NEW YORK STATE
DEPARTMENT OF TRANSPORTATION

OVERHEAD SIGN STRUCTURE
INVENTORY AND INSPECTION MANUAL

PREPARED BY:

NYSDOT REGION 10

and

OFFICE OF ENGINEERING
STRUCTURES DESIGN AND CONSTRUCTION DIVISION

APRIL 1999
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This Manual is a guide to obtaining inventory data and performing structural condition inspections of overhead sign structures located within New York State. The manual explains the procedures required to properly document the inventory and inspection data on standard forms, supplemented by required notes, sketches, and photographs.

Overhead sign structures include various types of span and cantilever structures, designed to support signs requiring vertical clearance for vehicles to pass underneath. Pole and cable sign supports, bridges which support signs, traffic signal poles which support signs, and standard sign post supports are not included in the inspection described in this manual. Support frames for bridge-fascia mounted signs (i.e., signs for traffic that passes underneath a bridge) are also not included, as they are inspected with the bridge. However, span and cantilever structures that are mounted to a bridge, for traffic on the roadway passing over the bridge, shall be inspected in accordance with this manual.

The Manual is divided into two separate sections: Inventory (Chapter 2) and Inspection (Chapter 3). Chapter 2 describes the inventory data to be recorded for a sign structure. Chapter 3 describes the inspection procedures, condition rating system along with examples, elements to be rated, and corrective actions to be taken when conditions are found that require remedial measures. Flagging procedures, standard forms for inventory, inspection, flags, and repair requests are enclosed in the Appendices.

This manual does not address safety and traffic control issues which are fundamental to the performance of field work. It is assumed that all field work is performed by qualified personnel who are knowledgeable of the behavior of engineered structures.
GENERAL

This chapter lists and describes the inventory items for which data is collected and verified as part of a sign structure inventory. All inventory items shall be entered on Form S107.

SIGN STRUCTURE ORIENTATION AND LOCATION

Sign Structure orientation is established the first time the sign structure is inventoried and shall not change for any subsequent update or inspection (even if it was incorrectly determined or recorded on the initial inventory). Record the Direction of Orientation with two corresponding letters: NO, SO, EA, WE, NE, NW, SE, or SW, in the boxes provided on Form S107. The orientation is established according to the following rules:

Rule 1: Structure inventory orientation shall be facing the sign panel text.

Rule 2: Where sign panels are on both sides of the sign structure, orientation shall be facing Northwest, North, Northeast, or East, as appropriate.

Terms referring to the right side and left side of the sign structure itself are determined based on the direction of orientation. Figure 1 is a schematic representation of these terms.

In order to describe the numbering scheme for individual elements/members of a sign structure, following terminology has been adopted:

**Truss Chord Identification:**
The terms utilized for chord identification of the four (4) chord truss system are (LF) lower front; (UF) upper front; (LB) lower back; (UB) upper back. The panel points are numbered from left to right and the front side of the truss is established while facing the sign structure in the direction of orientation.

The three (3) chord truss system will be treated the same except that the back single chord is referred to as Mid-Chord (M). Example: The interior diagonal from upper chord (U7) to Mid-Chord (M8) should be labeled U7-M8 (see Figure 2).

**Trussed-Post Web Member Identification:**
Web members (diagonals) of a trussed post are numbered from bottom to top.
FIG 2 - PANEL POINT DESIGNATIONS
INVENTORY PROCEDURE

The collection and verification of all sign structure inventory data is performed using standard form S107, to be supplied by NYSDOT. Typically, all inventory data will have to be entered the first time a sign structure is inventoried. The inventory data shall subsequently be reviewed and, if necessary, updated each time the structure is inspected.

INVENTORY DATA

The items that must be recorded as inventory items of the sign structure are explained below:

1 - R/C Code

The first digit of the Region/County Code indicates the New York State Department of Transportation Region in which the sign structure is located. (For region 10, this item is coded “0” (zero). For region 11, this item is coded “N”.) The second digit of this code is a number assigned to the specific County in which the sign structure is located. For county code numbers see Table 1.

2 - SIN

The Sign Structure Identification Number (SIN) is a unique five-character designation assigned to each individual sign structure. The first is the region number (0 for Region 10 and N for Region 11). The next four characters are numbers that are assigned, sequentially, by the Regional Structures Engineer, when the structure is first entered into the inventory system.

3 - RES Code

The first digit of the Residency Code indicates the New York State Department of Transportation Region in which the sign structure is located (0 for Region 10 and N for Region 11). The second digit of this code is a number assigned to the specific Residency in which the sign structure is located. For residency code numbers see Table 2.

4 - DATE

This item records the date that the initial or updated inventory was entered, in month/day/year format.

5 - INVENTORY TYPE

The purpose of this item is to record the type of inventory performed on the sign structure (1 = Create, which is used for an initial inventory; 2 = Update).
Table 1 - COUNTY CODE NUMBERS

