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DRIVER NEEDS ON TWO-LANE RURAL HIGHWAYS

Volume II - Simplified Location of Information Deficiencies (SLIDE) - A Procedure

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Final Report

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NOTICE

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INTRODUCTION

This volume, second in a set of four, presents the Simplified Location of Information Deficiencies (SLIDE) procedure. The Slide procedure has been developed to provide a practical means for state and local personnel to identify and evaluate information deficient locations on the rural two-lane road systems under their jurisdiction. The procedure is aimed at those lower volume two-lane roads where accident data is not adequate to identify potential problem locations.

The SLIDE procedure is structured around easy-to-use information deficiency evaluation checklists as well as other non-equipment intensive techniques. The several checklists represent a simplified Positive Guidance approach to identifying the problem and the likely solution alternatives.

The volume contains two major sections and an appendix. Section I describes the SLIDE procedure in detail while Section II presents a critique of the procedure. The critique is based on the results of two regional workshops. The workshops were designed to test the utility and practicality of the suggested procedure by the kinds of individuals most likely to use it.

In addition, an appendix presents the set of information deficiency checklists for nine specific situations, e.g., stop controlled intersection, height/weight limit restrictions, plus a tenth "other situations" checklist that are intended to be used as needed in applying the SLIDE procedure in the field.

I. THE "SLIDE" PROCEDURE

Many state and local highway agencies have in place a program for inventorying and periodically inspecting their signs. The inventory addresses sign type and location. The inspection element focuses on the physical aspects of the existing sign, i.e., if it is still there, its condition, reflectivity level, etc.

However, evaluations are rarely if ever done, to determine if the sign that is there is the correct one, is needed at all, or if a certain sign should be there that is not. This type of evaluation focuses on how well the highway provides the information the driver needs to safely navigate the road.

In many respects the two lane rural road network is the most difficult part of the highway system for the motorist. Because of its frequently changing geometry with curves, grades, at-grade intersections, driveways, railroad-grade crossings, and other situations, it is the most demanding of the driver. The driver must frequently make decisions concerning safe speed and/or path depending upon a view of the situation ahead which is often limited. This variability in geometry on the two-lane rural road system and the resulting difficulties it engenders for the driver creates numerous site-specific situations where the need for guidance information is much greater than would be the case on a higher design roadway system.

Unfortunately, it is the rural two-lane system which is likely to be deficient in providing guidance information at all locations where it is needed. The types of information deficiencies noted are discussed in chapter IV. The extensiveness of the two-lane system, the frequent need for information and the limited budget of the State and local jurisdictions all combine to cause this overall deficiency. There simply isn't enough money to provide an ideal system of signs, markings, and other traffic control devices that provide the needed information.

When the motorist is not provided the required guidance information that may not otherwise be gained from the view of the road, a potentially hazardous situation exists. Without the proper warning, the motorist may not be able to adjust his speed and/or path in sufficient time to avoid an acccident. Also, the lack of navigational information, such as route markers and directional signing at key loctions, can cause the motorist to be lost or to be confused, which in turn can result in erratic maneuvers and accidents.

The Manual on Uniform Traffic Control Devices (MUTCD) has been developed to provide direction and uniformity in the application of traffic control devices. In order to apply to a broad range of situations much must be left to engineering judgment. At present, available guidelines on how to determine where certain information may be needed are not sufficiently comprehensive.

A procedure was developed during the course of the study to assist the operating engineer in determining where information deficiencies exist and, ultimately, what corrections are necessary. The suggested procedure presented here is a simplified version of a more elaborate methodology used by the study staff during the approximately 5,000 miles of site surveys.

A. OVERVIEW OF PROCEDURE

The objective of the SLIDE procedure is to provide an easy-to-use technique whereby locations on the highway that have information deficiencies can be easily identified so that corrective action, if warranted, can be taken. Efforts were made to minimize the time and staff resources necessary for this type of activity. While a field survey is necessary, most of the data collection can be done from within a vehicle and without any special equipment being required. Although it can be done by one person, a two person team is recommended. The procedure is summarized below.

At the planning level highway sections of 5 to 15 miles are identified and ranked for surveying. Once the sections are established a two person team drives each direction of every road segment to be surveyed with the driver commenting verbally on whether or not the information needed for the different situations, e.g., curves, crests, intersections, etc., is being received. The commentary is divided into two sequential components. Within the first mile or so into the section the driver establishes general expectancies concerning the nature and characteristics of the road, the required attention level, and the availability of warning signs and markings. Subsequently, the driver continues on the section and continually verbalizes expectations, perceived needs, and decisions regarding upcoming events that are likely to affect the driver's attention, speed, or path selection. These comments focus on:

- o What is expected of the road ahead relative to direction (i.e., straight, curve left, curve right), sharpness of curve, bypassing vehicles, bridge width, right-of-way at intersections, etc.

- o What actions are necessary regarding speed changes, lateral movement, turns, etc.

- o Any uncertainty related to any aspect of items in item 1 or 2 above.

In general, whenever the driver comes upon a location or situation that is inconsistent in terms of what was expected and for which there was inadequate information, the location is identified as being an information deficient location. In some cases the solution may be obvious, such as the need for a stop ahead warning sign where one does not exist. For others, the solution may not be as apparent and will require further examination. In this case, the team returns to the location (sometime after the section survey is completed) and conducts an in-depth evalution of the location using a suggested checklist procedure.

Further explanation and details of the procedure follow. But before this is done, a number of principles related to the driving task, and the information needs that are basic to the procedure are described briefly.

B. PRINCIPLES

In order to be sensitive to the information requirements of the motorist, it is important to understand certain basic human factors concepts related to information needs and processing. These are common sense principles but are often overlooked if not considered in a systematic manner as suggested here. Included are the principles of driver performance levels, primacy, driver expectancy, consistency, uncertainty, and positive guidance. Most of the discussion of these principles is taken from "A Users' Guide to Positive Guidance, 2nd Ed" (1981), and the Handbook of Traffic Control Practices for Low Volume Rural Roads (1981) developed for Kansas.

Level of Driver Performance

Control. This level of driver performance includes those activities and information needs that relate to the physical manipulation of the vehicle. The driver controls the vehicle's position and speed via the steering wheel, accelerator, and brake.

When there is an information deficiency, such as a lack of a speed advisory for a sharp curve, it is often manifested by the driver having to make severe control corrections.

Guidance. This level refers to the driver's task of selecting a safe speed and path on the highway. Performance at this level is a decision process where the driver evaluates the immediate situation, makes appropriate speed and path decisions, and translates these decisions into control actions. Activities include decisions relating to lane positioning, safe speed for curves and other situations, car following, overtaking and passing. Information at this level comes from the road, the environment, traffic control devices and traffic.

Because the two-lane rural highway system is characterized by frequent changes in physical features especially in rolling and mountainous terrain, the guidance level takes on increased importance. To help the driver make correct decisions, information must be provided through warning signs, markings, and other traffic control devices as necessary.

Navigational. This level of driver performance incorporates the tasks of trip planning, route following, maintaining an appropriate direction, and destination finding. Information at this level comes from maps, guide signs, and landmarks.

The two-lane rural system is probably the most deficient system, especially for non-State roads, in terms of providing navigational information. Readily available maps frequently do not include many of the local jurisdictions' roads. Much of the system is without adequate route signing and lacks directional signing at intersections. Deficiencies in navigational information affect poor guidance level performance and can result in erratic maneuvers (e.g., rapid deceleration to make a needed turn) and motorists going off course.

Primacy

Primacy refers to the relative importance of each level of driver performance and the information associated with it. The control level has the highest primacy while information asociated with the navigation level has the lowest. If a driver does not receive adequate information to properly control the vehicle, an accident can result, whereas if navigation information is deficient this failure does not necessarily result in an accident. The concept of primary is useful in assessing relative importance and positioning wherever there is a need for warning, regulatory, and directional signing at the same approximate location along the roadway.

