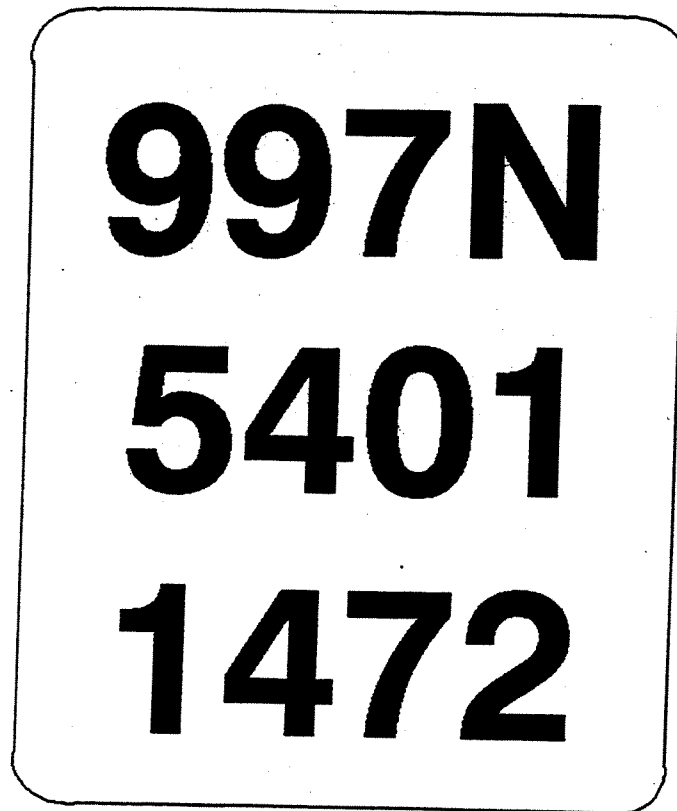


REFERENCE MARKER MANUAL



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NEW YORK STATE DEPARTMENT OF TRANSPORTATION
STATE CAMPUS, ALBANY, NEW YORK 12232

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INTRODUCTION

This manual was developed to explain the Reference Marker System as recently revised by the New York State Department of Transportation. It is intended to provide a detailed description of both the physical and operational characteristics of the system, establish the guidelines to be used in the installation of Reference Markers in the field, and serve as a procedural guide for those personnel responsible for the maintenance of this field system.

I. THE REFERENCE MARKER SYSTEM

A. Purpose and Scope

The continual increase in traffic volumes on New York State's highway system requires that the Department of Transportation develop and maintain a safe network of highways that will serve the State's present and future travel needs. To meet this requirement, various data related to the physical and operational characteristics of the present highway system are collected, correlated, and analyzed. The analysis of this information aids in making sound decisions regarding system maintenance and improvements.

The initial reason for the development and implementation of the Reference Marker System came from the "Highway Safety Act of 1966". Article 402(a) of the Act stated in part that, "each state shall have a highway safety program approved by the Secretary...such programs shall be in accordance with uniform standards promulgated by the Secretary...such standards shall include, but not be limited to, provisions for...surveillance of traffic for detection and correction of high or potentially high accident locations ..."

Since that time, the original use concept for these referencing devices has been expanded from one of just "accident location markers" to a statewide Reference Marker System which may be used not only for the description of highway accident locations, but also for a variety of other Department-wide referencing needs.

These reference markers have the following identification advantages:

1. They are field located and easily visible from the highway area.
2. They are uniform in size, shape, color, and identification legend.
3. They have been installed along New York State Touring Routes and other highway facilities that are New York State maintained. These facilities include ramps, service roads, arterials, spurs, reservation roads, parkways, institutional roads, reference routes, or any other facilities which are presently maintained by the State of New York.

B. Uses of the System

Currently, the Traffic Engineering and Safety Division maintains a computer file of all valid reference marker legends. The system contains both the markers physically posted in the field as well as sections of State highways, usually in cities, for which only a paper system exists. The Reference Marker System provides highway location identification for use in the following areas.

1. Highway Safety

By using the Reference Marker System to geographically locate traffic accidents, it is then possible to identify the highway characteristics that are associated with these traffic accidents. In addition, using the Reference Marker System to report dangerous highway conditions contributes to the Department of Transportation's ability to take the necessary corrective action. Historical traffic accident data for an extended period of time (approaching 20 years), Highway Safety Investigations (accident studies), and highway characteristic data (Sufficiency and Volume data), have been associated with this reference marker network.

2. Maintenance Management

Use of the Reference Marker System assists maintenance staffs in the location of areas where both highway deficiencies exist and routine highway maintenance and repair work is required. In addition, the Reference Marker System assists maintenance staff in the preparation of maintenance activity schedules, project planning, accident damage recovery work, and incident reporting, and also provides a means of relating maintenance costs (cost accounting) to specific locations throughout the State highway system.

3. Surveys and Physical Inventories

Reference marker legend data provides a base for the collection of data from such physical inventories as the traffic signal inventory, the railroad grade crossing inventory, the rest area inventory, the pavement marking inventory, the highway sign inventory, and the physical features inventory.

C. Panel Legend Components

The original reference marker panel legend components were derived from the basic route information as reported in the 1965 Highway Sufficiency Ratings and were designed only for use on those roadways that comprised the New York State Touring Route System. Since the installation of these original reference markers, however, many changes have occurred. The most significant has been the change in the general guidance to the Regions regarding alteration of panel legends. This has been revised recently, as reflected in Chapter V.

The following section will describe the panel legend components as they appear on the reference marker and show how several of these components were derived. Figure 1 depicts the dimension and location of the various components that comprise the reference marker panel face.

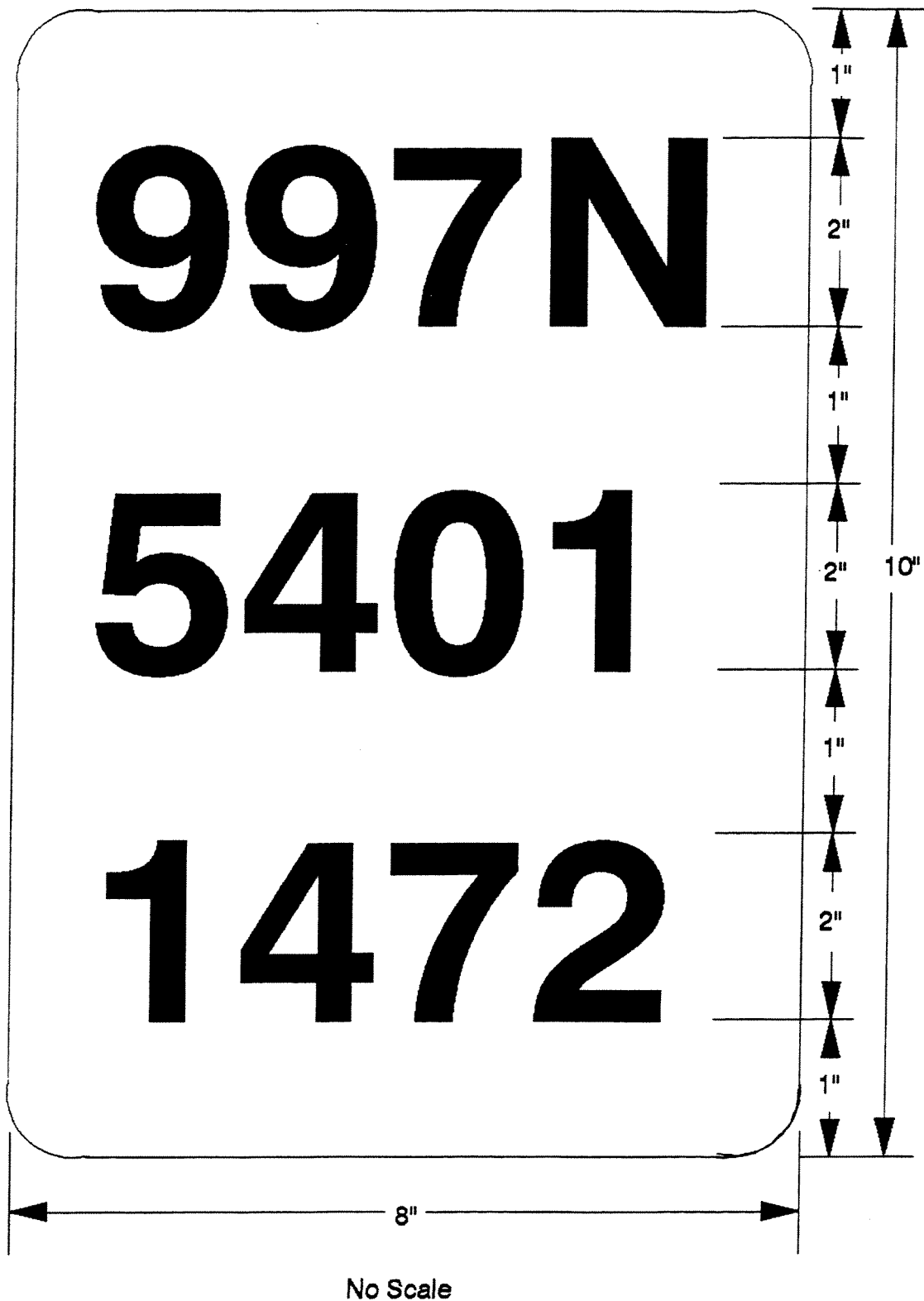


FIGURE 1. REFERENCE MARKER PANEL FACE

Each reference marker consists of three data lines which have a maximum capacity of four characters each. The components of each line are detailed below.

1. Reference Marker Panel Face Legend-Line (positions 1-4)

Positions 1-3 on this line are used to describe the touring route number. Touring route numbers range from one to three digits; for example, Route 5 or Route 177. When touring route numbers are entered on the reference marker, they are right justified starting in the third position on Line 1.

Position 4 on this line is used for the alphabetic suffix which forms a part of the touring route description; for example, Route 5S. If no such alphabetic suffix is required, this position is left blank.

2. Reference Marker Panel Face Legend-Line 2 (positions 5-8)

Position 5 on this line is used to describe the New York State Department of Transportation Region in which the particular portion of the touring route is located.

Position 6 on this line is used to describe the county of the Region in which the particular portion of the touring route is located. Map 1 depicts the distribution of counties by Region within New York State, defines the county distribution by Region, and depicts the range of acceptable Region-county codes that appear in positions 5 and 6 on Line 2 of the reference marker panel face.

Positions 7-8 on this line are used to describe the county order number of the touring route. The county order number is simply the number of counties which the route has traversed from its western or southern terminus.

3. Reference Marker Panel Face Legend-Line 3 (Positions 9-12)

Position 9 on this line is used to describe the control segment number of the touring route. This number simply locates the specific portion of the route within the county. Upon entering a county, the control segment starts at 1 and increases each time it crosses a city line (whether entering or leaving).

Positions 10-12 on line 3 are used to describe the sequencing numbers of the reference markers. Each reference marker, starting at the beginning of a control segment with sequencing number 000, is numbered sequentially for the total length of that control segment. Sequencing numbers revert to 000 when a new control segment begins. The segment length, as determined from the last 4 positions of the mile-point number (expressed in hundredths of a mile), is the basis for determining the total number of reference markers in each segment.

For example, a segment length of approximately 10.00 miles would contain 101 reference marker posts with consecutive numbers from 000 to 100, and the milepoint 09.50 would have a corresponding reference marker with positions 10-12 reading "095".

Since reference markers are installed at approximate one-tenth mile intervals, the sequencing number indicates the approximate distance to the nearest 0.1 mile from the beginning of the control segment. However, due to variations in location resulting from a variety of field locational problems (see Chapter III, Division B), individual linear intervals between consecutive sequencing numbers should not be equated to exact distances.

