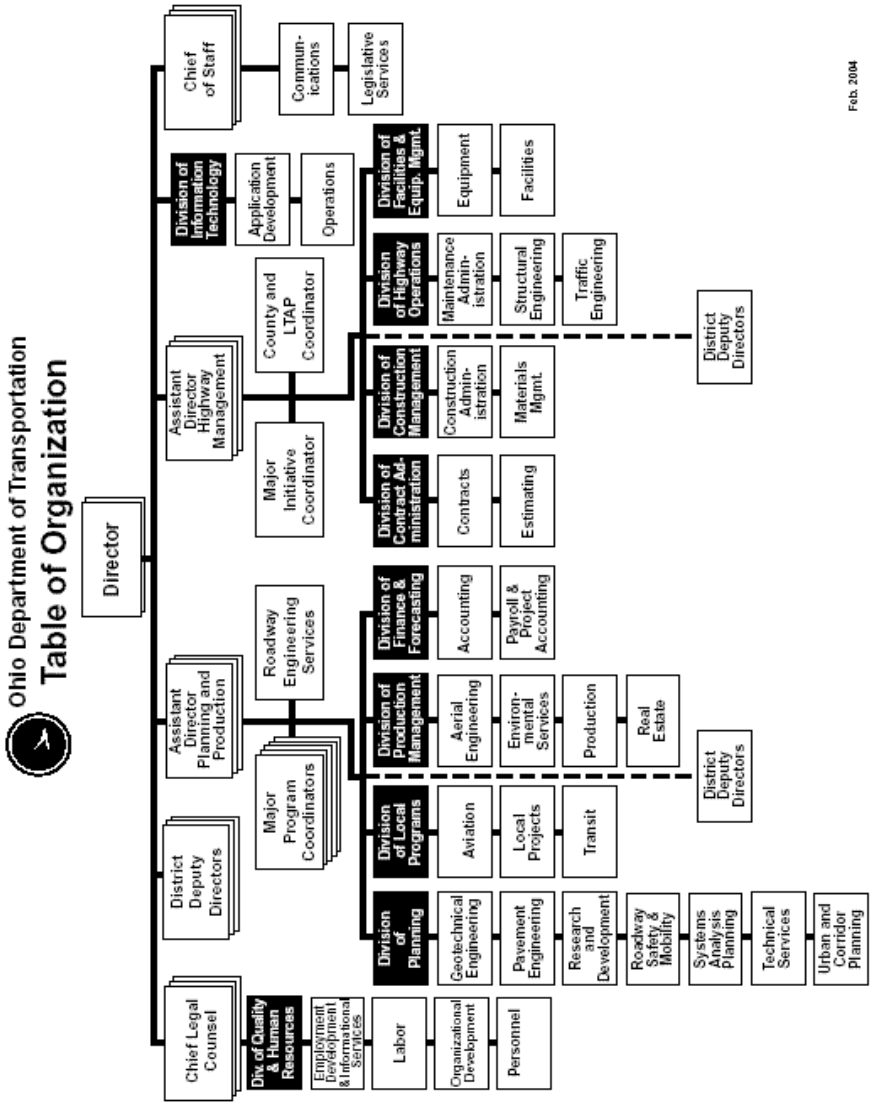

Figure 198-2. ODOT District Locations and Addresses

Dist.	Address	Phone No.	Centrex No.
1	1885 N. McCullough St., Lima, OH 45801	419-222-9055	995-7901
2	317 East Poe Rd., Bowling Green, OH 43402-1333	419-353-8131	995-7902
3	906 N. Clark St., Ashland, OH 44805	800-276-4188 419-281-0513	995-7903
4	2088 S. Arlington Rd., Akron, OH 44306	800-603-1054 330-786-3100	995-7904
5	9600 Jacksontown Rd. SE, Jacksontown, OH 43030	740-323-4400	995-7905
6	400 E. William St., Delaware, OH 43015	740-363-1251	995-7906
7	1001 St. Mary's Ave., Sidney, OH 45365	937-492-1141	995-7907
8	505 S. S.R. 741, Lebanon, OH 45036	800-831-2142 513-932-3030	995-7908
9	650 Eastern Ave., Chillicothe, OH 45601-0467	888-819-8501 740-773-2691	995-7909
10	338 Muskingum Dr., Marietta, OH 45750	740-373-0212	995-7910
11	2201 Reiser Ave. SW, New Philadelphia, OH 44663	330-339-6633	995-7911
12	5500 Transportation Blvd., Garfield Hts., OH 44125	216-581-2333 866-737-8112	995-7912