<table>
<thead>
<tr>
<th>REGION 1</th>
<th>REGION 2</th>
<th>REGION 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Albany County</td>
<td>1 - Fulton County</td>
<td>1 - Cayuga County</td>
</tr>
<tr>
<td>2 - Essex County</td>
<td>2 - Hamilton County</td>
<td>2 - Cortland County</td>
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<tr>
<td>3 - Greene County</td>
<td>3 - Herkimer County</td>
<td>3 - Onondaga County</td>
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<tr>
<td>4 - Rensselaer County</td>
<td>4 - Madison County</td>
<td>4 - Oswego County</td>
</tr>
<tr>
<td>5 - Saratoga County</td>
<td>5 - Montgomery County</td>
<td>5 - Seneca County</td>
</tr>
<tr>
<td>6 - Schenectady County</td>
<td>6 - Oneida County</td>
<td>6 - Tompkins County</td>
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<td>7 - Warren County</td>
<td></td>
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<tr>
<td>8 - Washington County</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>REGION 4</th>
<th>REGION 5</th>
<th>REGION 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Genesee County</td>
<td>1 - Cattaraugus County</td>
<td>1 - Allegany County</td>
</tr>
<tr>
<td>2 - Livingston County</td>
<td>2 - Chautauqua County</td>
<td>2 - Chemung County</td>
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<tr>
<td>3 - Monroe County</td>
<td>3 - Erie County</td>
<td>3 - Schuyler County</td>
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<tr>
<td>4 - Ontario County</td>
<td>4 - Niagara County</td>
<td>4 - Steuben County</td>
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<td>5 - Orleans County</td>
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<td>5 - Tioga County</td>
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<td>6 - Wyoming County</td>
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<td>6 - Yates County</td>
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<td>7 - Wayne County</td>
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<thead>
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<th>REGION 7</th>
<th>REGION 8</th>
<th>REGION 9</th>
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</thead>
<tbody>
<tr>
<td>1 - Clinton County</td>
<td>1 - Columbia County</td>
<td>1 - Broome County</td>
</tr>
<tr>
<td>2 - Franklin County</td>
<td>2 - Dutchess County</td>
<td>2 - Chenango County</td>
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<td>3 - Jefferson County</td>
<td>3 - Orange County</td>
<td>3 - Delaware County</td>
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<tr>
<td>4 - Lewis County</td>
<td>4 - Putnam County</td>
<td>4 - Otsego County</td>
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<tr>
<td>5 - St. Lawrence County</td>
<td>5 - Rockland County</td>
<td>5 - Schoharie County</td>
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<td></td>
<td>6 - Ulster County</td>
<td>6 - Sullivan County</td>
</tr>
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<td></td>
<td>7 - Westchester County</td>
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<table>
<thead>
<tr>
<th>REGION 10</th>
<th>REGION 11 (NEW YORK CITY - Code this item ‘N’)</th>
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<tbody>
<tr>
<td>1 - Nassau County</td>
<td>1 - Bronx County</td>
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<td>2 - Kings County</td>
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<tr>
<td></td>
<td>3 - New York County</td>
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<tr>
<td></td>
<td>4 - Queens County</td>
</tr>
<tr>
<td></td>
<td>5 - Richmond County</td>
</tr>
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Table 2 - RESIDENCY CODE NUMBERS

<table>
<thead>
<tr>
<th>REGION 1</th>
<th>REGION 2</th>
<th>REGION 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Albany Residency</td>
<td>2 - Hamilton Residency</td>
<td>1 - Cayuga/Seneca Residency</td>
</tr>
<tr>
<td>2 - Essex Residency</td>
<td>3 - Herkimer Residency</td>
<td>2 - Cortland/Tompkins Residency</td>
</tr>
<tr>
<td>3 - Greene Residency</td>
<td>4 - Montgomery/Fulton Residency</td>
<td>3 - Onondaga East Residency</td>
</tr>
<tr>
<td>4 - Rensselaer Residency</td>
<td>5 - Oneida East Residency</td>
<td>4 - Onondaga West Residency</td>
</tr>
<tr>
<td>5 - Saratoga Residency</td>
<td>6 - Oneida West/Madison Residency</td>
<td>5 - Oswego Residency</td>
</tr>
<tr>
<td>6 - Schenectady Residency</td>
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<td></td>
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<tr>
<td>7 - Warren Residency</td>
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<td>8 - Washington Residency</td>
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<th>REGION 4</th>
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<tbody>
<tr>
<td>1 - Genesee/Orleans Residency</td>
<td></td>
<td>1 - Allegany West Residency</td>
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<tr>
<td>2 - Livingston Residency</td>
<td>1 - Cattaraugus Residency</td>
<td>2 - Chemung West/Steuben East Residency</td>
</tr>
<tr>
<td>3 - Monroe East Residency</td>
<td>2 - Chautauqua Residency</td>
<td>3 - Schuyler/Yates Residency</td>
</tr>
<tr>
<td>4 - Monroe West Residency</td>
<td>3 - Erie North Residency</td>
<td>4 - Allegany East/Steuben West Residency</td>
</tr>
<tr>
<td>7 - Wyoming Residency</td>
<td>4 - Erie South Residency</td>
<td>5 - Tioga/Chemung East Residency</td>
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<tr>
<td>8 - Wayne/Ontario Residency</td>
<td>5 - Niagara Residency</td>
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<td>2 - Dutchess North Residency</td>
<td>2 - Chenango Residency</td>
</tr>
<tr>
<td>3 - Jefferson Residency</td>
<td>3 - Dutchess South/Putnam Residency</td>
<td>4 - Delaware South Residency</td>
</tr>
<tr>
<td>4 - Lewis Residency</td>
<td>4 - Orange East Residency</td>
<td>5 - Otsego Residency</td>
</tr>
<tr>
<td>5 - St. Lawrence Residency</td>
<td>5 - Orange West Residency</td>
<td>6 - Schoharie/Delaware North Residency</td>
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<tr>
<td></td>
<td>6 - Rockland Residency</td>
<td>7 - Sullivan Residency</td>
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<tr>
<td></td>
<td>7 - Ulster Residency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 - Westchester North Residency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9 - Westchester South Residency</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>REGION 10</th>
<th>REGION 11</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Nassau North Residency</td>
<td>0 - Bronx Residency</td>
<td></td>
</tr>
<tr>
<td>2 - Nassau Central Residency</td>
<td>0 - Brooklyn/Manhattan Residency</td>
<td></td>
</tr>
<tr>
<td>3 - Suffolk East Residency</td>
<td>0 - Queens Residency</td>
<td></td>
</tr>
<tr>
<td>4 - Suffolk Central Residency</td>
<td>0 - Staten Island Residency</td>
<td></td>
</tr>
<tr>
<td>5 - Suffolk West Residency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 - Nassau South Residency</td>
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</table>
6 - **ROUTE NUMBER (Boxes 1-4)**

This item indicates the Route Number along which the sign structure is located. The route number is defined as a State Touring Route, U.S. Touring Route, Interstate routes, Special Highway Route number, and reference route numbers for Institutional roads, Indian Reservations, and unnumbered State highways. Boxes 1-3 are numeric characters for the route number. If the route number contains less than three digits, the numbers should be left justified, but do not zero fill. Box 4 is reserved for a letter suffix if one exists but do not zero fill if none exists. Examples: *Interstate Route 495* would be inputted as “495I”, *State Route 25* would be inputted as ”_25_”, and *State Route 9A* would be inputted as “_9A”, where “_” designates an empty space.