Driver Expectancy

Driver expectancy is defined as the driver's anticipation of the occurrence or nonoccurrence of events and situations formulated as a function of both long-term and short-term driving experiences. Stated more simply, drivers expect a given road to have certain operating characteristics related to its geometry, surface, signs, and markings based on the cumulative experiences gained over years of driving (long-term) as well as the immediate experiences gained in just driving previous sections (short-term). These expectations relate to the general character of the road and to near future situations, e.g., curves, intersections, etc. When the driver's expectations are met or confirmed, driving performance is generally error-free. When the expectation is violated, however, longer response times and incorrect behaviors frequently result.

What the driver expects on a road is greatly influenced by what was experienced on the previous section of the road. Studies have shown that what a driver saw, e.g., presence or absence of traffic control devices, road surface type, condition, and width, narrow bridges or culverts, etc., (this might be called the "roadway environment,") is what the driver expects for the next 1/2 to 1 mile.

Driver expectancy is affected not only by very recent experiences but also by those things drivers have learned through past experiences; e.g., advance railroad crossing signs are at all railroad grade crossings, stop signs are red and white, curve warning signs are yellow and diamond shaped, etc. It follows that the consistent use and placement of traffic control devices can do a great deal toward assuring that the driver's expectancy is correct.

Driver expectancies are also affected by the type of road, i.e., interstate highway, State highway, county or township road. The driver expects to traverse each of these with different levels of caution.

Consistency

Consistency relates to the "sameness" of the nature of the road from one section to another. Inconsistencies result from sudden changes in the character of the road. Inconsistencies violate a driver's expectancy, thus either the road should be made consistent to fit expectancy, which is usually impractical, or something should be done to alter the driver's expectancy to fit roadway conditions. For example, consider the case of a hidden curve in a nearly straight roadway. Here, the use of a curve warning sign with, (depending on tangent and curve speeds) an advisory speed plate, will modify the driver's expectancy. After seeing the curve sign, the driver expects the curve, knows whether the road curves left or right and knows the speed at which the curve can be comfortably and safely driven.

Other examples of inconsistencies are:

- A road suddenly losing full shoulders.
- A blacktop road changing to a gravel road.
- A bridge narrower than the approach roadway.
- A sight restricted intersection in an area where most intersections have clear sight distances.

Whether or not a situation is an inconsistency may depend on the direction in which the driver is travelling. For instance, the driver, travelling from (1) to (4) in Figure 1, finds the first part of the road, (1) to (2), very consistent, i.e., there is hardly time to pick up speed before seeing or being on another curve. After passing (2), the road is straight for as much as a mile, and the driver now expects the road to continue -- straight -- and what is seen confirms this expectancy --"just a little dip," thinks the driver -- what a surprise to have to suddenly handle three 30 mile-per-hour curves! Obviously some modification of expectancy is in order and signing is likely the best way to do it. For the driver travelling from (1) to (4), no signs are needed at (1) or from (1) to (2) since the alignment is consistent. A curve warning sign prior to (3) (probably with an advisory speed plate) will be sufficient to give the driver enough information to handle the situation, i.e., expectancy has to be changed so "what you expect is what you get!" Now, consider the driver travelling from (4) to (1). The driver will probably need an advance curve warning sign, with speed plate, placed prior to (4). From (3) to (2), the driver's expectancy builds and more of the same straight road is expected. Prior to (2), an advance "winding road sign" is likely to be needed if the driver is to "know what to expect."

One must drive the roads to identify site-specific inconsistencies.

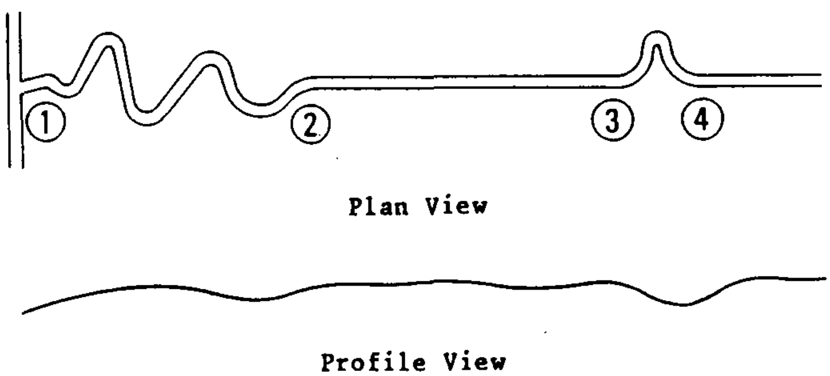

Figure 1. Plan and Profile Views of a Road

Uncertainty

There are many times when a driver can be uncertain as to the driving task, especially on a rural two-lane highway. There can be uncertainty as to the proper path because the geometrics and surrounding environment have limited the view of the road. There can be uncertainty as to the proper, safe speed for a given curve or other situation requiring a speed reduction. Generally speaking these uncertainties can be easily overcome by use of warning signs, e.g., curve warning for the former and speed advisory for the latter situation.

However, information provided by external means, e.g., traffic control devices, can also lead to uncertainty if the information is unclear, obscure, imprecise, or ambiguous. An imprecise or unclear message is one that does not tell the driver what to do, for example, DANGER AHEAD, or why something must be done, for example, SLOW DOWN.

Positive Guidance

Positive guidance is the concept, developed by Alexander and Lunenfeld (1975), that a driver can be given sufficient information where it is needed and in a form that can best be used to avoid a hazard. Any information cues, including the highway, that assist or direct the driver in making speed or path decisions provides guidance information. If drivers could see the curves far enough in advance to judge their sharpness and adjust to a safe speed, or see the approaching cars on crossroads because the intersections were clear of sight obstructions, or if all narrow bridges were visible to drivers from both directions, there would be little need for anything more than an occasional stop or yield sign to assign the right of way at the intersection of low volume roads with higher volume roads. This condition might be called "roadway positive guidance."

But for many situations on the two-lane rural highway the driver cannot rely simply on roadway guidance and must have positive guidance information provided in the form of warning signs, hazard markers, safe advisory speed signs, and roadway markings. Positive guidance information is provided when all needed information is presented clearly and conspicuously enough to meet decision sight distance criteria and enhance the probability of appropriate speed and path decisions.

The FHWA (1981) has developed a Positive Guidance process which structures engineering and human factors principles and procedures in a logical framework for analyzing potentially hazardous locations and arriving at a positive guidance information system. The procedure discussed here is complimentary to that positive guidance process.

Decision Sight Distance

Standard geometric design requires that stopping sight distance be provided continuously to the motorist so that it is possible to stop safely in the event that an object is in the travel lane. However, to detect a hazard or situation ahead and respond to it safely, longer distances are often required so that the motorist can have adequate time to assess the situation, make a decision, and act accordingly.

Decision sight distance meets this need. It is defined as the distance at which a driver can detect a hazard in an environment of visual noise or clutter, recognize it (or its threat potential), select an appropriate speed and path, and perform the required action safely and efficiently. Its application to information systems for two lane rural roads involves determining critical points where the driver needs certain information relative to an impending potentially hazardous situation.

Decision sight distance values for various speeds are tabled below, along with stopping sight distance.

SPEED	SIGHT DISTANCES (ft) FOR	
(mi/h)	STOPPING	DECISION
30	200	550
40	300	750
50	450	900
60	650	1150

C. DESCRIPTION OF THE "SLIDE" PROCEDURE

Classification of Highway System

A prerequisite planning step to this procedure, and indeed for any systematic highway performance surveillance and improvement program is to classify highways within the jurisdiction. Classifying highways is necessary for a variety of reasons including establishing priorities for improvements, surveillance, signing, etc. In the context of this procedure it can serve as a basis for ranking sections in order of importance for the survey. Also, highway classification can dictate the type of information improvement required and the priority for implementing it.