Reference markers are locational devices which were designed only for use in describing specific geographic reference points; they are NOT to be used as linear measuring devices. By definition, the terminology "reference marker" implies a unique location from which physical features can be initially referenced and later located with reasonable accuracy. By and large, the concept of ten reference markers to the mile is correct when considering approximate gross measurements; however, if finer measurements (to levels less than a one-mile interval) are required, existing reference marker spacing intervals may not produce the accuracy desired.

II. REFERENCE MARKER LOCATION AND SPACING FOR MAINLINE HIGHWAYS

A. Location and spacing of Reference Markers

The installation of reference markers varies with the type of mainline highway considered for installation. Along two-lane highways, markers are placed at approximately tenth-mile intervals on alternate sides of the highway facing the direction of travel (see Figure 2). Along multi-lane highways (four lanes or more), whether divided or not, reference markers are placed at approximate tenth-mile intervals on both sides of those highways facing the direction of travel (see Figure 3) to avoid the temptation of crossing the highway in order to obtain the reference marker legend.

B. Exceptions to Standard Placement and Spacing

The majority of reference markers installed in adherence to original contract specifications were placed at approximate tenth-mile (0.1 miles or 528 feet) intervals with an acceptable placement tolerance of \pm one hundredth (.01) of a mile or 52.8 feet. However, in some instances, exceptions to this standard placement and spacing may be encountered. These exceptions may be caused by one of the following factors.

1. Variations in the Spacing of Reference Markers Due to Physical Features

Variations in the spacing of reference markers may result in individual installation sites (approximate tenth-mile intervals \pm the allowable tolerance) falling at locations where physical features such as the center of an intersection, a driveway or a hard rock shoulder made it virtually impossible to install the reference markers. In cases of this type where adherence to both the approximate installation interval and placement tolerance could not be maintained, reference markers were installed at locations as close to the originally designated locations as possible.

2. Placement of Reference Markers at the End of Control Segments

Exceptions to standard placement intervals and tolerances may be encountered at the ends of various control segments of touring routes. Reference markers were originally installed along control segments at approximate tenth-mile intervals for the purpose of specifying reference points along these control segments. In most cases control segment lengths could not be expressed in an exact number of approximate tenth mile increments. Therefore, the installation of the last reference marker along individual control segments was modified to suit this condition. If the location of the last reference marker for a particular control segment was such that it fell within an area that was greater than five-hundredths (.05) of a mile but less than fifteen-hundredths (.15) of a mile from

the end of the control segment, the reference marker was installed. The distance between the last reference marker on one control segment and the first reference marker of the next control segment could be less than .1 mile (but never less than .05 mile) or greater than .1 mile (but never greater than .15 mile).

3. Variations in Reference Marker Placements on Multi-Lane Divided Routes Where Directional Alignments Differ in Length

Variations in the spacing of reference markers on multi-lane divided routes may be encountered in those areas where the routes' directional alignments differ in length. Originally, reference markers were installed at approximate tenth-mile intervals opposite each other on multi lane divided routes by starting from either the southern or western terminus of each route and proceeding to its northern or eastern terminus. This installation procedure has produced variations in the spacing of reference markers along both these shorter and longer directional alignments. For example, if the directional alignment for the primary direction of installation (south to north or west to east) is the shorter of the two alignments, reference markers installed on this alignment will always be located at approximate tenth-mile intervals while reference markers on the opposite, or longer, alignment may be located at distances greater than the approximate tenth-mile interval (including placement tolerance). Conversely, if the directional alignment for the primary direction of installation (south to north or west to east) is the longer of the two alignments, reference markers installed on this alignment will always be located at approximate tenth-mile intervals while reference markers on the opposite, or shorter, alignment may be located at distances shorter than the approximate tenth-mile interval (including placement tolerance).

4. Missing Reference Markers Due to Difficulty of Installation

Reference markers may be completely missing at some installation sites because physical features such as rock cut route portions and sidewalks in urban areas made it impossible to install these reference markers. Mounting posts could not be driven in rock cut portions or sidewalks and reference markers could not be installed. Nevertheless, the proper sequencing numbers have been maintained and the first reference marker following the gap in sequence will contain the correct sequence number for the particular control segment of the route on which it is located.

5. Additional Factors contributing to the Temporary Absence of Reference Markers

In addition to the previously mentioned conditions that have contributed to both variations in reference marker spacing and the absence of reference markers along portions of the State Touring Route System, such factors as removal as a result of motor vehicle accidents, maintenance operations, or vandalism have,

from time to time, also contributed to the temporary absence of certain reference markers along the New York State Touring Route System.

For the most part, variations in the spacing of reference markers can be accounted for by one of the previously mentioned factors. However, field use has indicated that there may be certain instances where reference marker installations deviate greatly from the approximate tenth mile installation interval (including placement tolerance). Please see Section V.B. for responsibilities in situations of misplaced markers.

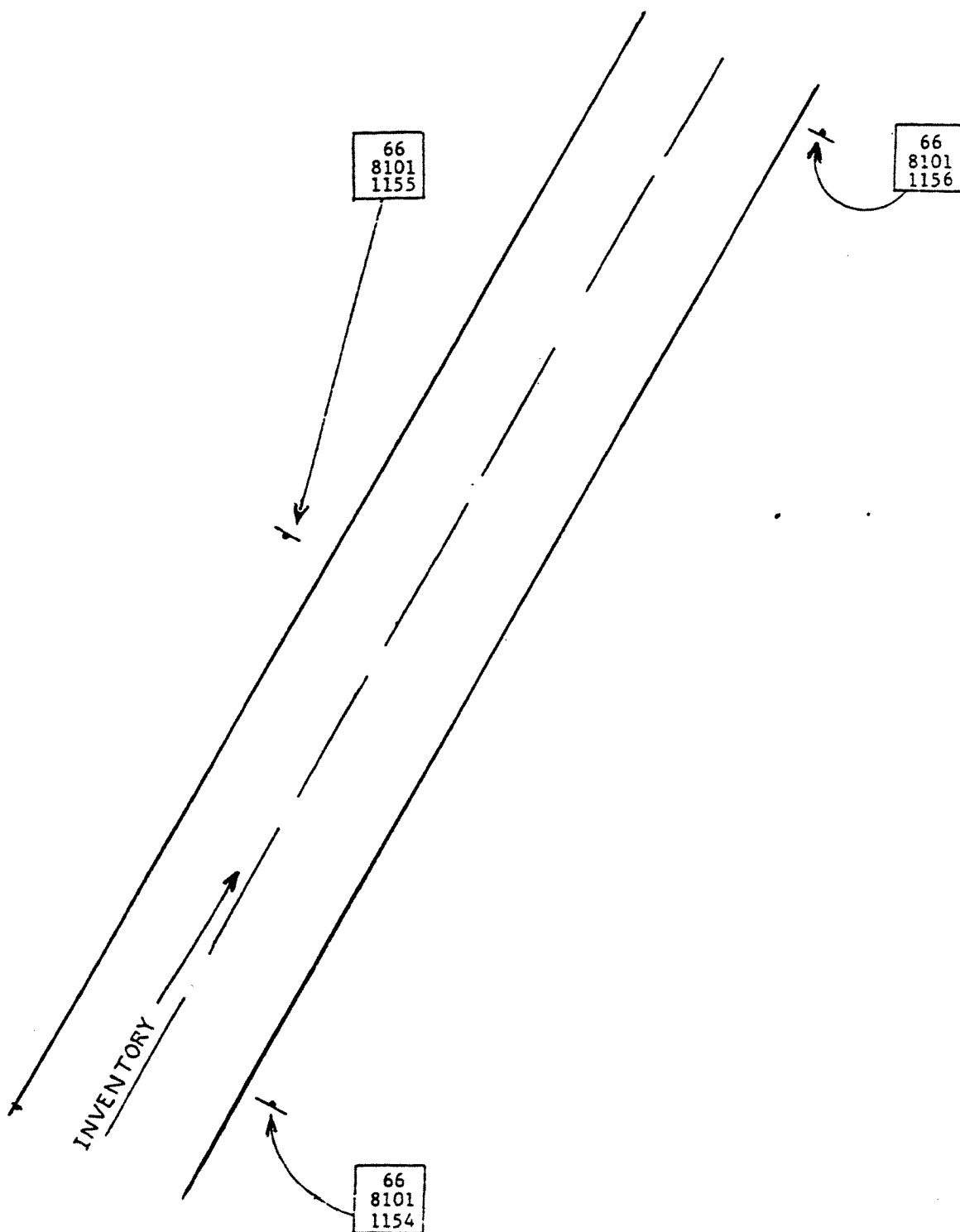
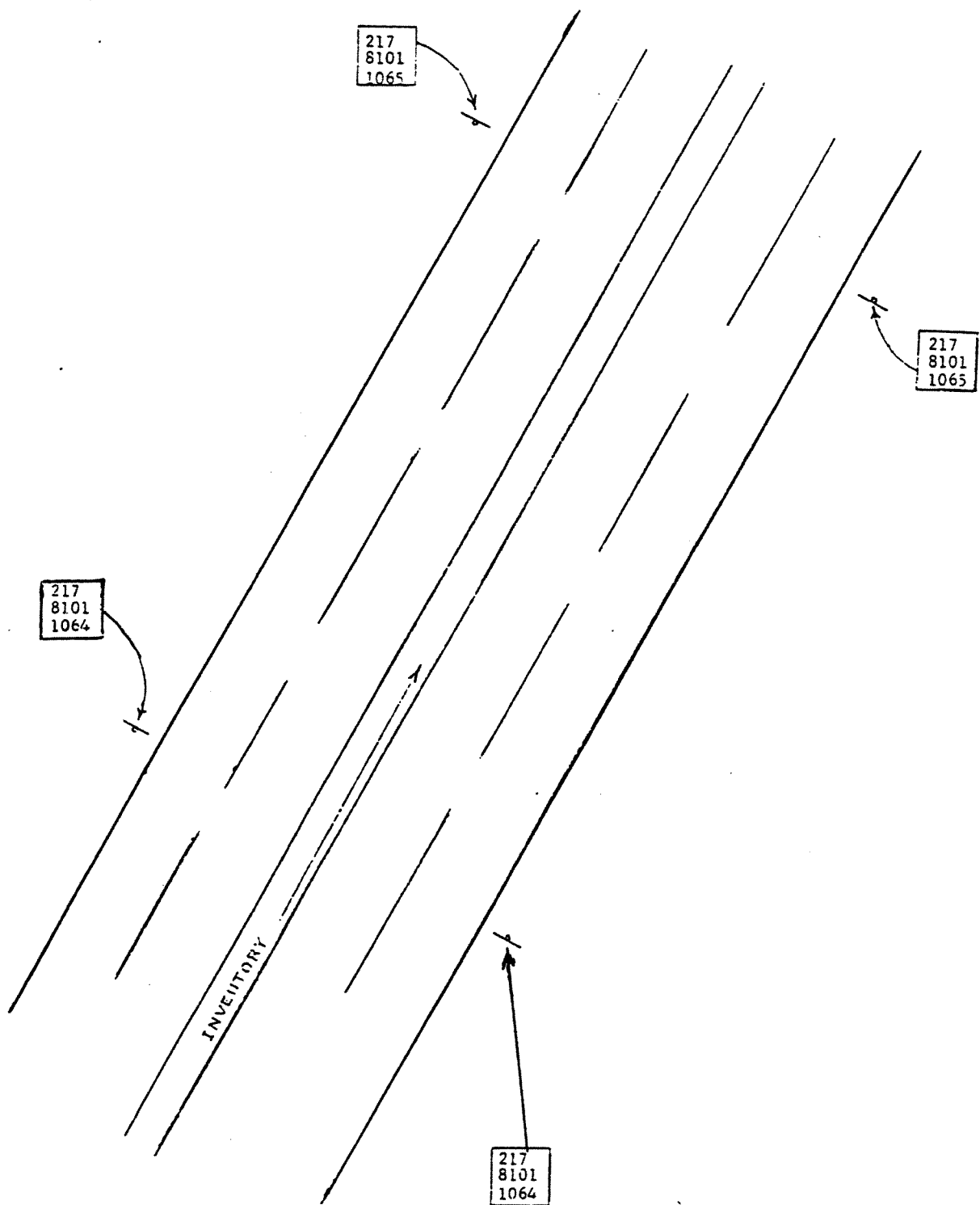


Figure 2. REFERENCE MARKER INSTALLATION ON A TWO-LANE HIGHWAY.