7 - **REFERENCE MARKER (Boxes 5-16)**

This item indicates the information regarding route number, route measure, etc. as it appears on the reference marker sign which is closest to the sign structure being inspected. The following is the description of the reference marker legend:

Top Line - The first three spaces contain the Route Number. The fourth space is reserved for route letter designations, e.g., 908M, 27A, etc. Interstate routes are designated as “I” in this space.

Second Line - The first character is the DOT Region. The second character is the County number. The third and fourth characters indicate the county order on the route, from its Western or Southern terminus.

Third Line - The first character is the Control Segment in each County. The last three characters indicate mileage in tenths-of-a-mile, within the segment.

Record the Reference Marker Legend in boxes 5 to 16. The Route Number portion is input (no zero fill) in boxes 5 to 7. The letter suffix, if one exists, is input in box 8. The remaining eight digits of the reference marker are input in boxes 9 to 16.

8 - **YEAR BUILT (Boxes 17-20)**

Record the year the sign structure was built, if known.

9 - **CONTRACT NO. (Boxes 21-27)**

Record the contract number under which the structure was constructed, if known. On existing structures, the contract number under which the sign panels were installed, is sometimes stamped.
on the back of the sign(s). This may or may not be the same contract that the structure was built under, and must be verified by obtaining and reviewing the corresponding contract plans.

10 - OCP (Box 28)

Enter Y if the original contract plans (OCP) for the sign structure are in the SIN folder, or available in the Regional Office, or N if not available.

11 - ON BRIDGE (Box 29)

Enter Y if the sign structure is on a highway bridge or N if it is not. This does not include fascia mounted signs.

12 - BIN (Boxes 30-36)

Enter the Bridge Identification Number if the sign structure is on a highway bridge.

13 - DIRECTION OF ORIENTATION (Boxes 37-38)

As previously mentioned, record the Direction of Orientation with two corresponding letters; e.g., East=EA, North=NO, and Northeast=NE.

14 - ADDITIONAL DESCRIPTION

Record any prominent roadway features, such as cross-streets name, exit numbers, etc. in order to facilitate the process of locating the structure.

15 - SIGN STRUCTURE TYPE

The sign structure type is classified as “Cantilever” or “Span”, based on its structural configuration.

Span type structure are further classified as “One-Way” or “Two-Ways” depending upon the traffic direction(s) under the span.

16 - POST

Record post configuration (Single or Trussed), and post shape (round, rectangular or I shape). Using a magnet, determine whether the metal is steel or aluminum. Record type of post material and surface coating (galvanized, weathering, painted or unpainted). Record the type of footing (concrete or steel) for the post. Note: Typically, sign structures are anchored to a spread or pier type concrete footing. If the sign structure is on a bridge, it may be attached to the superstructure via metal floorbeams or diaphragms, (code as steel), or it may be mounted to a bridge deck, parapet, or retaining wall (code as concrete).
17 - ARM/TRUSS

Record the configuration of the arm or truss assembly. The following is a list of common types of arm or truss assemblies:

A) Single Arm  
B) Dual Arm  
C) Dual Trussed Arm  
D) Dual Arm ‘Butterfly’ Type  
E) Plane Truss  
F) Tri-Truss  
G) Four Chord Truss

Using a magnet, determine whether the metal is steel or aluminum. Record type of Arm/Truss material and surface coating (galvanized, weathering, painted or unpainted). Determine and record the length of span for span structures, or length of arm for cantilever structures, and minimum vertical clearance to the bottom chord of the Arm/Truss. All measurements are to be in metric units.

Figure 4: Illustration for a **Single Arm Cantilever** type sign structure.
Figure 5: Illustration for a **Cantilever Dual Arm** type sign structure.

Figure 6: Illustration for a **Span Plane Truss** type sign structure.
Figure 7: Illustration for a **Cantilever Dual Arm Butterfly** type sign structure.

Figure 8: Illustration for a **Cantilever Dual Trussed Arm** type sign structure.
Figure 9: Illustration for a **Tri-Truss** type sign structure.

Figure 10: Illustration for a **Four-Chord Truss** type sign structure.
19 - SIGN PANELS

Record the number, sign panel location, text legend, direction of travel while facing the sign legend, type of sign panel, light fixture(s) attached to sign panel, vertical clearance to each sign panel or attached light fixture(s) if lower, and panel dimensions. The type of sign panels are recorded as V for a variable message sign (VMS), F for flat aluminum panel, and FO for other types of flat panels. Enter Y if light fixture(s) is attached to the sign panel. Sign panel locations are identified as left, center and right panels while facing the sign legend. Record the VMS Location Number, located on the front or side, if one exists. All measurements are to be in metric units.

20 - OTHER ATTACHMENTS:

This item indicates type of attachments mounted on the structure. Various attachment types are listed below.