Typically, highways are classified by administrative jurisdiction and by function. Administratively rural roads are primarily under the control of a State, county, or township. The only way an unfamiliar motorist may be made aware of road jurisdiction is by the route marker. State routes are practically always identified by a State route marker typically consisting of the State symbol. Some primary State routes will also have a U.S. number route marker. County routes are usually marked but this varies considerably among counties and within counties. Township roads and even lower-class State and county roads are less likely to be marked, and if so, are usually identified by a name rather than a number.

Within each jurisdictional class, there may be a wide variety of geometrics, operations, and control devices. However, it is reasonable to assume that motorists expect to find, on one end of the scale, reasonably good geometrics, signs, and markings on State primary routes, and on the other end, lower geometrics standards and few or no signs and markings on low volume rural township level roads.

In a functional classification system, a road is classified according to the type of travel and the origins and destinations it serves. The five functional classes in use for rural roads are described as follows:

1) Principal arterial -- serve corridor movements having trip lengths and travel density characteristics indicative of substantial statewide or interstate travel.

2) Minor arterial -- link cities and larger towns and form an integrated network providing interstate and intercounty service.

3) Major collector -- provide service to any county seat not on an arterial route, to the larger towns not directly served by the higher systems and to other traffic generators of intracounty importance.

4) Minor collectors -- collect traffic from local roads and bring all developed areas within a reasonable distance of a collector road and provide service to remaining smaller communities.

5) Local roads -- serve primarily to provide access to adjacent land and provide service to travel over relatively short distances.

There can be, obviously, a close correlation between jurisdictional and functional classifications. Generally speaking, State routes are the arterials, county routes can be minor arterials and major and minor collectors, and township-level routes are minor collectors and locals.

In at least one respect establishing a classification system and, hence, a priority for surveying, on the basis of function is logical because the volume of unfamiliar drivers, i.e., the motorists that need good information systems the most, continually increase from the local system up to the arterials. Motorists who drive a road frequently, if not daily, are familiar with the potentially hazardous locations and, generally speaking, do not need warning signs. Over time they have learned how to navigate various roads and know where to slow down or take other cautionary measures. In fact, they are likely to be oblivious to the presence of warning signs.

On the other hand, motorists travelling on the route for the first time or who are infrequent users need the warning signs. Consequently, with increasing volume and percentage of unfamiliar drivers increasing attention and priority should be given to providing all necessary signs.

Besides a road's function there are numerous characteristics that can influence the need for information systems and which, therefore, can be used in establishing a classification and priority system. Each is discussed briefly below.

Volume -- There is a high correlation between traffic volume and functional classification. While there is certainly overlap in levels of ADT for each functional group, volume decreases as one moves down the functional class structure from principal arterial to local roads. Generally speaking, improvements are usually made to the higher volume roads on the basis of cost-effectiveness. Medium to low volume roads tend to demonstrate a much greater level of signing deficiency in terms of not adhering to MUTCD requirements than do higher volume roads. True information deficiencies in terms of actual driver needs, however, vary considerably and demonstrate less volume dependence. In fact, high design, high volume roads may have warning signs, e.g. curve warning, that are not necessary.

Speed -- The speed at which motorists can safely travel (or at least what is perceived to be a safe speed) is a very important factor in determining the need for warning signs. If motorists travel slowly enough they can safely navigate any potentially hazardous section without the need for signs. Problems occur when motorists travel at or near the maximum design speed for a given situation. The adage "It's so bad there are never any accidents" is based on the situation where the geometrics of the road (curves, crests and pavement width) are so restrictive that drivers can't travel fast without experiencing discomfort. For these situations, warning signs are generally not required because the design features themselves act as a warning.

The most hazardous situation is one where there are sporadic situations for which speed reductions are required in an otherwise high speed facility. Whenever the motorist is lulled into a situation where it is possible to go faster than the safe speed for an upcoming situation, guidance and control problems can occur.

Roadway Width -- All other factors being equal, pavement width (or lane width) can affect average highway speed. With wider lanes, motorists are less concerned about opposing vehicles and their placement in the lane and, in general, will travel faster. Pavement width tends to decrease from the principal arterial class down to the local functional class.

Markings -- The presence of centerlines and edgelines on a two-lane rural road influences the driver's expectation for that road. When markings are present, the motorist feels a sense of security or safety and also expects that there will be signing to supplement the marking when needed. If the signs are not there when needed, the motorist may be more prone to guidance and control problems. On the other hand, if there are no markings, which typically should only occur on narrow width roads, then the motorist is in a more attentive state, will not expect signs to warn of potentially hazardous situations and, therefore, will drive more cautiously.

Table 1 provides a suggested classification system that could be employed for this procedure. This system, conceptually similar to that in use in the Kansas DOT Handbook of Traffic Control Practices for Low Volume Rural Roads, could be used to classify a given roadway section on the basis of the several characteristics described above. It should be recognized that a given route or section could be classified from A to E differently based on any one characteristic. For example, a given road might be classified as follows:

Major collector ---------- C
400 - 1000 ADT ----------- D
22 ft width -------------- A
No shoulder -------------- E
Center Lines & Edgelines - A
55 mph speed ------------- A

In determining priorities for conducting the survey or determining where sign improvements should be made, highest priority should probably be given to those roads that have a variety of class levels because this indicates an imbalance in design. Such an imbalance creates the potential for expectancy error. For instance, the section described above would merit attention before a section with all D or E ratings.

Table 1. Classification system for two-lane rural roads.

Characteristics	A	B	C	D	E
Function	Principal Arterial	Minor Arterial	Major Collector	Minor Collector	Local
Volume (ADT)	> 3,000	2,000 - 4,000	1,000 - 2,000	400 - 1,000	≤ 400
Pavement Width (feet)	≥ 22	≥ 20	≥ 18	≥ 16	≥ 16
Shoulder Width (feet)	≥ 4	≥ 4	2 - 4	0 - 4	0 - 2
Center Lines, Edge Lines	Both	Both	Center Lines Only	Center Lines Only	None
Speed Limit (mph)	55	55	45-55	35-45	≤35

Establish Initial Expectancies

The concept of expectancy, briefly defined and discussed in the previous section, is a focal concept for the procedure. For it is when expectancies are violated that there is a possible information deficiency.

It is an accepted human trait that people expect certain things to appear and operate in certain ways. When they don't people are not able to respond correctly or at least it takes longer for them to respond. An everyday example is when entering a dark room, one expects to find a well mounted "on-off" switch for the lights, and furthermore, that up is "on" and down is "off." When the switch operates the opposite way or where there is a rheostat knob the person is momentarily confused and may take longer to respond correctly.

This principle applies to highway driving as it relates to the design of the road and information systems. Expectancies are established as a result of past driving experience and frequent exposure to similar situations. For example, motorists expect curves, grades, intersections, and points of conflict on two-lane highways and do not expect these on freeways and expressways. Also in general they expect more warning signs, and lower speeds on two-lane roads. However, expectancies are also established by very recent experiences of what the driver was just exposed to over a section of highway. If the driver sees that a certain situation, e.g. a curve, is consistently signed a certain way, then an expectancy is established that the next curve will be signed in a similar manner.