III. REFERENCE MARKER LOCATION AND SPACING FOR RAMPS, SERVICE ROADS AND REST AREAS

A. Location and Spacing of Reference Markers

The following procedures are to be used to locate reference markers being installed along various ramps, service roads and rest areas which are part of the New York State Touring Route System. The beginning and ending points of each service road are defined as the locations at which each service road joins the mainline which it serves.

1. On all ramps and service roads, reference markers will be installed using either Technique 1 or Technique 2, subject to the following guidelines.

Guideline 1 - The installation or placement tolerance for reference markers to be installed on service roads is the same as the tolerance for mainline highway installations; i.e., \pm one-hundredth (.01) of a mile, or 52.8 feet.

Guideline 2 - The ending reference marker should always be installed on all service roads, unless this marker falls at a location less than five-hundredths (.05) of a mile from the next reference marker on the roadway which the service road serves. Under these conditions, the next to last reference marker becomes the end marker and no reference marker will be installed at the end point.

- a. Technique 1 - If the distance between the last mainline reference marker (prior to the service road) and the origin of the service road is less than five-hundredths (.05) of a mile, install the first reference marker at approximately one tenth (0.1) of a mile from the last mainline reference marker. In addition, install one reference marker at the ending point of the service road and intermediate reference markers at approximate tenth-mile (0.1) intervals. If the distance between the location of the last intermediate reference marker and the end reference marker is greater than five-hundredths (.05) of a mile, install this intermediate reference marker.
- b. Technique 2 - If the distance between the last mainline reference marker (prior to the service road) and the beginning of the service road is greater than five-hundredths (0.5) of a mile, install the first reference marker at the beginning of the service road. In addition, install one reference marker at the ending point of the service road and intermediate reference markers at approximate tenth-mile (0.1) intervals. If the distance between the location of the last intermediate reference marker and the ending reference marker is greater than five-hundredths (0.5) but less than fifteen-hundredths (.15) of a mile, install this intermediate reference marker.

B. Panel Legends for Ramps, Service Roads and Rest Areas

The physical characteristics (size, shape, color and character capacity) of reference markers to be used in ramp and service road installations are the same as those found on reference markers installed along the State Touring Route System. However, the interpretation of these legends will differ somewhat from those used in the mainline. These differences in interpretation, along with the components of each of the three data lines contained on these reference markers, are detailed below. In addition, an example of the more complex ramp reference marker panels and placement required in Region 11 is shown in the Appendix.

1. Panel Legends for Ramps

This category consists of two types of panel legends: the first for ramps at interchanges along the mainline; the second for ramps associated with service roads.

a. Ramp Panel Legends at Interchanges

(Examples of interchange ramps are shown in Figures 4-7.)

Positions 1-3 are used for the touring route number. Usually, this number will be that of the touring route from which the ramp carries traffic. If the "from" roadway is not a touring route, use the "to" route number for these positions.

Position 4 is used to enter any alphabetic suffix forming a part of the touring route description. If no such alphabetic suffix is required, this position is left blank (see Figures 5 and 6).

Position 5 lists the number of the New York State Department of Transportation Region in which the portion of the touring route and the associated ramp are located.

Position 6 lists the county (within the region) in which the portion of the touring route and the associated ramp are located. (The chart following Map 1 in the Appendix depicts the region-county codes used in positions 5 and 6 on Line 2.)

Positions 7-8 give the number assigned to the interchange. This interchange number is unique within a county and is determined by assigning code 01 to the first interchange of the higher-ordered route (ordered as follows: Interstate, U.S. Touring Route, NY Touring Route) regardless of letter suffix, and starts from the route's southern or western terminus within each county. Each succeeding interchange along this route within the same county is numbered consecutively - using codes 02-99 -- providing the route is the higher-ordered route. If the route

whose interchanges are being numbered is not the higher-ordered one, the interchange under consideration will be assigned its number from the higher-ordered route it is associated with. Or, if the higher-ordered route interchanges are being sequentially numbered and the interchange services a route of equal order, the interchange number would be sequenced from the route with the lower route number.

Since this technique for numbering features a unique sequential code (01-99), newly constructed interchanges (between existing interchanges) can be included within the system without disrupting previously assigned elements. One simply uses the next sequence number(s) to uniquely identify the newly added interchange(s). From the sequence number(s) the new interchange(s) can be correctly located along the highway or in the Reference Marker File.

NOTE: Alphabetics will be used in Position 8 for mainline interchange ramps only if 99 interchanges are expected in a county. In that case, 1A-9Z will be used, omitting 10-90 which can be confused with numerics.

When using this interchange numbering method, care must be exercised to ensure that reference marker legends are not duplicated.

Position 9 lists a number designating the residency .

Position 10 lists a letter of the alphabet (A through M) to identify the ramp within a given interchange of a particular route. All ramps associated with a particular route at a given interchange are lettered counter-clockwise beginning with A, oriented either West to East or South to North in conformance with the route's order of importance. The order of importance of routes is as follows: Interstate, United States Touring, and New York State Touring Routes. In the example in Figure 7, Interstate Route 87 is the primary route compared with New York State Route 155.

Positions 11-12 give the sequencing numbers of ramp reference markers.

b. Ramp Panel Legends at Service Roads

(Examples of Service Road Ramps are shown in Figure 8.)

Positions 1-3 give the touring route number. This number will be that of the touring route to or from which traffic is carried by a ramp en route to a service road.

Position 4 is used to enter any alphabetic suffix forming part of the touring route description. If no such alphabetic suffix is required, this position is left blank (see Figure 12).

Position 5 is used for the number of the New York State Department of Transportation Region in which the portion of the touring route and associated ramp are located.

Position 6 is used for the county within the region in which the portion of the touring route and associated ramp are located.

Position 7-8 are used for the location number of the service road ramp or ramps.

A location, in this case, is defined as an area where traffic interchanges are made via ramps either to or from mainline facilities to or from service roads. Location numbers are determined by assigning the code A1 to the first service road-mainline locational area. Each succeeding location is coded consecutively from A2-Z9 (omitting 01-09 which cannot be distinguished from the numerics, and R1-R9 which are used for Rest Area Ramp installations). Thus, it is possible to assign 216 different location numbers to the same mainline route. As construction or reconstruction changes locational areas, the uniqueness of this numbering system permits additional locational areas to be included without disrupting the numbering system. The user simply uses the next sequence number(s) to uniquely identify the newly added locational area(s). From the sequence number(s) the new locational area(s) can be correctly located along the highway or in the Reference Marker File.

Position 9 lists a number which designates the residency.

Position 10 lists a letter of the alphabet to identify the number of ramps within a locational area. All ramps associated with the locational area are lettered counterclockwise A, B, C, and so on.

Positions 11-12 are used for the sequencing numbers used on ramps.

(An example of the Service Road is shown in Figure 8.)

Positions 1-3 are used for the touring route number, that of the principal route served by a given service road. Only those roads that service state touring routes (and/or those service roads that are the responsibility of the state to maintain either by its own forces or by contract) will contain reference markers.

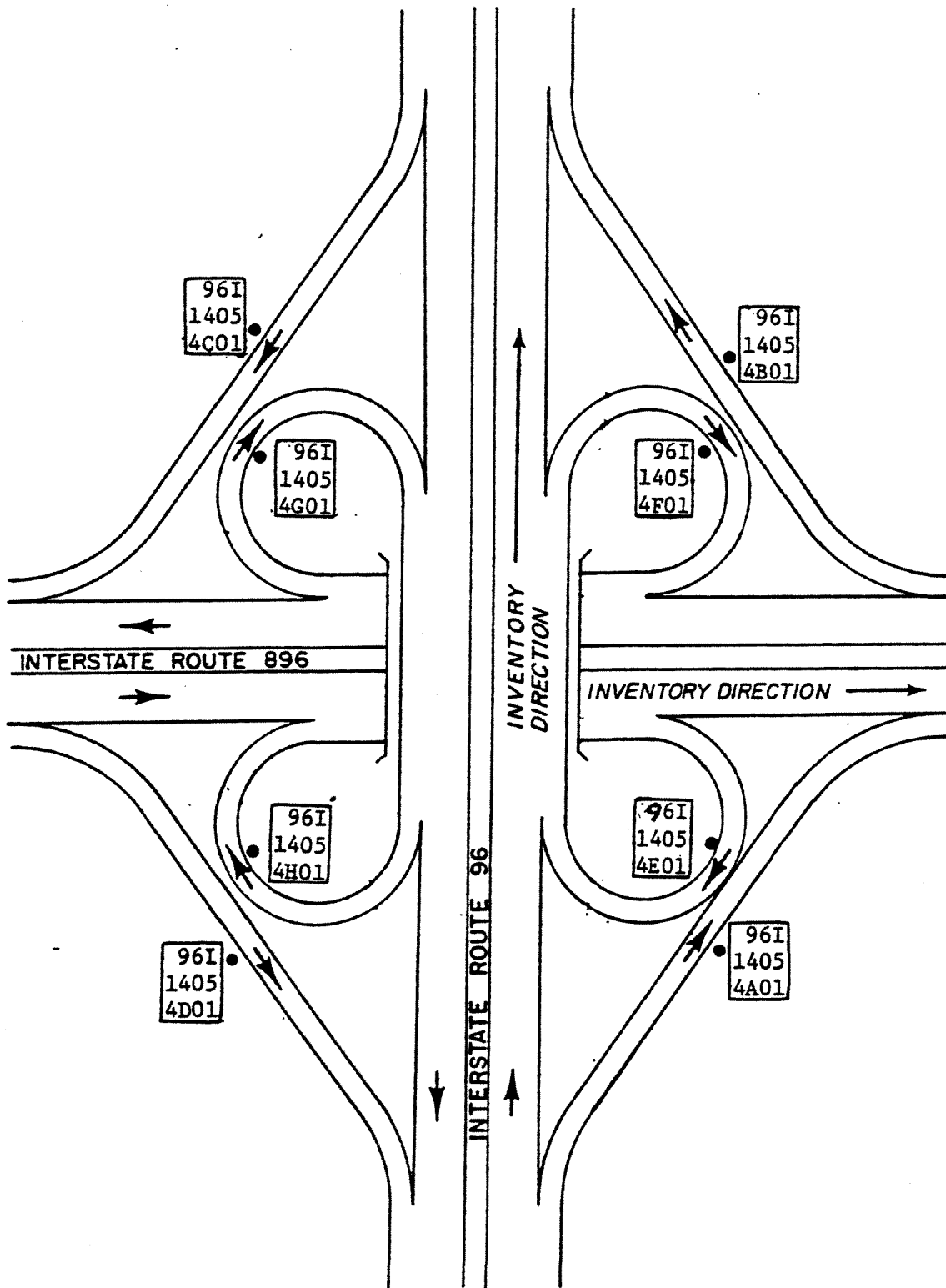
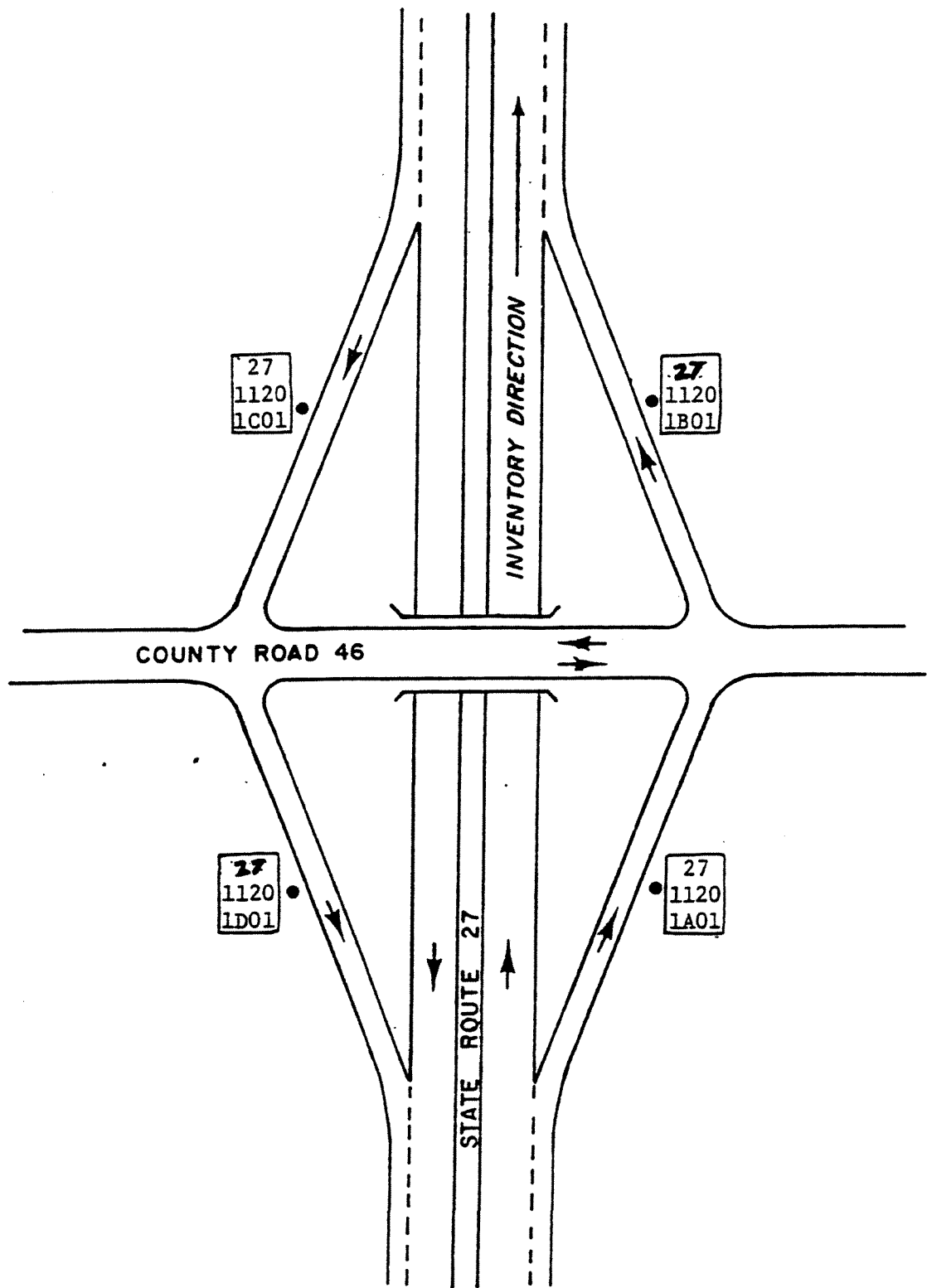