- Roadway Lighting
- Traffic Control Signal
- Flashing Signal (Warning)
- Dampener
- Camera
- Other (describe)

If the attachment is over a roadway, record the vertical clearance to it. (Note: Vertical clearance to dampeners need not be measured, unless the dampener falls below the bottom chord of the structure.)
GENERAL

This chapter describes the inspection procedures, condition rating system, reporting of findings, and corrective actions to be taken as remedial measures on overhead sign structures. All inspections shall be In-Depth. An in-depth inspection is a comprehensive detailed inspection of an entire sign structure, involving a 100% hands-on examination of each component, member, fastener and weld on the structure. This type of inspection requires the use of special access equipment, such as a cherry picker, platform truck, etc., and may incorporate non-destructive inspection techniques.

INSPECTION TEAM AND INSPECTOR QUALIFICATIONS

All inspection teams must include a Team Leader (TL) and Assistant Team Leader (ATL). The Team Leader is responsible for ensuring that the sign structure is inspected completely and that the inspection reporting conforms with all requirements of this manual and all applicable Technical Advisories, Engineering Instructions and Engineering Bulletins. The Assistant Team Leader may inspect and measure components, if working under the Team Leader’s direct supervision. Additional personnel, such as laborers or Assistant Team Leader Trainees, may be added as needed.

A Team Leader must meet the following minimum qualification:

i) Be currently registered with the New York State Education Department as a Professional Engineer (P.E.). An out-of-state P.E. registration may be substituted for a New York State P.E. provided that the individual received the P.E. based upon satisfactory completion of a 16 hour written examination, has applied for P.E. registration in New York State, and the New York State Education Department has acknowledged receipt of the individual’s intent to practice in New York under subsection (b) of Section 7208 of the Education Law.

ii) Have at least three (3) years of experience in design, construction, or inspection of bridges and/or sign structures.

An Assistant Team Leader must meet the following minimum qualifications:

i) Possess a Bachelor of Science Degree in Civil Engineering from an Accreditation Board for Engineering and Technology (ABET) accredited program or an equivalent degree acceptable to the Department, or

ii) Possess an Associate Degree in Civil Engineering Technology or an equivalent Associate Degree determined to be acceptable by the Department, and have one-and-one-half (1 ½) years of experience in the design, construction, or inspection of bridges and/or sign structures.

Civil Engineering experience on Department projects or programs may be substituted for all or a portion of the experience requirement in Subsection (ii) herein, if the Department determines, on the basis of the Department work performed, that the person possesses the necessary experience and skill.
INSPECTION SEQUENCE

Before performing an inspection, the inspector shall verify the SIN on the overhead sign structure in the field. The development of an inspection method for each type of sign structure is important. A well planned sequence will provide a working guide for the inspector and will insure a systematic and thorough inspection of all components of the structure. A suggested method is presented below:

- foundations
- base plates and anchor bolts
- guiderail
- posts, web members and connections
- connections to posts
- truss frame members and their welded/bolted connections
- sign panels and lighting system
- surface coating

Use of this sequence to inspect the structure will prevent any components from being overlooked or inspected twice.

THE SIN FOLDER

Every sign structure that is inspected should have a folder identified with the Sign Structure Identification Number (SIN), containing the following items:

- Report binder containing current and previous inspection reports, inventory forms, flag and repair request forms.
- Plans (“as-built”, if available) or sketches in lieu of plans, if plans are not available.
- Photographs.
- All pertinent correspondence.

To conduct a thorough inspection of a sign structure, it is necessary to review all available information pertaining to the structure history. The SIN folder for the corresponding sign structure shall be reviewed prior to the inspection. Using record plans, if available, (or pictures, if record plans not available), a comparison shall be made between the existing structure (with sign panels currently in place) and the record plans and/or photos from the last inspection or inventory. The purpose of this check is to verify that the existing structure is carrying the sign panels it was originally designed for. If either the structure size or panel area and locations differ from the record, the existing configuration shall be recorded on the inspection forms, and the box to “Recommend Further Investigation” should be checked, along with an explanation. The inventory information shall also be reviewed and, if necessary, shall be updated using form S107.

NUMERICAL CONDITION RATING SCALE

The inspection report forms use the numerical rating scale as noted in Table 3 to evaluate the condition of the structural elements of a sign structure. Place the number that best describes the condition of the element in the box next to the name of the element on the inspection report form S101. Include a written description for clarification or further explanation for elements that are rated 4 or less.
It is essential that the inspector use the rating scale in a manner consistent with the criteria established in this manual. Meaningful statewide assessment of sign structure conditions is possible only through consistent use of the rating scale.

**Table 3 - The Numerical Rating Scale**

<table>
<thead>
<tr>
<th>Rating #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Condition and/or existence unknown.</td>
</tr>
<tr>
<td>8</td>
<td>Does Not Apply.</td>
</tr>
<tr>
<td>7</td>
<td>New condition. No apparent problems.</td>
</tr>
<tr>
<td>6</td>
<td>Used to shade between ratings of 5 and 7.</td>
</tr>
<tr>
<td>5</td>
<td>Minor deterioration, but functioning as originally designed.</td>
</tr>
<tr>
<td>4</td>
<td>Used to shade between ratings of 3 and 5.</td>
</tr>
<tr>
<td>3</td>
<td>Serious deterioration, or not functioning as originally designed.</td>
</tr>
<tr>
<td>2</td>
<td>Used to shade between ratings of 1 and 3.</td>
</tr>
<tr>
<td>1</td>
<td>Totally deteriorated, or in failed condition.</td>
</tr>
</tbody>
</table>
INSPECTION FORMS AND PHOTOGRAPHS

Blank copies of inspection forms S101 thru S106 are found in Appendix B. Record all condition ratings for the foundation and superstructure on Form S101.

Narrative comments and photos are required for all items rated 4 or lower, including a complete technical description of the location, nature, and extent of the problem. Comments shall be cross-referenced to photos. Use Form S102 for recording findings, descriptions, and comments.