These long-term and short-term expectancies both come into play and affect how well a driver can respond to the changing character of two-lane rural roads. For a high-design two-lane highway designated as a primary State route, the motorist expects to be informed through signing whenever a change in speed and path are required, especially if that need cannot be discerned by the view of the road itself. At the other extreme, motorists expect little if any signing on an unpaved, low-volume, local road. For both situations, these expectancies can be violated. For the former, it can be whenever a situation occurs that requires a speed or path change and the motorist was not adequately warned. For the latter, curve warning signs may be installed for several consecutive curves and then not used for the next, thereby producing an expectancy violation.

It is important to realize that even though motorists have certain expectations for typical types of road, these "long-term" expectations can be and are modified by what the driver experiences along any given section of road. These latter expectancies are short lived, constantly being modified by a few minutes of driving or exposure to several similar situations.

Therefore, if a motorist has been consistently provided curve warning with speed advisory plate for sharp curves, the same treatment will be expected at the next similar curve. If not provided, this expectancy is violated. If, then, the next few curves do not have signing, the motorist's expectations will be modified to not expecting curve warning signs.

The expectancies that the motorist has and further develops or modifies for a given road will affect overall attention to driving and the ability to handle situations requiring a change in speed and/or path. In assessing the information deficiencies it is important, then, to consider the expectancies that an unfamiliar driver has for a given road. It is recommended, therefore, that as part of the information deficiency survey expectancies about the road be explicitly expressed by the driver. These expectancies should be stated early into the site, typically after driving a mile or two.

The principal elements upon which expectancies could be established are:

Alignment -- The presence or absence of horizontal curves and vertical curves, crests, etc. establishes how much sight distance will be available and the need for warning signs. Drivers establish expectancies regarding their speed, need for speed changes, attention to driving, and their overall level of comfort based on design features.

Width -- The lane width or the full pavement or travel width also has an affect on the driver's attention and feeling of comfort. On narrow roads, especially those without centerlines, the motorist is more concerned about the vehicle's position on the road when there is opposing traffic.

Shoulder -- The presence or absence of a shoulder, and to some extent, the type of shoulder (paved, stabilized gravel, grass, dirt) will influence the driver's expectancy.

Pavement -- Drivers establish expectancies based on the type and condition of the pavement. In general, for unpaved roads motorists expect little traffic, slow speeds and few or no warning signs. On a smooth paved surface, motorists may expect to have better geometrics and perhaps to go faster.

Speed and Speed Changes -- Based on the geometrics (alignment, width, shoulder, etc.) and pavement condition, the driver establishes expectancies about the safe speed, which may or may not be confirmed by the speed limit, and the need for speed changes.

Signs and Markings -- The mere presence or absence of signs and markings along the first part of a road establishes an expectancy of what the driver will experience for the remainder of the road. For example, if the first two curves are appropriately signed with curve warning signs, then the driver could reasonably expect the remainder of curves to be signed as well. Roads with well marked centerlines and edgelines establish an expectancy that the road will have ample signing and delineation whenever needed.

There is no precise way these expectancies should be stated. Two hypothetical examples to illustrate how one might comment on initial expectancies are presented below.

> "Now travelling on Rt. 101, Northbound. The road has a smooth surface with a 2-4 foot paved shoulder and open terrain. The road is generally straight with a few gentle curves and short crests with generally good sight distance. The road is marked with centerline and edgeline. I expect to be able to travel at 55 mph even though a speed limit is not posted. I am not concerned about on-coming traffic. If there are curves or other situations requiring a speed reduction, I expect to be warned through appropriate signing."

or

> "Now travelling on Jones Bridge Road, Southbound. The road is paved but there are occasional breaks in the pavement. There is no shoulder or centerline and I am not certain as to my lane limits. The road is curvilinear with several crests and dips which limit the sight distance. Except for some locations my safe speed is about 50 mph. There will be several occasions where I will have to reduce my speed but I expect to receive curve warning signs with speed advisory only at those locations that are really severe."

Running Commentary

Following the statement of initial expectancies concerning the road, the driver continues through the section providing continuous commentary as a method to identify potential information deficient locations. (Obvious information deficient locations located within the first mile or two should be identified as a result of the expectancy statement commentary). This procedure is recommended because it forces the driver/inspector to verbally state what is expected of the road ahead and how it should be handled. By doing so, the driver becomes more sensitive to locations and situations where the road is not as expected and needed warning information was not provided.

The comments should be oriented towards:

a) what the drivers expects of the road ahead relative to any of the following items:

   - o direction -- straight, curve left, curve right
   - o sharpness of curve
   - o approaching vehicles
   - o bridge width
   - o right-of-way at intersection
   - o other roadway conditions - e.g. pavement condition, shoulders, etc.

b) what actions are required of the driver regarding speed changes, turns, passing, etc., and

c) if there is any uncertainty as to any item related to a) or b).

A few hypothetical examples of the type of commentary suggested are presented in figure 2.

Item	Possible Commentary
	Example A
Approach to Crest Vertical Curve	"Crest curve ahead," view of road limited ... tree line indicates that road goes straight ahead ... not concerned about on-coming traffic ... wide enough pavement ... can maintain cruising speed ..."
On Vertical Curve Crest	"Confirmed" [continue with next section] or "Expectation violated ... tree line went straight but road curved left ... not sharp enough to cause any problem ... no need for warning sign." [continue with next section] or "Expectation violated ... tree line went straight but road turned left sharply ... needed to reduce speed ... should have had curve warning sign at least ... possibly speed advisory ... mark site for study"
	Example B
Approach to Horizontal Curve	"Curve left ahead ... see curve warning sign, no speed advisory ... should be able to take curve at cruising speed ... looking out for opposing vehicles because of narrow width"
Point of Curvature or Within Curve	"Curve sharper than anticipated ... speed reduction necessary especially if on-coming vehicles ... mark site for speed advisory check ... "
	Example C
Approach to Narrow Bridge on Curve	"Curve right ahead ... see curve warning sign ... assume I can maintain speed ..."
Closer to Curve/Bridge	"See bridge headwalls ... narrower pavement ... not certain if wide enough for two vehicles ... need to slow down ... can't see across bridge for opposing vehicles ... "
At Bridge	"Curve sharper than expected, bridge width narrower than expected ... two vehicles couldn't cross if truck ... needed speed advisory ... mark for study ..."

Figure 2. Example commentaries.

The commentary need not be long or continuous. On very long straight sections of highway with good sight distance there may not be any need for comments except for an occasional restating of the general expectancies for the road. The driver should travel at the speed limit or as close to it as is comfortable.

At first, the driver/inspector might be reluctant to comment or will be awkward or verbose in the comments made. However, it does not require much exposure to the procedure to become relaxed and able to comment concisely. It is recommended, however, that the driver/inspector gain experience before actual surveying. Four to eight hours of training is all that is required.

Although not necessary, it is suggested that the commentary be taped and kept on file. The comments could be replayed whenever the site is being further evaluated. Furthermore, it could serve as evidence that an evaluation of signing needs was made if ever required for a tort liability case.

The use of a hand-held switch will allow the driver to turn the recorder off whenever comments are not being made. Alternatively, a more expensive voice activated recorder could be used. A microphone should be clipped onto the driver's shirt to insure good reception.

Whenever the driver/inspector comes across a situation where it is felt that an information deficiency exists this fact should be noted by an appropriate comment. The accompanying observer/recorder can then mark the location of the site by the odometer reading. The form shown in Figure 3 can be used for this purpose. Besides basic information about route and direction, the form lists all the locations that were noted by the driver/inspector and the corresponding odometer readings. A brief description of the situation and deficiency is all that is required.

Site Investigations

The next step in the process is to conduct a more detailed survey of those sites identified as potential problems during the commentary driving.

INFORMATION DEFICIENCY LOG

Route ____________________	Recorder ____________________
Direction ________________	Date ________________________
Starting at ______________	Ending at ___________________

Odometer Reading	Situation Comment
000.0	Start
000.9	Sharp curve, no warning
001.5	Overhead bridge, no low clearance sign
o	
o	
o	
009.8	End

Figure 3. Sample information deficiency log.