Figure 4. REFERENCE MARKER INSTALLATION AT A TYPICAL CLOVERLEAF INTERCHANGE.



16 Figure 5. REFERENCE MARKER INSTALLATION AT A TYPICAL DIAMOND INTERCHANGE.

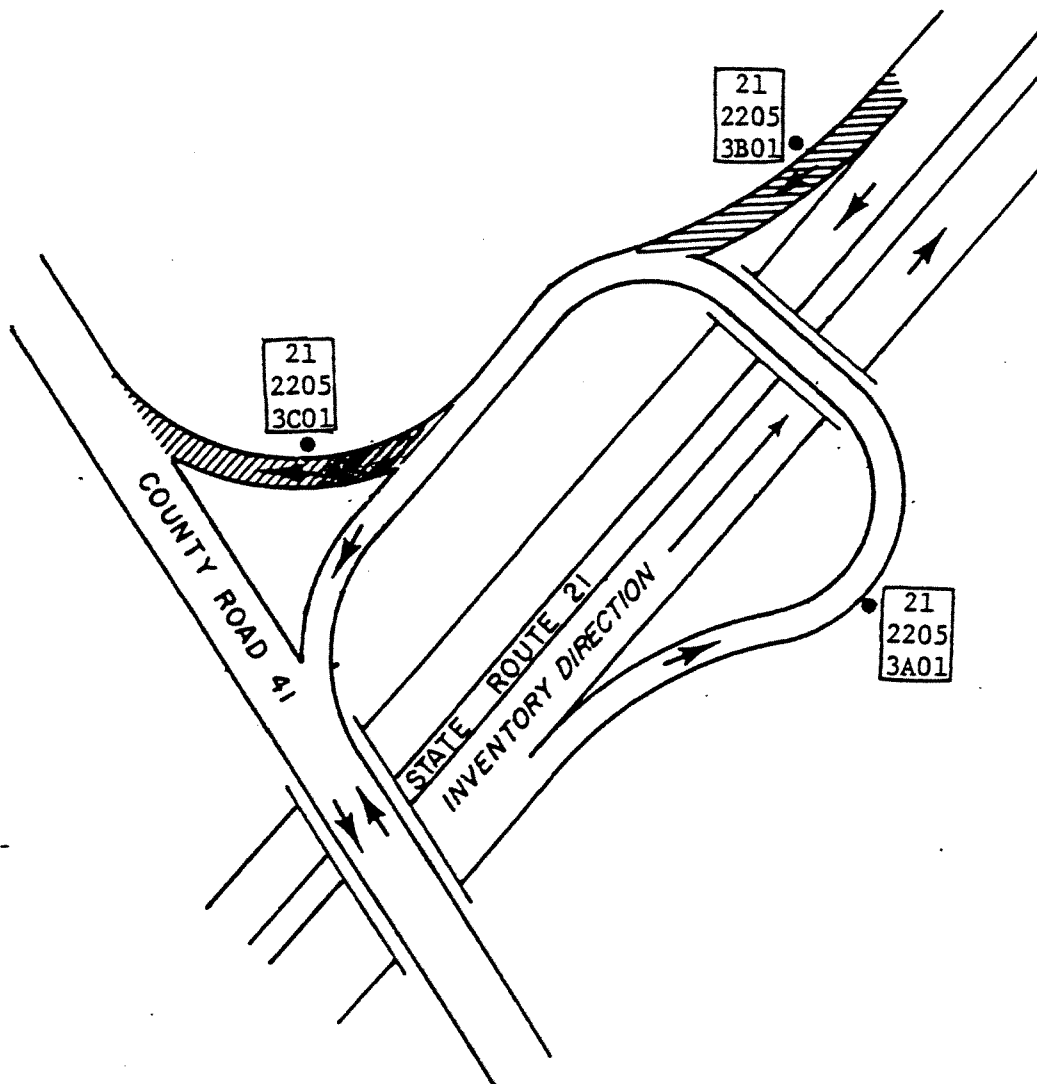


Figure 6. REFERENCE MARKER INSTALLATION AT A DIVERGENT OR INTERWEAVING RAMP.

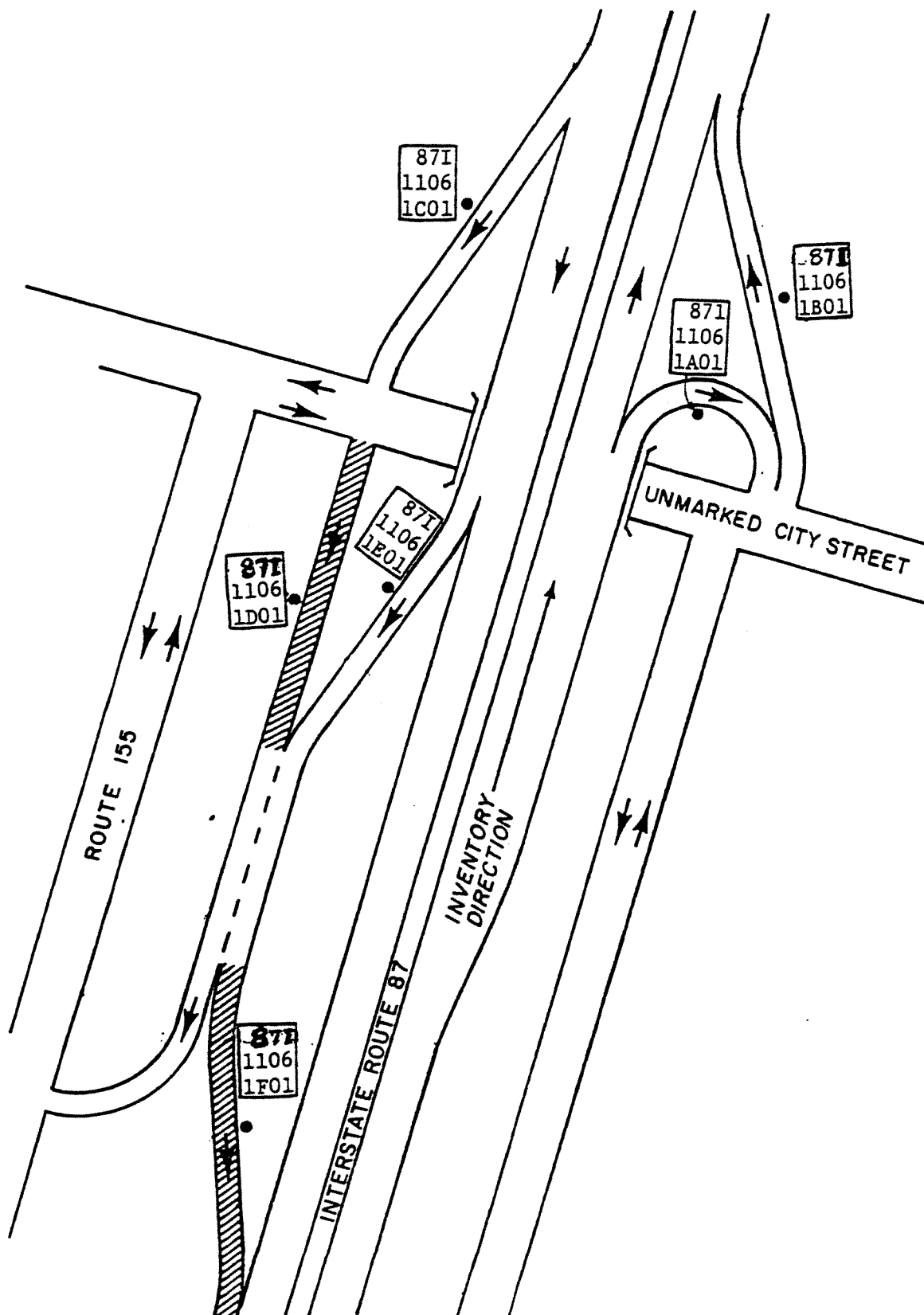


Figure 7. REFERENCE MARKER INSTALLATION AT A DIVERGENT OR INTERWEAVING RAMP.