In addition to forms S101 and S102, the following forms are also provided for convenience, and shall be included in the Inspection Report submission:

- Form S103 - Photo mounting sheets w/commentary & reference area
- Form S104 - Used for drawing sketches and sign legend

Forms S105 (List of photos) and S106 (Daily progress report) are provided for record keeping only, and are not required in the Inspection Report submission.

Provide a minimum of two (2) 3.5" x 5" color photographs (35 mm format) of the complete structure (front, showing text legend, and back oblique views). In addition, provide photographs and sketches of areas with defects, damage, or deterioration as noted in the inspection commentary. Use a camera that has a date stamp, with the date impressed on each photo.

RECORDING OF INSPECTION RESULTS

Record all inspection data on standard report forms, S101 to S106. Record the REGION/COUNTY code, RESIDENCY code, SIN, and DATE in the boxes provided on forms S101 and S102. The R/C and Residency codes are found in Tables 1 and 2 of Chapter 2. Record the type of AGENCY (State=10, Consultant=13) performing the Inspection, in the boxes provided on Form S101. The Team Leader’s name and signature, and the Assistant Team Leader’s name must be recorded on all inspection forms.

Element Ratings:

The one rating number that describes the condition of an element that consists of multiple components, should reflect the condition of the worst component. Any remarks made in the inspection report for that element should also include a brief statement of the condition of the other components.

Example: For a span type structure, the “Arm/Truss” is an element composed of many chord and diagonal components. If it has one severely deteriorated or cracked diagonal, the rating of the element would be 2 or 1, even though the other components may be in excellent condition.
The following items are to be inspected and rated as elements of the sign structure:

1 - FOUNDATION (Box 17)

What To Rate:

Rate the condition of the foundation and its ability to function properly. Also include any foundation material deficiencies that may be causing distress to the superstructure.

What To Look For:

- Check concrete foundation for soil erosion, soil failure-tipped foundation, spalling and/or cracks; noting any vegetation growth through cracks. Also check and note condition of grout, if used.
- Conduct soundness test of the concrete foundation by listening to the sound made when lightly tapped with a hammer. Any areas around the outside of the foundation which exhibit a hollow sound are to be noted for further evaluation and/or testing.

Rating Examples:

- 9 - This code ("Unknown") is used when the foundation is covered or inaccessible.
- 5 - Indicates minor deterioration, such as minor cracking or spalling.
- 3 - Indicates significant deterioration by cracking or heavy spalling.
- 1 - Indicates a foundation that has deteriorated to such an extent that it does not function as originally designed; e.g., bearing plate undercut. Soil failure-tipped foundation.
Figure 11 shows foundation for Trussed Posts in good condition. This foundation is rated 6.

Figure 12 shows foundation for a Single Round Post in poor condition. The mortar cap is totally deteriorated, exposing rebars and leveling nuts. This foundation is rated 2.
2 - BASE PLATES AND ANCHOR BOLTS (Box 18)

What To Rate:

Rate the condition of base plates, anchor bolts (remove dust caps where required), and shoe bases. The rating should reflect the condition of the worst elements for a trussed post configuration.

What To Look For:

- Using a magnet verify whether the metal is steel or aluminum.
- Inspect base plates, gussets and structural tubing (post base) for rust, ponded water, clogged weep holes, welds for cracks and condition of galvanizing. If cracks are found, the visual limits of the cracks are to be marked on the member with paint prior to photographing them for documentation.
- Inspect the anchor bolts for size, rust, tightness of nuts, lock washers, section loss at threads and condition of galvanizing. Use 16-ounce ball-peen hammer when checking bolts. Hit both sides of top nut and top of bolt to check for loose nuts and/or cracked or broken bolts. Tight nuts give sharp ringing sound, loose equates to dull sound. Determine and record bolt pattern, record missing bolts, damage, etc.

Rating Examples:

- 7 - Base plates and anchor bolts are in new or like-new condition.
- 5 - Minor corrosion of base plate and/or anchor bolts, loose nut.
- 3 - Heavy corrosion of base plate and/or anchor bolts.
- 1 - Cracked weld, sheared anchor bolt, missing nuts, cracked base plate/shoe base.

3 - GUIDERAIL PROTECTION (Box 19)

What To Rate:

Rate the condition of the guiderail as it is installed. If no guiderail is present, record clear distance from roadway curb to the sign structure post(s).

What to Look For:

- Check guiderail for impact damage, correctness of installation and clearance between the guiderail and the sign structure post(s) against the record plans.
Rating Examples:

7 - No deterioration or misalignment, new or like-new condition.

5 - Some minor deterioration of the posts and/or rails, but all components still in original position and functioning as originally designed.

3 - Major deterioration, impact damage, serious misalignment, significant looseness in the connections, resulting in weakening the rail well below original design.

1 - Severe impact damage or deterioration resulting in a totally ineffective system. This includes guidewals that are missing because of impact or deterioration.

4 - POSTS (Box 20)

What To Rate:

Rate the physical condition and functional capability of the posts.

What To Look For:

- Inspect end support posts and diagonals for dents, cracks, rust, overall condition of galvanizing, and plumbness.

- Check for handhole covers and vegetation growth inside the tubing when handhole is exposed. In such instances, visually inspect the condition of electrical components in the handhole. Missing handhole covers and post caps should be reported.

Rating Examples:

7 - Use for posts in new or like-new condition.

5 - Minor corrosion of post with no section loss, moderate corrosion of web members and/or their connections with no section loss. Missing handhole cover. Missing post cap.

3 - Heavy corrosion of post with localized section loss, heavy corrosion of web members and/or their connections with section loss.

1 - Deterioration is so severe that structural integrity is in doubt. Failure may be imminent. Cracked welds in trussed posts.
5 - CONNECTIONS TO THE POSTS (Box 21)

What To Rate:

Rate the connection of Arm/Truss to posts. This rating should reflect the condition of the worst element rated.