These are the locations where a solution is not obvious to the survey team on the drive through and commentary. It should be noted however, that even where a solution seems obvious a site review is necessary. Sometimes what may appear to be an obvious and simple solution, e.g., a curve warning or side road warning sign, may, upon more careful analysis, reveal an altogether different solution.

If a site is identified for detailed investigation, this could be accomplished either (a) immediately after passing the site, (b) after the entire section or other sections are surveyed or even (c) on another day. Option (a) is not recommended as frequent stopping for detailed site investigations can be disruptive to the continuity of the commentary survey. It is possible to overlook problem sites or identify some that may not be problems where running commentary and problem site analysis are mixed. Therefore, other than conducting the site investigation immediately, the choice as to when the investigation should be done is up to the survey team.

Upon returning to each potential problem site, a more detailed assessment should be made to confirm or modify the initial problem identification and information deficiency. This investigation may require one or more additional drive-throughs of the site. Also, it will require an evaluation from one or more stationary positions upstream of the location.

The detailed survey should focus on the nature of the problem and preliminary recommendations as to how it could be resolved. To assist the survey team, checklists have been developed for the following nine typical situation assessments frequently encountered:

1) Stop-controlled intersection
2) Narrow/one-lane bridge
3) Horizontal curve
4) Tangential intersection
5) Intersection which requires a turn
6) Railroad-highway grade crossing
7) Uncontrolled Y-intersection

8) Low water stream crossing
9) Height/weight limit restrictions

In addition, there is a tenth general checklist that could be adapted for any other situation. Checklists for the nine specific situations listed above along with the tenth, general situation checklist are found in the appendix. The general checklist is also presented here (figure 4) to assist in explaining the recommended procedure.

The checklist has three parts. Part I requires some basic information related to the site. Specifically it requires the following items:

- o Route ID -- either by number and/or name
- o Location -- to locate a specific situation note its distance (in tenths of mile) from a reference point such as the starting point for the survey or nearest intersection.
- o Approach Direction -- Circle the direction of travel based on map or route designation
- o Date/Time -- self-explanatory
- o Inspector(s) -- enter names or initials
- o Approach Speed During Survey -- This is the speed at which the driver approached the site during the initial survey
- o Speed Limit Posted or Estimated -- Enter the speed limit and check whether it was posted at any point leading up to the site or that it was not posted and was estimated.
- o Decision Sight Distance -- Using the speed limit if posted, or the maximum of the approach speed or estimated speed, circle the appropriate decision sight distance value. From this disance upstream of the beginning of the site, e.g. the point of curvature, start of bridge or width transition, etc., initial observations are to be made regarding several checklist questions presented in Part II.

Part II is a series of suggested questions which serve as a checklist to evaluate the nature of the deficiency. At a location approximating the decision sight distance for the appropriate speed, the inspector(s) should

INFORMATION DEFICIENCY EVALUATION

OTHER SITUATIONS

PART I:

LOCATION:_____________ MILES FROM

ROUTE ID ______________________________ REFERENCE POINT _______________

APPROACH DIRECTION N S E W (Circle)

DATE __________ Time __________ AM/PM INSPECTORS ____________________

APPROACH SPEED DURING SURVEY _____ MPH

SPEED LIMIT _____ MPH _____ POSTED _____ ESTIMATED

DECISION SIGHT DISTANCE (Circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	220	275	345	420	500	585	680

DESCRIBE SITUATION ____

____

____

PART II:

(1) Is the [specific situation] clearly visible from decision sight distance? ___ Yes ___ No

If yes, go to (4)

(2) Is there a [situation-specific] warning sign present? ___ Yes ___ No

If no, go to (4)

(3a) Is the warning sign accurate? ___ Yes ___ No

(3b) Is the warning sign clearly visible on the approach? ___ Yes ___ No

(3c) Is the warning sign properly designed? ___ Yes ___ No

(3d) Is the warning sign properly located (Check Table of Placement Distances for Advance Warning Signs)? ___ Yes ___ No

(3e) Is there a supplemental speed advisory plate attached to the warning sign? ___ Yes ___ No

Figure 4. Problem location checklist.

(4) Do other informational sources (i.e., markings, delineators, brush/tree line, etc.) provide information suggesting either: (1) that the situation ahead is not a [specific situation] or (2) that the [specific situation] is located further downstream than it actually is?
___ Yes ___ No

If yes, then identify those sources and describe how they provide confusing, conflicting, or misleading information: ________________
____
____

(5) Is the presently available informaton sufficient for you to recognize that a [specific situation] is downstream? ___ Yes ___ No

(6) Would the presently available information be sufficient for you to recognize that a [specific situation] is downstream:

during nighttime conditions? ___ Yes ___ No
when the roadside vegetation is at its densest growth? ___ Yes ___ No

(7) Is the presently available information sufficient for you to decide on an appropriate control action and to execute the selected maneuver?
___ Yes ___ No

(8) Would the presently available information be sufficient for you to decide on an appropriate control action and to execute the selected maneuver:

during nighttime conditions? ___ Yes ___ No
when the roadside vegetation is at its densest growth? ___ Yes ___ No

PART III:

SUGGESTED TREATMENTS

__ Install [situation specific] warning sign
__ Improve visibility of [situation specific] warning sign
__ Relocate advance warning sign
   Move closer to situation by ___ feet
   Move back from situation by ___ feet
__ Replace non-standard warning sign with standard warning sign
__ Install supplemental speed advisory plate; suggested speed is ___ mph
__ Improve visibility of situation
__ Correct for confusing, conflicting or misleading information: ________
____
____
____
__ Implement other treatment: ________________________
____

Figure 4. Problem location checklist (continued).

assess the visibility of the specific situation and the presence and use of appropriate warning signs and other devices, e.g. markings, panels, delineators, chevrons, etc. For each of the nine situations there are specific questions. They are designed and structured to lead the investigator through a systematic evaluation of the adequacy of the information system and identification of the deficiencies. These are minimum sets of suggested questions that may be modified or added to depending upon the specific location. No two situations of the same type are identical with regard to the specific geometrics, land development, traffic, etc. Some jurisdictions may want to modify these questions to reflect their special policies, highway characteristics, topography, etc.

It should be noted that while surveys during the night would be useful, it is recommended that the surveys be performed during the day. At first thought, it would seem that the nighttime would be the more critical time with regard to providing driver information needs. While in fact there are some situations where the loss of daylight visibility creates a problem which would not otherwise occur during the daylight hours, more problems arise during the day. Because the whole visual scene is available to the driver during the day, there are competing and conflicting information sources that do not occur at night. At night, motorists can get information regarding the path of the road from the headlight beam of the opposing vehicles. For instance, there may be less apprehension exhibited approaching a sharp crest curve on a narrow road at night than at day, because the driver knows that if a vehicle is over the crest, the oncoming headlight beam will be visible.

Although the investigation will usually be conducted during the daylight hours, it is important to consider any special problems or deficiencies that would occur at night. Hence, the last question in Part II is to remind the investigator to consider the information sources for the nighttime condition. Also, if the survey is being conducted at a time other than when the roadside vegetation is at its most dense growth, the investigator is prompted to consider this situation in the investigation.

Part III provides a check list of suggested treatments appropriate to the situation being investigated. The list is intended merely to motivate the investigator into considering several options. The investigator may check off one or more possible solutions for further consideration upon return to the office and subsequent discussion with the responsible engineer.

The list of suggested treatments provided for all the situations is not likely to be all inclusive. Other treatments could be added depending on the policy and design standards of the jurisdiction.