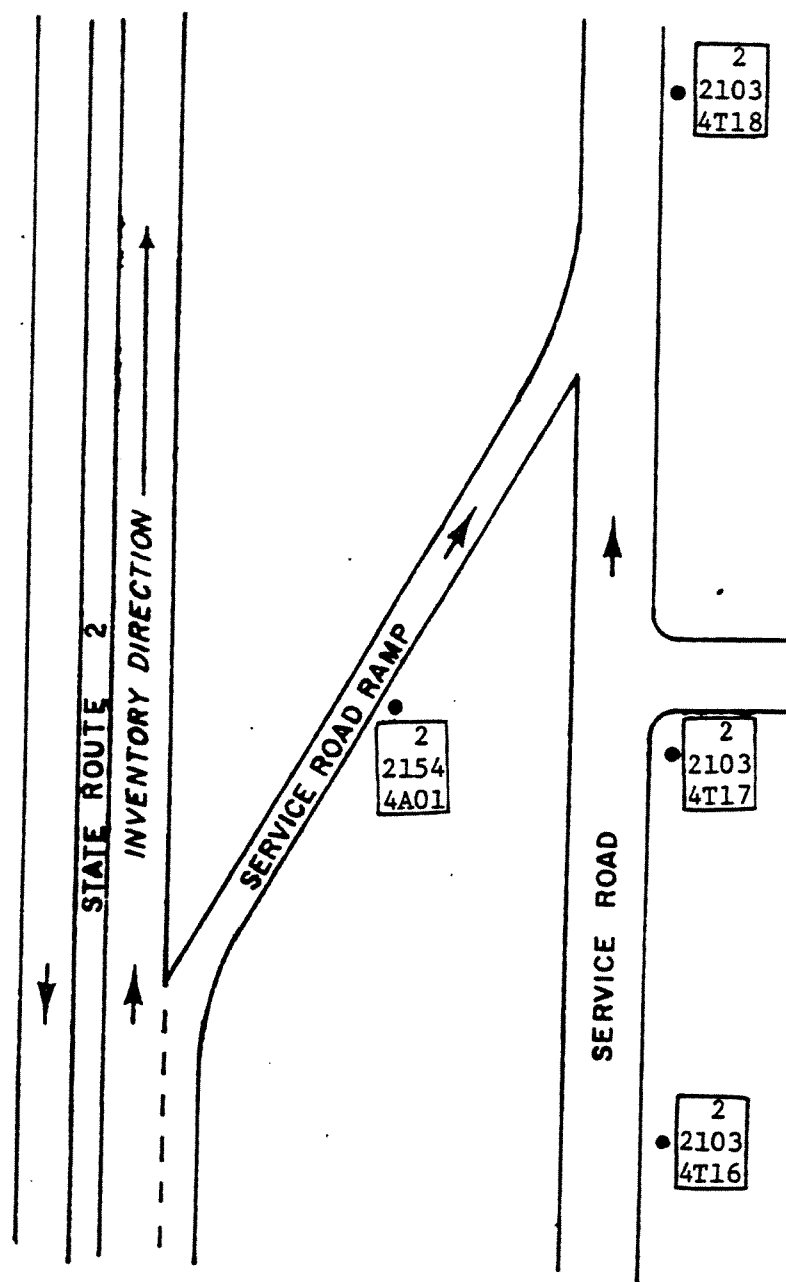


Figure 8. REFERENCE MARKER INSTALLATION AT A SERVICE ROAD RAMP AND SERVICE ROAD.

Position 4 is used to enter any alphabetic suffix which forms a part of the touring route description. If no such alphabetic suffix is required, this position is left blank (see Figure 8).

Position 5 is used for the number of the New York State Department of Transportation Region in which the portion of the touring route and associated service road are located.

Position 6 describes the county within the region in which the portion of the touring route and associated service road are located.

Positions 7-8 are used for the county order number of the touring route connected to the service road. This two position number denotes the number of counties which the route has traversed from its western or southern terminus.

Position 9 lists a number which designates the residency.

Position 10 gives a service road letter an alphabetic character (N through Z) to uniquely designate a service road associated with a touring route within a given region-county. Only 9.9 miles can be coded into positions 11 and 12. Should a service road exceed this length, the identification alphabetic in position 10 will advance to the next letter. A second service road connected to the same route within the same county and residency would then require the next available letter of the alphabet.

Positions 11-12 are used for the sequencing numbers of reference markers used for service roads. The first reference marker will be located at the southern or western terminus of the service road and will contain the sequencing number 00 (units and tenths position only). Each succeeding reference marker will contain a sequencing number 01 higher than the one preceding. In the event that a service road is longer than 9.9 miles for 100 sequencing numbers (from 00-99), position 10 of the service road panel face legend may be increased. Each time a series of 100 sequencing numbers (00-99) is exceeded for a particular service road associated with the same route within the same region-county, position 10 may be changed to the next letter of the alphabet.

2. Panel Legends for Rest Areas

Positions 1-3 are used for the touring route number of the mainline. Position 4 is used for entering any alphabetic suffix which forms a part of the touring route. If no such alphabetic suffix is required, this position is left blank.

Position 5 is used for the number of the New York State Department of Transportation Region in which the portion of the touring route is located.

Position 6 is used for the county of the region in which the portion of the touring route is located.

Position 7 will contain an 'R' to signify Rest Area.

Position 8 will contain a number to designate the number of the Rest Area within the residency on the route.

Position 9 lists a number which designates the residency.

Position 10 gives a unique letter for each ramp associated with a rest area on a touring route.

Positions 11-12 are used for the sequence numbers of the reference markers for Rest Area ramps. If the first reference marker to be installed on the Rest Area ramp is located opposite the bullnose (this condition will exist only if the bull nose of this ramp is greater than five hundredths (.05) of a mile from the previous mainline reference marker), the sequencing number for this reference marker will be 00 (units and tenths position only). If the first reference marker to be installed on the Rest Area ramp is at a point other than the bull nose [if the bull nose of the ramp is less than five hundredths (.05) of a mile from the previous mainline reference marker], the sequencing number of this reference marker will be 01. Each succeeding reference marker along the Rest Area ramp will contain a sequencing number 01 higher than that shown on the previous marker.

IV. ADDITIONAL PANEL LEGENDS

In addition to the reference marker legends used to describe mainline, ramp and service road locations, various other legends are used to describe those touring routes that are realigned or reconstructed as well as those facilities that are non-touring route state highways maintained by the New York State Department of Transportation. The first part of this chapter will describe panel legends used for realigned or reconstructed routes; the second part will describe panel legends used for the various types of non-touring route state highways ("900 series" state routes, state institutional and facility roads, reservation roads).

A. Panel Legends for Realigned or Reconstructed Routes

From time to time, state touring routes undergo various changes as continual improvements are made to the system. Often, portions of the state touring routes are realigned or reconstructed. When this occurs, new reference markers must be installed on these realigned or reconstructed portions. The existing reference markers on abandoned portions should be removed.

The new reference markers, which are to be installed on these new highway portions, must contain legends that do not conflict with or duplicate existing legends in the Reference Marker System. To the extent possible, the new reference markers should be in sequence order, even if that requires renumbering the route from the start. See Figures 9 and 10 for illustration of reconstructed routes.

In addition to insuring that the proper panel legend components are utilized, the following placement rules are to be observed when reference markers are installed along realigned or reconstructed portions.

1. The placement of the first reference marker on a newly aligned or reconstructed portion is such that it is approximately a tenth-mile from the preceding reference marker on the old or existing portion.
2. The placement of the last reference marker on a newly aligned or reconstructed portion (or any reference marker immediately preceding a county or city boundary) is such that it is not less than five-hundredths (.05) of a mile nor more than fifteen hundredths (.15) of a mile from the next reference marker on the old or existing portion. This reference marker will be located in the vicinity of the point where the realigned or reconstructed portion returns to the old or existing portion.

The physical characteristics of reference markers which are to be installed along realigned or reconstructed routes are the same as the ones used for mainline installations. Although each reference marker used for installation along realigned or

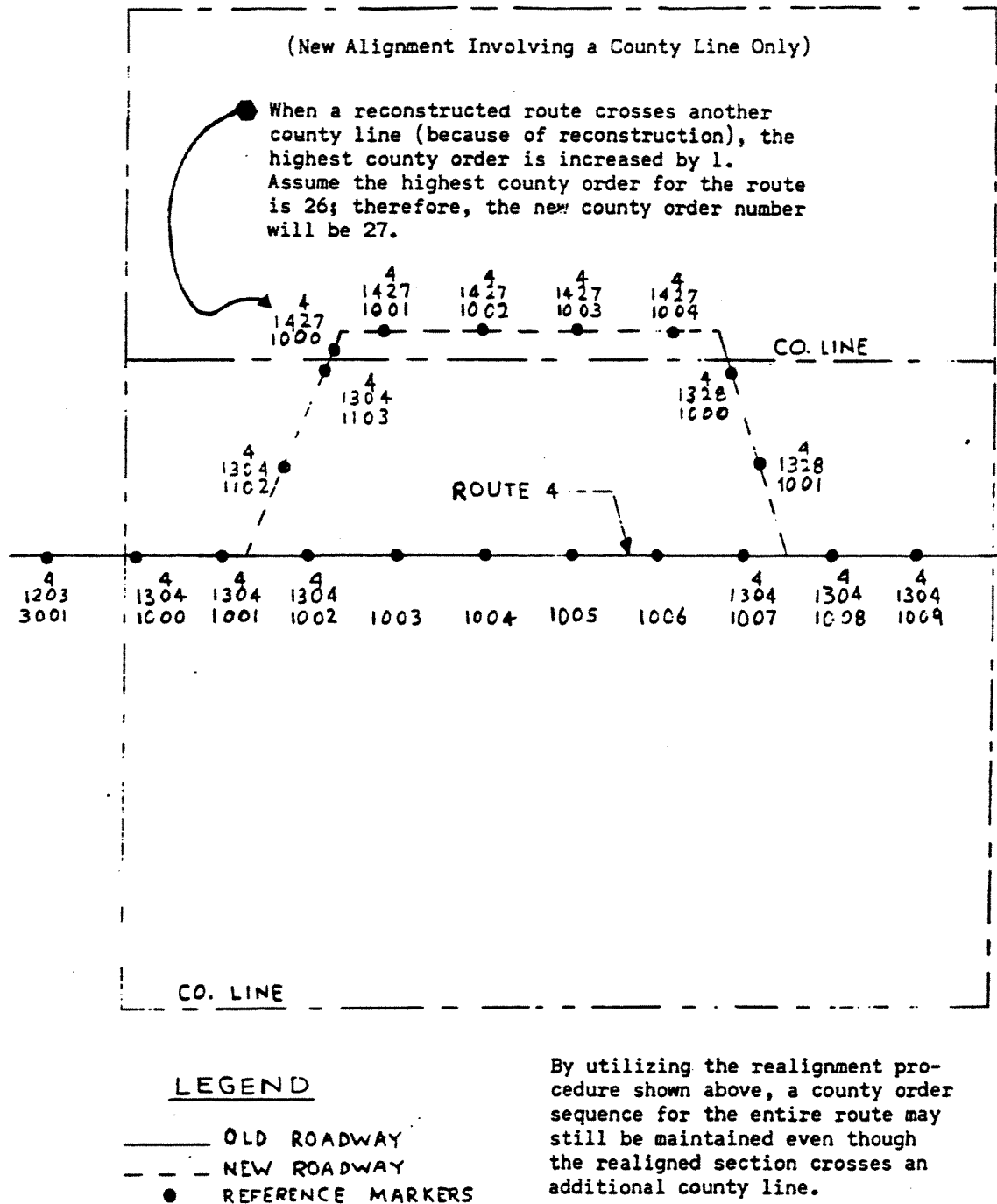
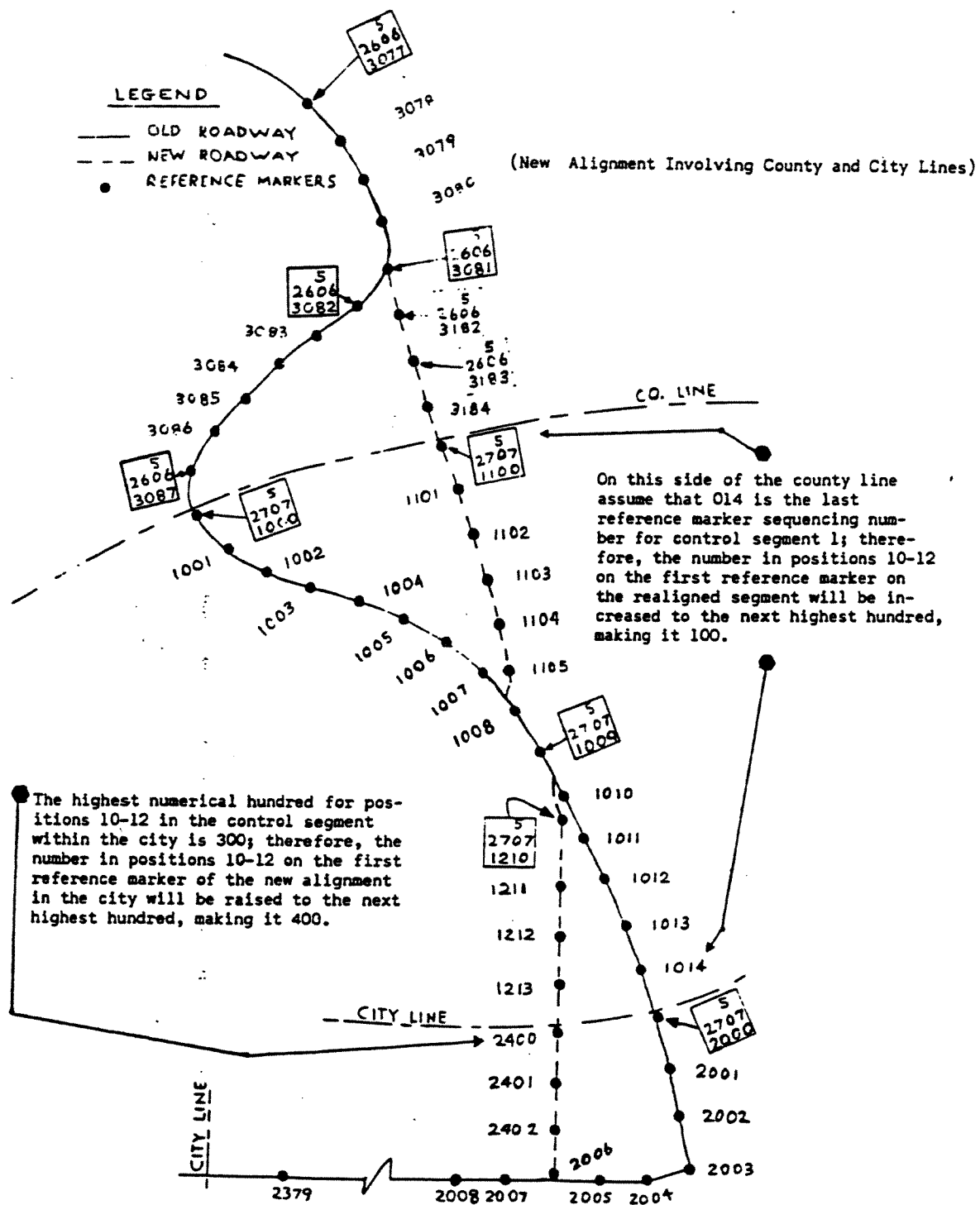