What To Look For:

- Inspect the arm connections on cantilever type structures, and the truss connections on span type structures, to posts. This includes connection plate(s), clamps and all welds/bolts.

- Visually inspect all welds for cracks; especially where galvanizing is peeling, cracked or shows signs of rust. Dye-penetrant or other non-destructive testing may be required.

- Inspect all bolts and nuts for tightness; any indication of section loss and/or cracking and corrosion. Check the material type for U-bolt connection to saddle block. If material type is aluminum, flag for replacement.

Rating Examples:

7 - New or like-new condition; no significant deficiencies in connections.

5 - Minor corrosion of connections without any section loss.

3 - Moderate corrosion of connections with section loss.

1 - Crack in any welded steel plates at posts. Missing or broken bolts at main connections.
Figure 13 shows top of a Trussed Post in good condition. However, the post cap is missing. Rate this side posts 5, and issue Request for Repair for missing post cap.

Figure 14 shows a single round post in good condition. This post is rated 6.
Figure 15 shows typical arm to post connection for a steel dual trussed-arm cantilever sign structure that is in good condition. Rate this connection 6.

Figure 16 shows bottom arm to post connection for a steel dual trussed-arm cantilever sign structure that is in very poor condition. The upper bolt is disengaged due to stripped threads in the post flange plate. Rate this connection 1. Issue a flag with Prompt Interim Action.
6 - ARM/TRUSS FRAME MEMBERS (Box 22)

What To Rate:

The most common truss type for cantilever sign structures is a plane truss, whereas a tri-truss is the most common type for span sign structures. The integrity of the entire truss is dependent upon the condition of each individual element. Improper alignment of individual truss members can significantly affect their ability to carry axial loads. Bowed or buckled compression members may severely reduce the capacity of the entire truss. A single non-redundant member or connection in poor condition can dramatically influence the capacity of the entire truss. Keeping these facts in mind, rate the Arm/Truss members. Follow the numbering scheme for truss members, as described in this manual, to record deficiencies.

What To Look For:

- Inspect all tubes/pipes for dents, cracks, and rust.
- Inspect the splice plates/flanges and bolts/nuts for rusting, looseness, and cracks.

Rating Examples:

7 - New or like-new condition; no significant deficiencies in truss members or connections.

5 - Minor corrosion with no section loss, minor misalignments, no significant impact damage.

3 - Serious corrosion to one or more members or connections, corroded or missing bolts/nuts in one or more critical members, minor impact damage.

1 - Crack in any member or weld, severe section loss in members or connections, severe truss member misalignment, severe impact damage.
Figure 17 shows a Four-Chord steel truss with moderate corrosion throughout. Truss members are rated 5.

Figure 18 shows a severed diagonal web member of an aluminum Tri-Truss. This truss receives a Flag with Prompt Interim Action.
7 - SIGN PANELS (Box 23)

Compare the number, locations and dimensions of the sign panels in place with the inventory sign data on form S107, and/or Record Plans. The purpose of this check is to verify that the existing structure is carrying the sign panels it was designed for. If either the panel areas or locations differ, report discrepancies to NYSDOT’s regional office and check box 27 on form S101 to recommend further investigation.

What To Rate:

Rate the physical condition of sign panels and lighting system with their structural supports.

What to look for:

- Inspect all U-bolts connecting the sign to the arms or truss chords, and all connections in the sign framework.
- Inspect sign face extrusions for impact damage and weathering.
- Inspect light support for tightness where attached to the truss chords. Also check structural condition of luminaries and housing.
- Check for missing or inoperable units, fixtures hanging out of housing and exposed wiring. To test lights with a photocell, cover the cell for about one minute and check to see if lights turn on.

Rating Example:

7 - Sign panels are new or like-new.

5 - There may be minor loss of legibility due to dulled paint or loss of reflectorization. Graffiti, vandalism, or collision damage, but not affecting legibility. Minor deterioration or impact to connecting components.

3 - Signs are difficult to read for any reason. Significant deterioration or impact damage to the sign panel and/or connecting components.

1 - Any collision damage or deterioration serious enough to threaten collapse, or separation of sign from structure.
Figure 19: Illustration for a truss mounted Sign Panel and Light Fixtures.

Figure 20: Illustration for a truss mounted four line Variable Message Sign (VMS) Panel.
8 - SURFACE COATING (Box 24)

What To Rate:

Rate the physical condition of the paint or protective coatings of the sign structure. For weathering steel, rate the effectiveness of the iron oxide coating. Similarly, rate the effectiveness of galvanized coating for hot-dip galvanized-steel.

What To Look For:

- Inspect paint and/or surface coating of sign structure for chalking, alligatoring (checking), cracking, blistering, holidays (thin areas), pitting, saponification (alkaline chemical attack), loss of adhesion, wrinkling, or other deterioration. Application defects often include thin areas, scrapes, and peeling (lack of adhesion) due to improper surface preparation or handling. Thinner areas of paint or surface coating are noticeable due to differences in appearance such as coloring or shading.

The surface coating rating shall reflect the condition of the current paint or protective coating system. Prior section loss remaining in the base metal after painting should be reflected in the member rating.

Rating Examples:

7 - New: The paint or coating system is in new or like-new condition. Galvanized steel surface is hard and either shiny spangled or dark gray matte finish in appearance.

6 - Slight Deterioration: The paint or coating system is in generally good condition with isolated areas requiring touch-ups. There may be some thinner areas of paint/coating. Isolated areas of wrinkling due to excessive paint thickness or temperature during painting might be observed. Galvanized surfaces are generally in good condition, appearance is flat/dull.