Personnel Requirements

It is recommended that two people be used for the survey. If available staff is very limited, however, one person could perform the essential elements of the procedure. There are no rigid specifications on attributes of the driver or the assistant recorder, but the following factors should be considered:

- The driver/commentator should be knowledgeable in the application of traffic control devices, especially signs and markings. Familiarity with the MUTCD and signing requirements is important. Ideally this person would be a traffic engineer or individual with some training in traffic control devices.

- Having a driver/commentator who is unfamiliar with the road system is preferable to one who is familiar with it. One way to accomplish this and still have one who is technicially knowledgeable is to "borrow" an engineer from another county on a reciprocal basis. If this is not possible, then the driver can be from your own staff. The procedure, if followed as suggested, forces the driver to behave like an unfamiliar driver.

- The driver/commentator should not be an extremely cautious nor aggressive driver. The former person will tend to overstate the deficiencies and need for signs while the latter will be too liberal or have a high tolerance level for the need for warning signs.

- The assistant recorder need not have the same skills as the driver/commentator unless the two will be taking turns driving. As a minimum the person should be an engineering technician, and perhaps could be a college engineering student if the survey is done during the summer season.

It is advisable that the person most responsible for determining what signs are installed, e.g. the county engineer, should participate in the survey at least in a review/quality control role. This individual should be familiar with the process and spot-check a few of the roads to insure that obvious deficiencies are not overlooked. Of course, recommended solutions to deficient locations should be reviwed and approved by the responsible person.

Frequency of Survey

This type of survey does not need to be done on an annual or periodic schedule. In fact, once the initial survey is performed, the only reasons for repeating it would be because the character of the road related to its geometrics, speed, and volume had substantially changed. This, does not mean that once a road has been surveyed the individual responsible no longer has to be concerned with providing adequate information to the motorist. That is a continuous responsibility which can be addressed through periodic sign inspections, and even informal information deficiency surveys whenever the staff is driving the road network.

II. CRITIQUE OF PROCEDURE

Two workshops were conducted to establish the utility, practicality, and overall acceptance of the suggested procedure by State and local operating engineers who would be expected to use it. The first workshop was held at State College, PA and was attended by nine individuals representing one township in Pennsylvania, two counties in Maryland and New York, three state-level traffic engineers (West Virginia, Maryland, and New York), and three State-local liaison representatives from Pennsylvania. The second workshop was held at Denver, Colorado, and was attended by representatives from seven counties in the States of Washington, Oregon, New Mexico, and Minnesota; from four State local-aid or traffic engineering offices in Kansas, Minnesota, Idaho, and Iowa; and from the National Park Service.

The workshop lasted a day and a half and followed the agenda shown below:

- Discussion of the research project, its goals and objectives, how the procedure was used for the research project, and the purpose of the workshop.
- Description and explanation of some human factors/traffic engineering concepts and principles basic to the procedure and used throughout the workshop.
- Brief overview description of the procedure.
- Discussion of driver expectancy related to roadway characteristics including viewing of sample road film clips and an exercise to establish expectancies.
- Explanation of the commentary procedure with audio-film clip demonstrations.
- Discussion on recognizing types of information deficiencies using slides of deficient locations found during the research.
- Explanation of the information deficiency checklists and how they are to be used.
- Written and verbal critique of the procedure.

Due to time and logistical constraints, the participants were not able to see the procedure applied in the field or to personally apply the procedure in an actual highway situation. They had to rely on the instructors' explanation and the audio-film and slide illustrations provided.

A. PARTICIPANT RESPONSES.

A multi-part questionnaire was used to elicit comments about the utility of the procedure in its present form, what could be changed to make it more useful or practical, whether or not it might actually be used, what type of personnel would be necessary, whether or not training was necessary, and other issues. The highlights of the questionnaire responses to ten key questions raised are summarized below.

Do They Already Have a Similar Activity?

While almost all participants responded yes to the question of having an existing activity performed with the objective of identifying information deficient locations, their explanations indicated that these were, for the most part, sign maintenance inventories to determine the physical condition of the signs. State agency representatives indicated that they do perform sign surveys on a regular basis, while those from local agencies indicated they rarely do. No one indicated that they, indeed, have a procedure that attempts to evaluate whether or not the motorist is getting the information needed for the particular situation.

Is the Procedure Useful?

Without exception all respondents throught that the procedure would be useful, although several State representatives thought that it would be more appropriate to local jurisdictions. In general, the State representatives thought that they already have an adequate sign evaluation program although none noted that the evaluation followed the essence of the recommended procedure. One local jurisdiction respondent indicated that it was particularly useful becaue it did not require, in his estimation, the need for a professional engineer to make the sign evaluation.

Is the Procedure Technically Acceptable?

The intent of this question was to establish whether or not the procedure would, in fact, identify information deficient locations. All participants responded favorably to this question. None expressed the concern that the procedure would over or under estimate the existence of information deficient locations.

Does It Provide a Perception of the Roadway Not Otherwise Gained?

All but two respondents indicated that they thought the procedure with its commentary format would provide them with a different perception of the roadway and the information system that they would not otherwise have using any existing procedure currently followed.

Factors for Establishing Priority for Use of Procedure

Listed below are the most cited factors, ranked in order of frequency of response, that the participants thought should be used in deciding what roads should have priority for this procedure:

- Accident experience
- Volume
- Functional classification
- Percent of unfamiliar drivers
- Geometrics
- Engineer's judgment

Other factors cited included susceptibility to tort liability and physical condition. One person felt that all roads should be done eventually and that they be selected on a random basis. Another felt that the procedure should be applied to the worst roads first and then worked up to the better roads.

What Type of Personnel Would They Assign?

Here the responses were quite varied. As many thought that the driver/commentator should be an engineer as did those who thought a experienced technician would suffice. A minority thought neither was necessary but that the person should be able to make "common sense" commentary. Most thought that the passenger/aide should be a technician level person familiar with the road, although a few thought that this person should be an engineer.

Is It Necessary to Use an Unfamiliar Driver?

Slightly more than half of the respondents thought that it was indeed necessary to use a driver/commentator who was unfamiliar with the road being surveyed. Others thought that the procedure, if followed objectively, was sufficient to insure that someone familiar with the road could evaluate it as if he/she were an unfamiliar driver.

Is It Feasible to Get an Unfamiliar Driver?

The response to this question were about equally split between yes and no. Some local government representatives indicated that they do on occassion use staff from other jurisdictions, so that borrowing staff to evaluate their roads would not be a problem. Conversely, others indicated that this could not be done easily. Some indicated that college engineering students on summer recess could be used for this purpose.

Would You Fit It Into Your Program?

Nearly all indicated that they would try to fit this procedure into their existing program or at least incorporate certain elements of it. The main impediments to incorporating the total procedure were staff and budget limitations.

Is Training Necessary to Implement the Procedure?

Even if the procedure was documented in a users' guide or handbook, a majority felt that some sort of field training exercise would be needed to properly implement the procedure. This response varied according to the jurisdiction. State participants felt less need for training because their personnel are already exposed to some elements of the procedure. Local jurisdiction attendees were more prone to express the need for training.

B. SUMMARY

The majority of the participants at the two workshops felt positive about the procedure. The State representatives indicated that their States already have programs to identify deficient locations (e.g., hazardous locations) on two-lane rural roads, and that roads under their responsibility are usually adequately signed and marked. Hence, they are not as likely to adopt the entire procedure. Local jurisdiction representatives, on the other hand, indicated that they did not have such a program and thought this procedure would be very useful to them. All workshop participants thought that the commentary procedure, based on what little they experienced from audio-film clips, would heighten the sensitivity and awareness of the driver/investigator making it possible to better judge information deficient locations. Several indicated they would attempt to implement the procedure but felt the need for better documentation and/or training.