Figure 9. REFERENCE MARKER INSTALLATION ON RECONSTRUCTED ROUTES.



reconstructed routes contains three data lines with a maximum capacity of four characters each as the mainline reference markers do, the interpretation of these legends differs somewhat from mainline legends and is detailed in the subsequent text.

Positions 1-3 are used to describe the touring route number.

Position 4 is used for entering any alphabetic suffix which forms a part of the touring route description. If no such alphabetic suffix is required, this position is left blank.

Position 5 is used to describe the New York State Department of Transportation Region in which the particular portion of the touring route and associated realignment or reconstruction is located.

Position 6 is used to describe the county of the region in which the particular portion of touring route and associated realignment or reconstruction is located.

Positions 7-8 are used to describe the county order number of the touring route. This county order number is simply the number of counties which the route has traversed from its western or southern terminus. If the county order number or a particular portion of a touring route must be changed due to a realignment or reconstruction, the new county order number will be numerically one (1) higher than the highest county order value for the particular route under consideration. For example, if the particular route has crossed 25 county lines from its western or southern terminus, its county order number would be 26. Additional county order numbers, required as a result of a realignment or reconstruction involving a county line, will be determined by raising the highest original county order value (26) by one (1) each time a county line associated with the realignment or reconstruction is crossed.

Position 9 is used to describe the control segment number of the touring route. This number simply locates the specific portion of the route and its associated realignment or reconstruction within a specific county. Generally, position 9 on the panel face legend will not change due to a realignment or reconstruction unless positions 10-12 (sequencing numbers) contain a numeric value that cannot be raised by 100 (refer to the description of sequencing numbers presented below). If it is necessary to change position 9, it will contain a numeric value that is one (1) greater than the highest control segment for the county in which the route exists.

Positions 10-12 are used to describe the sequencing numbers of the reference markers. These numbers simply indicate the distance along a route, in approximate tenth-mile intervals, from the beginning of a particular control segment. To determine the new sequencing numbers for realigned or reconstructed route portions, the highest numeric value of positions 10-12 (the sequencing number) for the control segment (in which the realignment or reconstruction appears) must be

determined. This highest value is then raised by 100 and added to the next value in sequence to obtain the first sequencing number of the realigned or reconstructed portion. To determine the sequencing numbers for reference markers on the new alignment in control segment 3 one must first determine the highest numeric value of sequencing numbers for the control segment in which the new alignment occurs. In this case, the highest numeric sequence in control segment 3 is 087; therefore, the first reference marker on the new alignment in control segment 3 (this reference marker will be placed after sequence number 081 on the old alignment) will contain the next value in sequence raised by 100 - that being sequencing number 182. The remaining reference markers along the new alignment within control segment 3 will contain values that continue in sequence from sequencing number 182.

B. Panel Legends for "900 Series" Routes

This classification consists of reference state routes, state institutional and facility roads, reservation roads and parkways. Each of these types of "900 series" highways is the responsibility of the New York State Department of Transportation to maintain either by its own forces or by contract, and is described separately below because of its unique nature.

1. Panel Legends for Reference Routes

Reference routes are state maintained highways that have not been assigned touring route numbers. For record keeping purposes, they have been assigned numbers in the 900 series.

In general, the panel legends used on reference markers for unnumbered routes are similar to the ones used for state touring routes with the exception of the first four (4) positions of the legend. The specific application of the portion of the legend that appears in positions 1-4 along with an explanation of the remainder of the legend is detailed below.

Position 1 contains the numeric 9 which designates the highway as being a "900 Series" state maintained facility.

Position 2 contains the numeric code used to describe the New York State Department of Transportation Region in which the route is located.

Position 3 must contain a numeric designation (ranging from 0-6) which is sequentially assigned to the reference route.

Position 4 contains an alphabetic designation which is assigned (along with the numeric designation in position 3) to the unnumbered state route. All alphabetic characters are used with the exception of I (used for Interstate highways), N

(reserved for institutional roads), O (the alphabetic O is often confused with the numeric zero), R (reserved for reservation roads), S (the alphabetic S is often confused with the numeric 5), X (a designation sometimes used in Region 10), Y and Z (appear at the end of the alphabet and are not used). Q and U are also not currently being assigned because of some past confusion resulting from their use. The combination of seven (7) numeric designations and sixteen (16) alphabetic designations in positions 3 and 4 allows a total of 112 possible route designations for each of the Department of Transportation's 11 regions.

Positions 5-8 contain the following items of information.

1. Position 5 - D.O.T. region code.
2. Position 6 - D.O.T. county code.
3. Position 7-8 - county order number.

These items are explained in detail in Chapter I, Division C.

Positions 9-12 on this line contain the following items of information.

1. Position 9 - control segment number.
2. Positions 10-12 - sequencing number.

These items are explained in detail in Chapter I, Division C.

2. Panel Legends for State Institutional and Facility Roads

Although institutional and facility roads are assigned to various New York State government agencies, some are maintained by the New York State Department of Transportation. The panel legend components for these roads, although similar to legends used for state touring routes, are detailed below.

Position 1 contains the numeric 9 which designates these roads as being state owned roads not assigned a Touring Route number.

Position 2 contains the numeric code used to describe the New York State Department of Transportation Region in which these roads are located.

Position 3 contains the numeric 1 which denotes the road as being an institutional or facility road.

Position 4 contains the alphabetic designation "N" which (when combined with the numeric designation in position 3) denotes the road as being an institutional or facility road.

Position 5 contains the numeric code that describes the New York State Department of Transportation Region that the particular institutional or facility road is located in.

Position 6 contains the numeric code that describes the county of the region that the particular institutional or facility road is located in.

Positions 7-8 contain a two-digit numeric code which is assigned to each individual institutional or facility road (by region and state agency) that is maintained by the Department of Transportation. The maximum number of institutional or facility roads that may be associated with a state agency in a particular region is therefore, 99.

Position 9 contains a one-digit numeric which denotes the state agency that is associated with the particular institutional or facility road. The following listing denotes the agency names and corresponding numeric codes used in position 9.

<u>Agency Name</u>	<u>Code</u>
Other	0
Health	1
Military and Naval Affairs	2
Education	3
State Police	4
Executive-Youth	5
Conservation	6
Corrections	7
Social Services	8
Mental Hygiene	9

Positions 10-12 contain the sequencing numbers of the reference markers. Sequencing numbers are determined by starting with 000 and assigning a new sequencing number (that is 001 greater than the previous number) at each approximate tenth-mile interval starting at the western or southern terminus of the institutional or facility road and continuing to its eastern or northern terminus.

3. Panel Legends for Reservation Roads

Currently there are seven reservations in New York State that have appreciable populations and possess rights of way that are to be maintained. Reference marker panel legends for those reservation roads which are to be marked are detailed below.

Position 1 contains the numeric 9 which designates these roads as being non-touring route state maintained facilities.

Position 2 contains the numeric code used to describe the New York State Department of Transportation Region in which these roads are located.

Position 3 contains a numeric designation (ranging from 1-9) assigned to each individual reservation within a region.

Position 4 contains the alphabetic designation "R" which denotes the road as being a reservation road.

Position 5 contains the numeric code that describes the New York State Department of Transportation Region that the particular reservation is located in.

Position 6 contains the numeric code that describes the county of the region that the particular reservation road is located in.

Positions 7-8 contains a two-digit numeric code which is assigned to each road within each reservation.

Position 9 will contain the numeric 1 which denotes the road as being a reservation road.

Positions 10-12 contain the sequencing numbers of reference markers. Sequencing numbers are determined by starting with 000 and assigning a new sequencing number (that is 001 greater than the previous number) at each approximate tenth-mile interval starting at the western or southern terminus of the reservation road and continuing to its eastern or northern terminus.

4. Panel Legends for Parkways Routes

Until now, this Department neither placed reference markers on or inventoried these routes. However, with the takeover of certain of these facilities for maintenance purposes, a general procedure has been developed to apply to all parkways routes.

Reference markers will be placed only on those portions of routes for which the Department has maintenance responsibility, generally the "DOT parkways". The reference marker sequencing should commence at the inception of the parkway, and follow the rules of location and spacing for mainline highways as detailed in Chapter III.

Position 1 contains the numeric 9 which designates the highway as being a state-maintained facility.

Position 2 contains the numeric code used to describe the New York State Department of Transportation Region in which the route is located.

Position 3 must contain a numeric designation (ranging from 7-9) which is sequentially assigned to the route.

Position 4 contains an alphabetic designation which is assigned (along with the numeric designation in position 3) to the route. All alphabetic characters are used with the exception of those mentioned in the Reference Route Section above (B1). The combination of three (3) numeric designations and sixteen (16) alphabetic designations in positions 3 and 4 allows a total of 48 possible route designations for each of the Department of Transportation's 11 regions.

Positions 5-12 contain the same information as Touring Route and Reference Route panels.