5 - Moderate Deterioration With No Corrosion: The paint or coating system shows signs of deterioration at isolated locations. Base metal is not corroded. Typical signs of deterioration include peeling of the finish coat, bleeding with localized areas of rust staining, alligator cracking, and chalking. Galvanized steel surfaces show signs of localized loss of zinc coating, especially at minor scrapes or shallow scratches.

4 - Poor Condition With Minor Corrosion in Isolated Areas: The paint or coating system has localized areas in poor condition with minor corrosion. Galvanized steel surfaces have undergone significant loss of zinc coating. Surface texture is dull and matte-like throughout with localized areas of base metal exposed by scratches or scrapes.
<table>
<thead>
<tr>
<th>Condition Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - Poor Condition With Minor Corrosion Widespread</td>
<td>The paint or coating system is generally in poor condition throughout the structure. Steel members show moderate corrosion at many locations. Galvanized steel surfaces have lost much of the zinc coating with noticeable stains at scratches, loss of shine, and a general dull matte finish.</td>
</tr>
<tr>
<td>2 - Very Poor Condition With Serious Corrosion Isolated Areas</td>
<td>The paint or coating system is in very poor condition with moderate to heavy corrosion of steel members at isolated areas. Galvanized steel surfaces have little or none of the zinc coating left and localized areas of base steel are exposed with moderate corrosion present.</td>
</tr>
<tr>
<td>1 - Very Poor Condition With Serious Corrosion Widespread</td>
<td>The paint or coating system is in very poor condition and severe corrosion is widespread. Severe scaling, delamination, and deep pitting are common. Large areas have no paint remaining and where it is present, paint is faded, peeling, and/or chalking. Galvanized steel surfaces have many areas of exposed, heavily corroded, base steel.</td>
</tr>
</tbody>
</table>

Figure 21 shows a painted aluminum tri-truss with painted steel posts. There is widespread corrosion and loss of paint at posts with no section loss. Rate surface coating for posts 2.
Figure 22 shows a newly painted aluminum tri-truss and steel trussed posts. Rate this surface coating 7.

9 - OVERALL RECOMMENDATION (Box 25):

This rating is the team leader’s assessment of the sign structure’s overall condition. The one rating number to be assigned to the structure should reflect both the condition of the structural elements and their ability to function as a system. Elements which have greater structural or functional importance should have greater influence in determining the overall recommendation. Note that some elements may be rated 3 and at the same time, the overall rating could be 5. The overall rating should also reflect the condition of the structure as it relates to public safety.
ACTIONS

If during field inspection, conditions are found that warrant corrective actions to be taken, the team leader shall exercise engineering judgement in order to determine if the problem warrants issuance of a “Recommendation for Further Investigation”, “Sign Structure Flag”, or “Request for Repair”.

The team leader will have to indicate on Form S101 the action taken and fill corresponding forms. Forms for “Sign Structure Flag”, “Request for Repair” and “Recommendation for Further Investigation” are found in Appendix C. Completed forms shall be sent to the Regional Structural Engineer.

Items to be completed on Form S101 are explained below.

1 - RECOMMEND FURTHER INVESTIGATION? (Boxes 26-27)

This item indicates that further engineering investigation or analysis is required to determine the condition found on the sign structure. Examples include flat (1/8” thick aluminum) sign panels which have been moved and/or increased in size and/or number; sign structures that supports a VMS unless the structure has been designed for the additional eccentric dead load and provisions for fatigue loadings; and sign structures that supports a VMS that has been moved from its original location and/or changed in size and/or number.

On Form S101, if a Recommendation for Further Investigation is required, check box 27 and provide a brief description in the space provided.

2 - FLAG ISSUED? (Boxes 28-29)

There is only one type of flag used for the sign structures, namely Sign Structure Flag (SSF). A Sign Structure Flag is used to report the failure or potentially imminent failure of a critical primary structural component. Potentially imminent means that a failure is likely before the next scheduled inspection.

This flag would also be used to report the actual or imminent failure of a non-critical structural component, where such failure may reduce the reserve capacity or redundancy of the structure, but would not result in a structural collapse presenting a clear and present danger.

On Form S101 indicate whether a Sign Structure Flag (SSF) is issued for the inspected structure. If no flag has been issued, check box 28. No further explanation is required. If a flag has been issued, check box 29. Provide a brief description in the space provided. A detailed flagging procedure is found in Appendix A.

3 - REQUEST FOR REPAIR ISSUED? (Boxes 30-31)

This item indicates the condition is not an immediate safety hazard to the traveling public, however it may be one that warrants a repair. If a “Request for Repair” is deemed necessary, check box 31 and provide a brief description in the space provided. If no such action is required, check box 32; no further explanation is required. (Note that conditions at a sign structure may have boxes 29 and 31 checked at the same time.)
This procedure sets forth a uniform method of timely notification of appropriate responsible parties for serious sign structure deficiencies that require fast attention. It further establishes requirements for certifying that appropriate corrective or protective measures are taken within an appropriate time frame. Flags shall not be used to identify repairs needed where no immediate or potential danger exists.

**Sign Structure Flag - Definition:**

Flag used to report the failure or potentially imminent failure of a critical primary structural component. Potentially imminent means that a failure is likely before the next scheduled inspection.

This flag would also be used to report the actual or imminent failure of a non-critical structural component, where such failure may reduce the reserve capacity or redundancy of the structure, but would not result in a structural collapse presenting a clear and present danger.

**Flag Status:**

A Sign Structure Flag is categorized as follows:

- **Active Flag** - A flag for which a “Flag Removal/Inactivation Report” has not been filed. Active Flags shall be categorized as:
  1. Response pending
  2. Response overdue

- **Inactive Flag** - A flagged condition for which a “Flag Removal/Inactivation Report” has been filed indicating “Flag Inactivation”. Inactive Flag is categorized as follows:
  3. Temporary repairs made or actions taken.