APPENDIX

INFORMATION DEFICIENCY CHECKLISTS

Multi-page checklists have been developed for the following nine typical roadway situations:

1) Stop-controlled intersection
2) Narrow/one-lane bridge
3) Horizontal curve
4) Tangential intersection
5) Intersection which requires a turn
6) Railroad-highway grade crossing
7) Uncontrolled Y-intersection
8) Low water stream crossing
9) Height/weight limit restrictions

In addition a tenth general information deficiency checklist is provided that could be adapted to any roadway situation not covered in one of the nine specific situation checklists.

INFORMATION DEFICIENCY EVALUATION

STOP-CONTROLLED INTERSECTION

PART I

ROUTE ID______________________ INTERSECTING ROUTE_______________________________

APPROACH DIRECTION N S E W (circle)

DATE__________TIME__________ AM PM INSPECTORS____________________

APPROACH SPEED DURING SURVEY________MPH

SPEED LIMIT: a) Posted_____MPH or b) Estimated_____MPH (one entry)

DECISION SIGHT DISTANCE (circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	220	275	345	420	500	585	680

PART II

(1) Is the intersection clearly visible from decision sight distance?
___Yes ___No

(2) Is the stop sign clearly visible from decision sight distance?
___Yes ___No

If no, go to (4)

(3) From decision sight distance, can you determine that the stop sign applies to you? ___Yes ___No

If yes, go to (6)

(4) Is there a STOP AHEAD warning sign present? ___Yes ___No

If no, go to (6)

(5a) Is the STOP AHEAD warning sign clearly visible on the approach?
___Yes ___No

(5b) Is the STOP AHEAD warning sign designed according to the specifications in the MUTCD? ___Yes ___No

(5c) Is the STOP AHEAD warning sign properly located? (i.e., neither too far upstream such that you would "forget" it or too close to the intersection such that you would not have sufficient time to stop) (Check Table of Placement Distances for Advance Warning Signs in MUTCD) ___Yes ___No

(6) Do other informational sources (i.e., roadway surface edges, terrain cuts, brush/tree line, shoulder edges, centerlines, etc.) provide information suggesting either 1) that the situation ahead is not a stop-controlled intersection, 2) that stop sign does not apply to your approach, or 3) that the stop controlled intersection is located further down stream than it actually is? ___Yes ___No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:______________

____

____

____

____

(7) Is the presently available information sufficient for you to recognize the stop-controlled intersection at a distance such that you can stop safely? ___Yes ___No

(8) Would the presently available information be sufficient for you to recognize that a stop-controlled intersection is located downstream:

- during nighttime conditions? ___Yes ___No
- when the roadside vegetation is at its densest growth? ___Yes ___No

PART III

SUGGESTED TREATMENTS

___ Install STOP AHEAD warning sign
___ Improve visiblity of STOP AHEAD warning sign
___ Relocate STOP AHEAD warning sign
-Move closer to intersection by ___feet
-Move back from intersection by ___feet
___ Replace non-standard warning sign with standard STOP AHEAD warning sign
___ Improve sight distance to intersection
___ Improve visibility of stop sign
___ Install stop lines
___ Improve markings at intersection
___ Improve signing at intersection
___ Correct for confusing, conflicting or misleading information:

____

____

____

___ Implement other treatment:

____

____

____

INFORMATION DEFICIENCY EVALUATION

NARROW/ONE-LANE BRIDGES

PART I

LOCATION:________________MILES FROM
ROUTE ID_______________________REFERENCE POINT____________________

APPROACH DIRECTION N S E W (circle)

DATE__________TIME__________AM/PM INSPECTORS____________________

APPROACH SPEED DURING SURVEY________MPH

SPEED LIMIT: a) Posted____MPH or b) Estimated____MPH (one entry)

DECISION SIGHT DISTANCE (circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	230	290	355	430	510	590	680

PART II

(1) Is the bridge clearly visible from decision sight distance?
___Yes ___No

If no, go to (3)

(2) From decision sight distance, can you perceive the reduced roadway width at the bridge? ___Yes ___No

If yes, to to (5)

(3) Is there a NARROW BRIDGE or ONE-LANE BRIDGE warning sign present?
___Yes ___No

If no, go to (5)

(4a) Is the warning sign accurate? (i.e., the ONE-LANE BRIDGE is applicable to bridges with usable roadway widths less than 16 ft or 18 ft if a significant number of wide vehicles cross the bridge or if the approach alignment is winding)
___Yes ___No

(4b) Is the warning sign clearly visible on the approach?
___Yes ___No

(4c) Is the warning sign properly designed according to the specifications in the MUTCD? ___Yes ___No

(4d) Is the warning sign properly located? (i.e., neither too far upstream such that you would "forget" it or too close to the bridge such that you still would not have sufficient time to select a safe speed and decelerate to it) (Check Table of Placement Distance for Advance Warning Signs in MUTCD)
___Yes ___No

(4e) Is there a supplemental speed advisory plate attached to the warning sign?
___Yes ___No

(5) Do other informational sources (i.e., hazard panels, guardrails, edgelines, roadway edges, bridge abutments, etc.) provide information suggesting 1) that the situation ahead is not a narrow/one-lane bridge, 2) that usable roadway width across the bridge is wider than it actually is, or 3) that a narrow/one-lane bridge is located further downstream? ___Yes ___No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:______________

____
____
____
____

(6) Is the sight distance to opposing vehicles sufficient for you to make a safe decision on whether you can safely cross the bridge and to safely execute the selected maneuver? ___Yes ___No

(7) Is the presently available information sufficient for you to recognize the narrow/one-lane bridge at a distance such that you can decelerate safely to a safe and comfortable crossing speed? ___Yes ___No

(8) Would the presently available information be sufficient for you to recognize that a narrow/one-lane bridge is downstream:

- during nighttime conditions? ___Yes ___No
- When the roadside vegetation is at its densest growth? ___Yes ___No

PART III

SUGGESTED TREATMENTS

___ Install NARROW BRIDGE warning sign
___ Install ONE-LANE BRIDGE warning sign
___ Improve visibility of advance warning sign
___ Relocate advance warning sign
-Move closer to bridge by ___ft
-Move back from bridge by ___ft
___ Replace non-standard warning sign with standard warning sign
___ Install supplemental speed advisory plate;
suggested speed is ___MPH
___ Install other advance warning signs, i.e.,
___Curve warning
___Intersection warning
___Low overhead clearance
___Other (specify)___________________________

____
___ Improve pavement markings at bridge (i.e., tapered approach treatment)
___ Install hazard panels at bridge
___ Improve visibility of bridge
___ Correct for confusing, conflicting or misleading information:
____
____
____
___ Implement other treatment:
____
____
____

INFORMATION DEFICIENCY EVALUATION

HORIZONTAL CURVES

PART I

LOCATION:________________MILES FROM
ROUTE ID______________________REFERENCE POINT______________________

APPROACH DIRECTION N S E W (circle)

DATE__________TIME__________ AM PM INSPECTORS______________________

APPROACH SPEED DURING SURVEY________MPH

SPEED LIMIT: a) Posted_____MPH or b) Estimated_____MPH (one entry)

DECISION SIGHT DISTANCE (circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	230	290	340	390	445	500	550

PART II

(1) From decision sight distance, is it clearly visible that there is a curve ahead?
___Yes ___No

If no, go to (3)

(2) From decision sight distance, can you perceive the degree of curvature (i.e., sharpness) of the curve? ___Yes ___No

If yes, go to (5)

(3) Is there a curve, turn, reverse curve, reverse turn, or winding road warning sign present? ___Yes ___No

If no, go to (5)