5. Panel Legends for One-Way Couplets

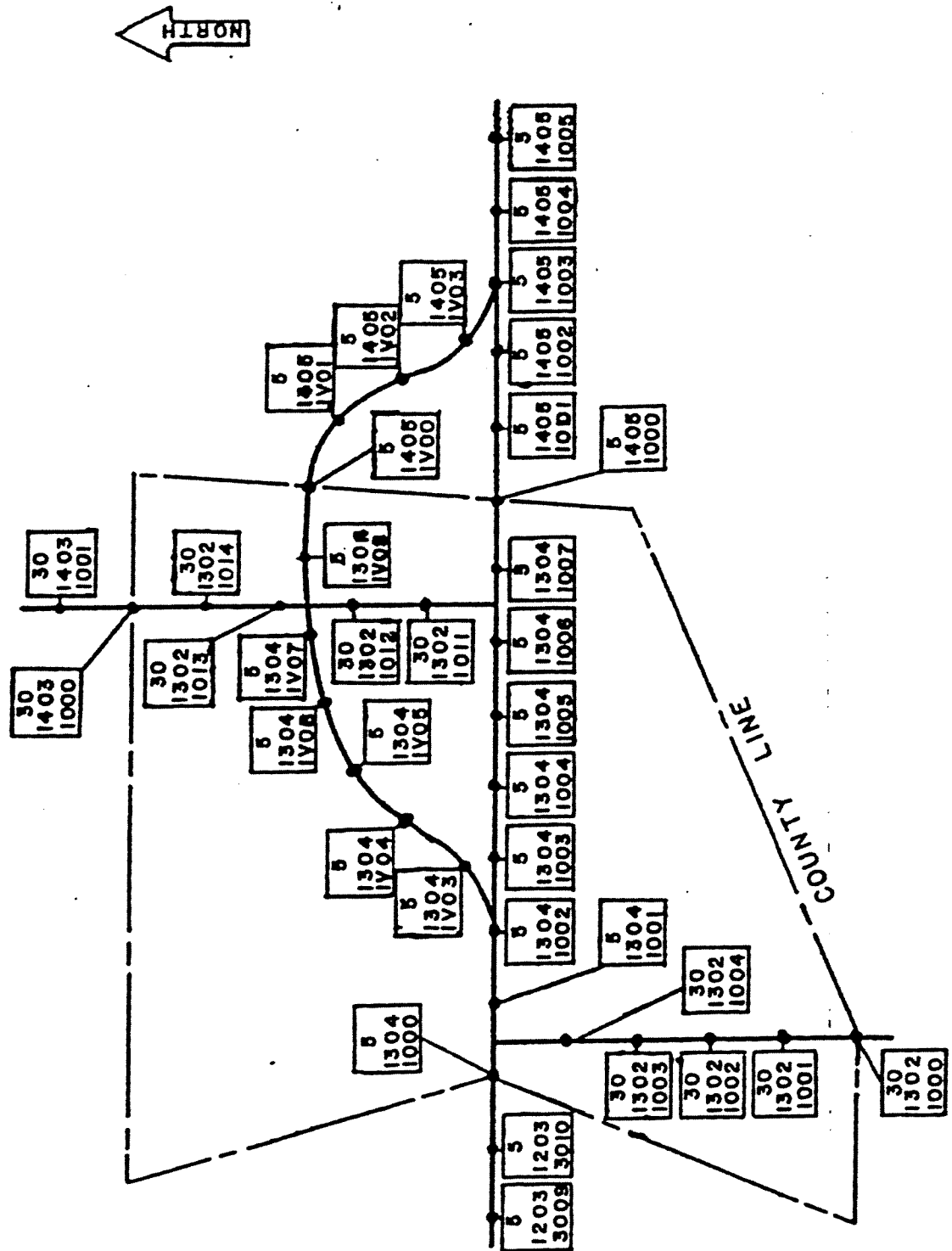
(An example of a one-way couplet is shown in Figure 11.)

- A. Panel legends of reference markers installed in the principal direction of travel are derived in the same manner as for state touring routes.
- B. Panel legends of reference markers installed in the opposite direction of travel are similar to the ones used in the principal direction of travel with the exception of position 10. This position will contain the alphabetic character V.

6. Reference Marker Placement for Opposite Direction of Travel

- A. Opposite direction reference markers will begin where the opposite direction roadway of the one-way couplet first departs from the principal direction of travel. The reference marker sequencing (line 3, positions 11 and 12) would then continue in the normal manner, incrementing by one every one-tenth mile until this opposite direction roadway rejoins the principal direction roadway.

Figure 11. Reference Markers for One-Way Couplets



V. GUIDELINES FOR PHYSICAL SYSTEM MAINTENANCE

While it is important to maintain the physical sign system in the field, it is equally as important for us to update and maintain our network to keep it in agreement with the field system. The key in accomplishing this is for Traffic Engineering and Safety to be made aware of changes being made to the field system.

Traffic Engineering and Safety does not have to be notified of routine maintenance activities, such as replacing a missing reference marker. However, notification is needed for the following situations:

1. When reference markers are being installed on a route for the first time (e.g., when jurisdictional responsibility for the highway section is being taken over by the State), we need to know the route number, and reference marker series being installed.
2. When reference markers are being permanently removed from a route (e.g., when the State turns jurisdictional responsibility for the highway section over to a locality), we need to know the route number, beginning reference marker and ending reference marker being removed.
3. When an existing reference marker legend is being replaced with a new marker essentially at the same relative location (e.g., reconstruction of a highway section which significantly alters the highway alignment), we need to know the route involved and an equivalency list containing a cross reference between the old legend and the new replacement legend for each marker involved.

Whenever new markers are being installed, a check should be made to insure that the proposed marker series does not already exist. The marker legend equivalency is needed so we can retrieve our historic accident data and realign accidents associated with old marker legends to the new legends.

A. Areas of Responsibility - New Reference Marker Installation

The plans, specifications, and estimates for a new state highway should include a table enumerating the reference markers to be installed on the new facility. It is generally the responsibility of the regional Design Group to determine the proper legends for these reference markers through use of the Reference Marker Manual. It should be noted, however, that Regional discretion is permitted regarding the unit responsible for initiation and changing of marker legends. After this determination is made, a listing of these legends is forwarded to the Regional Planning Group for verification.

Upon verification by the Regional Planning Group, a table (see Figure 11) enumerating the reference markers is prepared for inclusion in the contract plans. These new reference markers will be furnished and installed as directed by contract under the supervision of the Regional Construction Group.

These procedures will be followed regardless of the circumstances under which the new reference markers have been installed. In certain instances, reference markers may be installed under a special contract related only to reference marker installations. In other instances, reference markers may be installed by state work forces, or they may be installed as a part of a regular contract.

B. Areas of Responsibility - Existing Reference Marker Replacement

The primary responsibility for the replacement of missing reference markers, the maintenance of existing reference markers, and the relocation of grossly misplaced reference markers rests with the Resident Engineer.

Upon discovery that certain reference markers are missing, the Resident Engineer will notify the Regional Maintenance Engineer that such a condition exists and will provide the legends of the reference markers immediately preceding and following the gap of missing reference markers. The Regional Maintenance Engineer will request a determination and verification of the proper legend or legends from the Regional Planning Engineer. After the legends have been assigned by the Regional Planning Engineer, the Regional Maintenance Engineer will furnish the Resident Engineer with the replacement reference marker legends.

The Resident Engineer will be responsible for the maintenance of clearly readable legends on all reference markers in his Residency as well as the replacement of badly damaged reference markers (due to accidents, snow removal operations, or vandalism).

After notification by the Resident Engineer that certain reference markers are grossly out of placement with regard to spacing criteria and tolerance, the Regional Maintenance Engineer will request a review of each marker misplacement by the Regional Planning Engineer and the Regional Traffic Engineer. After the necessary judgement regarding the marker misplacement in question has been made by the Regional Planning Engineer and the Regional Traffic Engineer, the Regional Maintenance Engineer and Resident Engineer will be notified. If the action requires the movement of reference markers, the Resident Engineer will take the steps necessary to correct any reference marker placement errors.

In each separate instance mentioned above, whether it be after the replacement, maintenance, or relocation of reference markers, the Resident Engineer will inventory all reference marker changes and submit changes to the Traffic and Safety Division, who

will then process the revised data into the Reference Marker File and will advise the Planning Division of the completed change or installation.

In the situation where an existing highway is being reconstructed on a new alignment, the existing reference markers may be moved to new locations along the new alignment unless substantial mileage changes occur. The determination of the new reference marker legends will be made by the Regional Planning Engineer. The Regional Planning Engineer will then advise the Regional Maintenance Engineer of the new panel legends and he will furnish the Resident Engineer with the legend information requested.

After all reference marker installation is complete, the Resident Engineer will inventory all reference markers as installed and submit the information to the Traffic and Safety Division. The Traffic Engineering and Safety Division will then advise the Planning Division of the completion of all installation work and will perform the necessary updates to the Reference Marker File and will forward an updated listing of the Reference Marker File to the Regional Maintenance Engineer and the Regional Planning Engineer.

C. Installation and Maintenance Guidelines

The installation of reference markers may be accomplished in any one of the following manners.

1. Installation as part of a highway construction or reconstruction contract.
2. Installation by special contract for reference marker installation only.
3. Installation by New York State Department of Transportation maintenance forces.

With regard to Items 1 and 2 above, the installation of reference markers by contract, the following shall be applicable.

1. The contractor who will be performing the reference marker installations will receive, as part of the contract documents, a Table of Reference Markers (see Figure 9) enumerating all locations that require reference marker installations. In addition, a sample extract depicting the type and scope of locational information available to the contractor will be provided.

2. The basic data for preparing the Table of Reference Markers for the contractor is contained in the Highway Inventory Data Bank. The information required for the preparation of the reference marker legends and the computation of approximate quantities of reference markers is contained therein.
3. When the designer is preparing the Table of Reference Markers for inclusion in the contract documents, sufficient information to delineate sections of the proposed route to be posted should be included.