- **Removed Flag** - A flagged condition for which a “Flag Removal/Inactivation Report” has been filed indicating “Flag Removal”. Flag Removals are categorized as follows:
  5. Repairs have been made and certified by a NYS PE.
  6. Sign Structure with flagged condition certified as safe by a NYS PE.

**Flag Numbering:**

The Sign Structure Flag (SSF) number will be a unique sequential number assigned to each individual flag, such as SSF-1, SSF-2, etc. Inspection agency issuing flag shall coordinate with NYSDOT’s regional office in numbering of flag reports.
Flagging Procedure:

The Flagging procedure is outlined in the following paragraphs for Sign Structure Flags.

1. Observation - Immediately after the problem is observed, the inspection team leader shall complete the “Flagged Sign Structure Report” (FSSR) and shall attach photographs where practical. If in the team leader’s judgement, expediency is required, verbal notification to the Regional Structural Engineer (RSE) may be made before completing the FSSR.

2. Prompt Interim Action - The inspection team leader shall determine if the problem warrants a recommendation of “Prompt Interim Action” (PIA). If this recommendation is made, it shall be included in the verbal notification to the Regional Structural Engineer. For all PIA Flags, the Flag Packet shall be completed by the team leader, consisting of “Flagged Sign Structure Report”, inspection forms and any available condition photos. The packet shall be forwarded to the Regional Structural Engineer within five working days (maximum) from the date the condition was observed.

3. Verbal Notification of RSE for P.I.A. - The team leader shall immediately, upon completing the Flagged Sign Structure Report, telephone the RSE describing the physical condition. The team leader shall record the name of the Regional Structures person notified on the Flagged Sign Structure Report. The Regional Structures Engineer shall determine who is the Responsible Party for the flagged portion of the sign structure.

4. Verbal Notification of Responsible Party for P.I.A. - The RSE shall immediately notify the responsible party. The RSE shall make the inspection team and necessary access equipment available at the sign structure site to explain the flagged condition, if needed. The RSE should, as soon as possible, forward the flag packet to the Responsible Party. The RSE shall make recommendations for corrective or protective measures.

5. Decision on Prompt Interim Action - The Responsible Party shall be informed of the Prompt Interim Action recommendation. A decision by the Responsible Party is required within 24 hours.

6. Flag Packet - The flag packet shall be completed by the team leader and forwarded to the RSE within five working days (maximum) from the date the flagged condition was observed.

7. Written Notification (Flag Letter) to Responsible Party - The RSE shall transmit a copy of the Flag Packet by memo to the Responsible Party. The flag transmittal memo must accurately state the facts and clearly emphasize the degree of urgency involved. As an alternate to restating all the particulars of the flag condition, the transmittal memo may refer to information contained in the Flag Packet. A copy of the transmittal and flag packet shall be sent to the NYSDOT’s Structures Division.

8. Response to Written Notification - The response shall be signed by New York State licensed Professional Engineer (NYS PE), explaining what action is or will be taken and when it will be taken. If no action is being taken, the response shall explain the reasons for this decision. All actions proposed or taken must be certified by a NYS PE. Generally, all actions taken shall be
completed within six weeks, but if action is deferred, a NYS PE shall certify that the sign structure is safe and the flagged condition is not a danger to the traveling public.

9. Flag Removal/ Inactivation - When certified corrective or protective actions are reported by the Responsible Party as complete for all deficiencies causing the Sign Structure Flag, or the sign structure is certified as safe, the RSE shall remove or inactivate the flag. A flag is removed when the sign structure is permanently removed or when repairs have been certified by a field inspection by a NYS PE. A flag is made inactive when temporary repairs are made. The RSE shall complete a Flag Removal/Inactivation Report to delete the flag from the list of active flagged sign structures. The RSE shall send a memo explaining the flag removal or inactivation to the Responsible Party, attaching a copy of the Flag Removal/Inactivation Report.

10. Flag Review - When a flag is reported, the RSE shall review the previous inspection report. If the RSE determines that the previous report should have indicated an overlooked condition that lead to the flag, the RSE should discuss these findings with the team leader. In case of consultant inspection, the RSE shall discuss the findings with the Consultant Project Manager of the firm performing the previous inspection.

As a quality assurance effort, NYSDOT Structures Division shall review selected Flag Packets, and correspondence to evaluate the effectiveness of the inspection program and initiate changes as needed. Flag Packets shall contain sufficient information for this review.

11. Overdue Flag Response - The RSE shall monitor the list of Sign Structures with the active flags for receipt of written replies from the Responsible Parties. Within five weeks of the date of the written transmittal, the RSE shall send follow up notification to the Responsible Party for all active flags. The memo shall be similar to the initial notification in form and content and state the six week time limit is imminent.

**Documentation:**

The Flag Packet shall consist of:
- Flagged Sign Structure Report
- Inspection Forms
- Notes
- Sketches
- Photos (colored copies)

Inspection form S101 shall indicate that the “Sign Structure Flag” is issued (check box 29). Five copies of the Flag Packet shall be submitted to the RSE within five working days (maximum) from the date the flagged condition was observed.

**Flag Continuation:**

When an existing flagged condition is found by the team leader to remain in a subsequent inspection, the condition shall be reflagged with a new Flagged Sign Structure Report and complete documentation. The new flag shall be assigned a new flag number. The Flagged Sign Structure Report shall note that an existing flag is being superseded. The superseded flag shall be deleted from the flag database when the new flag is entered.
OVERHEAD SIGN STRUCTURE

INVENTORY AND INSPECTION MANUAL

APPENDIX B

INVENTORY AND INSPECTION FORMS
OVERHEAD SIGN STRUCTURE

INVENTORY AND INSPECTION MANUAL

APPENDIX C

FLAG, REPAIR REQUEST, & RECOMMEND FURTHER INVESTIGATION FORMS