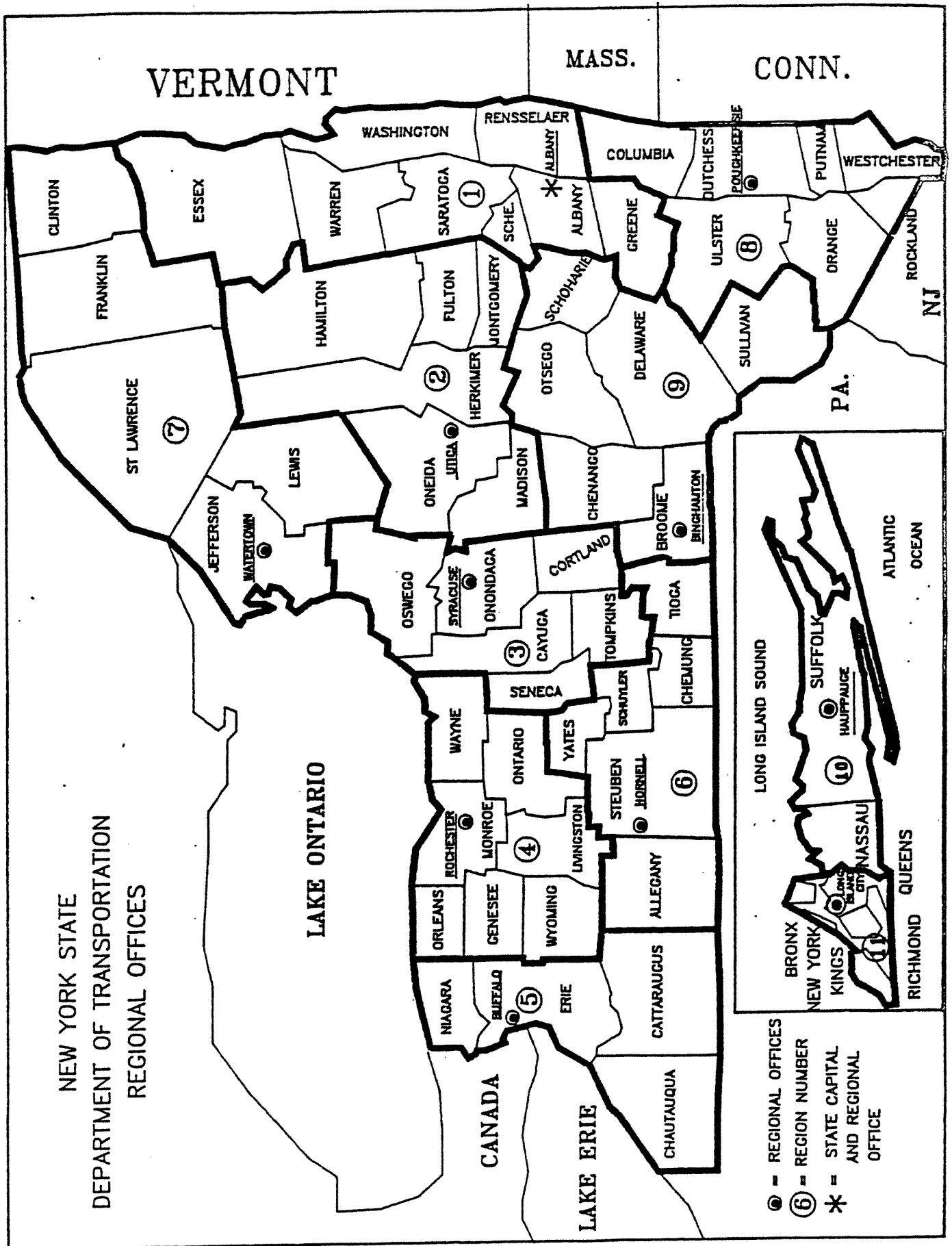
The following procedures are to be followed by both contractors and State maintenance forces during the installation and/or maintenance of reference markers. Standard Specification 646, with standard sheets 646-4R1 and 646-5 should provide guidance on such installation. Any proposals concerning the installation and maintenance of markers should be addressed to the Design Division.

1. Reference markers are to be installed on a 7, 8 or 12-foot flanged post. These posts may be driven or set.
2. On touring routes, reference markers should be placed in line with the delineators or immediately behind the guide railing or at a distance from the edge of pavement deemed necessary and appropriate by the Resident Engineer. Reference Markers within 50 feet longitudinally of an existing delineator post should be mounted on the existing post and the delineator removed as the reference marker is reflective and will serve as a delineator.
3. On roadway portions other than expressway portions when the reference markers are within 50 feet longitudinally of existing posts (signs, lights, traffic signal poles, or other signal devices) the reference markers should be mounted on these existing posts. Reference markers are not to be mounted on utility company poles, or private or temporary signs.
4. When reference markers are mounted on walls, bridges, bridge railings, or poles care should be exercised so as not to damage structural features and to restore painted or galvanized surfaces which must be drilled so as to prevent corrosion.

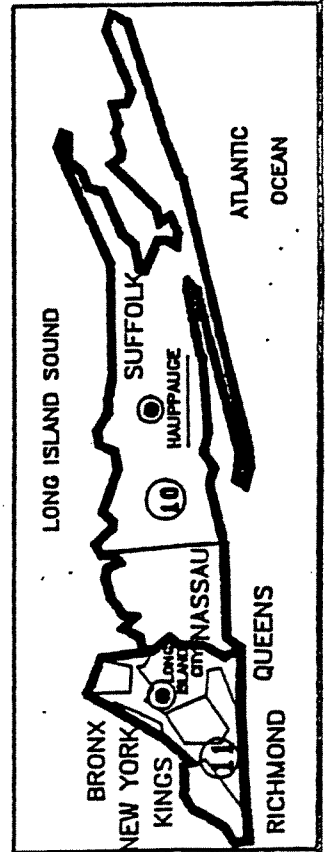
Installation Points												Number of Reference Markers
From						To						
Route Number	Region County	County Order	Control Segment	Sequence Numbers	Remarks	Route Number	Region County	County Order	Control Segment	Sequence Numbers	Remarks	
79	91	01	1	000		79	91	01	1	173		174
79	91	01	2	000		79	91	01	2	027		28
79	91	01	3	000		79	91	01	3	051		52
79	92	02	1	000		79	92	02	1	021		22
79	92	02	2	000		79	92	02	2	051		52
79	91	03	1	000		79	91	03	1	037		38
79	91	03	2	000		79	91	03	2	029		30
79	91	03	3	000		79	91	03	3	091		92

APPENDIX

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
REGIONAL OFFICES



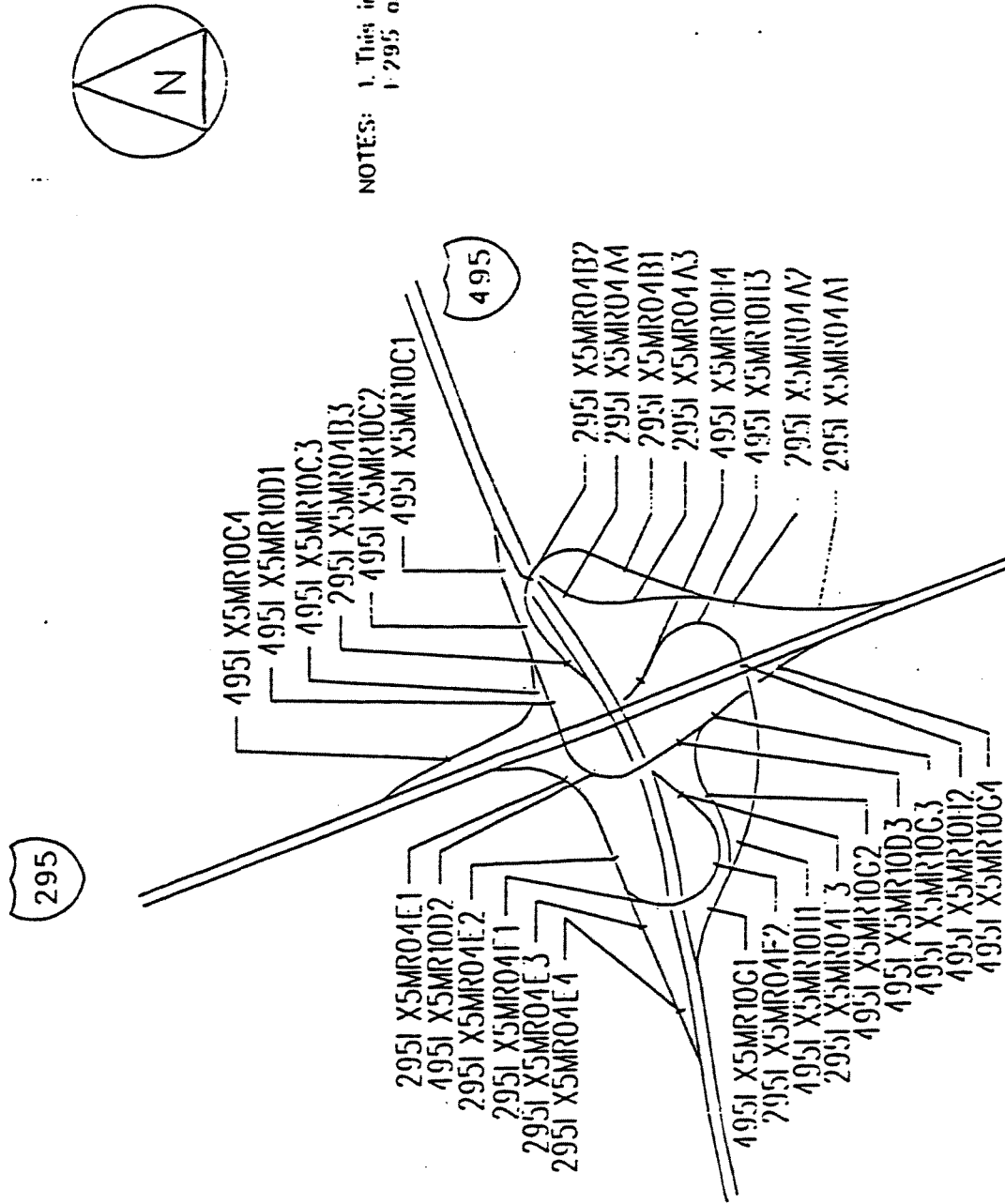
- = REGIONAL OFFICES
- ⑥ = REGION NUMBER
- * = STATE CAPITAL AND REGIONAL OFFICE



NYS DOT REGION/COUNTY CODES

REGION	COUNTY CODES							
	1	2	3	4	5	6	7	8
1	Albany	Essex	Greene	Rensselaer	Saratoga	Schenectady	Warren	Washington
2	Fulton	Hamilton	Herkimer	Madison	Montgomery	Oneida		
3	Cayuga	Cortland	Onondaga	Oswego	Seneca	Tompkins		
4	Genesee	Livingston	Monroe	Ontario	Orleans	Wyoming	Wayne	
5	Cattaraugus	Chautauqua	Erie	Niagara				
6	Allegany	Chemung	Schuyler	Steuben	Tioga	Yates		
7	Clinton	Franklin	Jefferson	Levis	St. Lawrence			
8	Columbia	Dutchess	Orange	Putnam	Rockland	Ulster	Westchester	
9	Broome	Chenango	Delaware	Otsego	Schoharie	Sullivan		
10 (O)			Nassau				Suffolk	
11 (N)	Bronx	Kings		New York	Queens	Richmond		

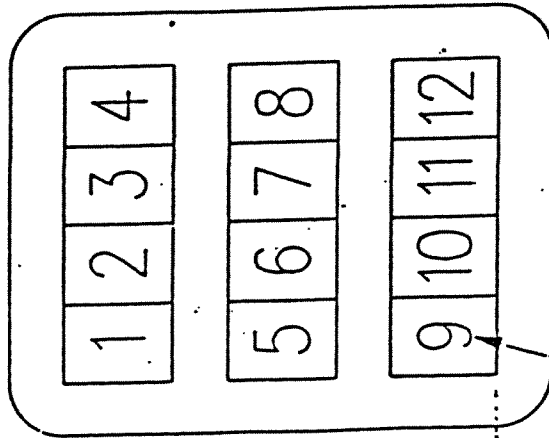
REFERENCE MARKERS FOR COMPLICATED INTERCHANGES



NOTES: 1. This interchange is number 4 for I-295 and number 10 for I-495.

FIGURE 1

I-295 Clearview Expwy/
I-495 Long Island Expwy
Interchange



POSITION NUMBER

REFERENCE MARKER DETAIL

MAINLINES AND C-D ROADS

RAMPS

POSITIONS

POSITIONS

1-3	ROUTE NO.	1-7	SAME AS MAINLINES
	"900" SERIES FOR PARKWAYS	8	"R"
	RIGHT JUSTIFY ROUTE NO.	9-10	INTERCHANGE NO. (1-99)
4	"I" FOR INTERSTATE	11	RAMP LETTER (A-Z)
	"A-V" FOR PARKWAYS	12	MILEPOINT
	BLANK FOR PROSPECT EXPWY, ROUTE NO. 27,		($<0.25m$, 1 MARKER @ MIDPOINT $>0.25m$, 0.1, 0.2, ...)
	WEST SHORE/M.L.KING EXPWY: NO. 440;		
	NASSAU EXPWY: NO. 878		
5	"X" FOR REGION 11 (NYC)		
6	BRONX: 1, NY: 4, KINGS: 2, QUEENS: 5, RICHMOND: 6		
7	MAINLINE: M, C-D ROAD: C		
8	COUNTY ORDER		
9	NORTH: 1, SOUTH: 2, EAST: 3 & WEST: 4		
10-12	MILEPOINT: XX.X		
	(X) REPRESENTS OPPOSITE CARDINAL DIRECTION REFERENCE MARKER		