(4a) Is the warning sign accurate? ___Yes ___No

(4b) Is the warning sign clearly visible on the approach?
___Yes ___No

(4c) Is the warning sign properly designed? ___Yes ___No

(4d) Is the warning sign properly located? (i.e., neither to far upstream such that you would "forget" it or too close to the curve such that you would not have enough time to select a safe speed and decelerate to it) (Check Table of Placement Distances for Advance Warning Signs in MUTCD) ___Yes ___No

(4e) Is there a supplemental speed advisory plate attached to the warning sign? ___Yes ___No

(5) Do other informational sources (i.e., markings, roadway, shoulders, delineators, brush/tree line, terrain cut, Chevrons, etc.) provide information suggesting 1) that curve is shallower than it actually is or 2) that the curve can be driven at a speed higher than what would be considered the safe speed? ___Yes ___No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:______________

____

____

____

____

(6) Is the presently available information sufficient for you to select a safe and comfortable speed for the curve and safely decelerate to that speed? ___Yes ___No

(7) Would the presently available information be sufficient for you to select a safe and comfortable speed for the curve and safely decelerate to that speed:

- during nighttime conditions? ___Yes ___No
- When the roadside vegetation is at its densest growth? ___Yes ___No

PART III

SUGGESTED TREATMENTS

___ Install curve warning sign
___ Install turn warning sign
___ Install reverse curve warning sign
___ Install reverse turn warning sign
___ Install winding road warning sign
___ Install supplemental speed advisory plate; suggested speed is ____MPH
___ Improve visibility of advance warning sign
___ Relocate advance warning sign
-Move closer to curve by ____ft
-Move back from curve by ____ft
___ Replace non-standard warning sign with standard warning sign
___ Install post mounted delineators
___ Install large arrow sign
___ Install Chevron alignment signs
No. of Chevron signs____
___ Improve sight distance through curve
___ Improve pavement markings on curve (i.e., widen edgelines)
___ Correct for confusing, conflicting or misleading information:
____
____
____
___ Implement other treatment:
____
____
____

INFORMATION DEFICIENCY EVALUATION

TANGENTIAL INTERSECTIONS

PART I

ROUTE ID________________________ INTERSECTING ROUTE________________________

APPROACH DIRECTION N S E W (circle)

DATE__________TIME__________ AM PM INSPECTORS________________________

APPROACH SPEED DURING SURVEY________MPH

SPEED LIMIT: a) Posted_____MPH or b) Estimated_____MPH (one entry)

DECISION SIGHT DISTANCE (circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	230	290	340	390	445	500	550

PART II

(1) From decision sight distance, is it clearly visible that there is a curve ahead?
___Yes ___No

(2) Is the intersecting side road clearly visible from decision sight distance?
___Yes ___No

If no, go to (4)

(3) From decision sight distance, can you recognize that the situation downstream is a horizontal curve with a tangentially intersecting side road/driveway? ___Yes ___No

If yes, go to (6)

(4) Are there warning signs present? ___Yes ___No

If no, go to (6)

(5a) What types of warning signs are present?

___Curve warning sign
___Intersection warning sign
___Modified curve warning sign showing intersecting side road
___Other (specify)____
____

(5b) Is the warning sign(s) clearly visible on the approach?
___Yes ___No

(5c) Is the warning sign properly located? (i.e., neither to far upstream such that you would "forget" it or too close to the curve such that you would not have enough time to select a safe speed and decelerate to it) (Check Table of Placement Distances for Advance Warning Signs in MUTCD) ___Yes ___No

(5d) Is there a supplemental speed advisory plate attached to the warning sign?
___Yes ___No

(6) Do other informational sources (i.e., brush/tree line, telephone lines, terrain cuts, shoulder edges, etc.) provide information suggesting 1) that the situation ahead is only a curve or 2) that the route continues straight ahead?
___Yes ___No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:______________

____
____
____
____

(7) Is information provided that would enable you to select a safe path?
___Yes ___No

If yes to question #7, then

(8a) What types of information are provided:

- Post mounted delineators? ___Yes ___No
- Chevrons? ___Yes ___No
- Large arrow signs? ___Yes ___No
- Other guidance information? ___Yes ___No
  Specify_______________________________________
  ____
- Navigational information? ___Yes ___No
  Specify_______________________________________
  ____

(8b) Is the provided information clearly visible on the approach?
___Yes ___No

(8c) Is the provided information properly designed? ___Yes ___No

(8d) Is the provided information properly located? ___Yes ___No

(9) Is the presently available information sufficient for you to recognize the tangential intersection at a distance such that you can select a safe speed and path and safely traverse the curve? ___Yes ___No

(10) Would the presently available information be sufficient for you to recognize that there is a tangential intersection ahead:

- during nighttime conditions? ___Yes ___No
- when the roadside vegetation is at its densest growth? ___Yes ___No

PART III

SUGGESTED TREATMENTS

___ Install a modified curve or turn warning sign which shows the curve and the intersecting side road
___ Install supplemental speed advisory plate; suggested speed is ____MPH
___ Improve visibility of advance warning sign
___ Relocate advance warning sign
-Move closer to curve by ___ft
-Move back from curve by ___ft
___ Replace existing warning sign(s) with modified curve or turn warning sign
___ Install post-mounted delineators
___ Install Chevron alignment signs
No. of Chevron signs____
___ Improve visibility of the curve
___ Install directional assembly in advance of intersection
Specify____
____
___ Install destination signs in advance of the intersection
Specify____
____
___ Install directional assembly at intersection
Specify____
____
___ Install destination signs at the intersection
Specify____
____
___ Improve visibility of existing navigational guide signs
Specify Sign____
___ Replace existing navigational guide signs with properly designed guide signs
Specify Sign____
___ Relocate existing navigational guide signs
Specify Sign____
-Move closer to intersection by ___ft
-Move back from intersection by ___ft
___ Relocate large arrow sign
___ Relocate Chevron alignment signs
___ Improve sight distance through curve
___ Improve pavement markings through intersection (e.g., apply dotted edgeline through intersection)

___ Correct for confusing, conflicting or misleading information:

___ Implement other treatment:

INFORMATION DEFICIENCY EVALUATION

INTERSECTION WHICH REQUIRES A TURN

PART I

ROUTE ID______________________ INTERSECTING ROUTE______________________________

APPROACH DIRECTION N S E W (circle)

DATE__________TIME__________AM PM INSPECTORS____________________

APPROACH SPEED DURING SURVEY________MPH

SPEED LIMIT: a) Posted_____MPH or b) Estimated_____MPH (one entry)

DECISION SIGHT DISTANCE (circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	195	250	320	395	470	560	650

PART II

(1) Is the intersection clearly visible from decision sight distance?
___Yes ___No

If no, go to (3)

(2) From decision sight distance, can you determine that you have to turn at the intersection to stay on the signed route? ___Yes ___No

If yes, go to (8)

(3) Are signs informing you that you have to turn at the intersection to stay on the signed route present? ___Yes ___No

If no, go to (8)

(4) Are any of the following provided upstream of the intersection:

- advance route turn assemblies? ___Yes ___No
- advance destination signs? ___Yes ___No
- advance trailblazer signs? ___Yes ___No
  If yes, specify____
  ____
- advance intersection warning signs? ___Yes ___No

If no to all of the above, go to (6)

(5a) Are the advance informational signs provided upstream of the intersection clearly visible on the approach? ___Yes ___No

(5b) Are the advance informational signs provided upstream of the intersection properly designed according to the specifications in the MUTCD? ___Yes ___No

(5c) Are the advance informational signs provided upstream of the intersection properly located? ___Yes ___No

(6) Are any of the following provided at the intersection:

- directional assemblies? ___Yes ___No
- destination signs? ___Yes ___No
- trailblazer signs? ___Yes ___No
- other guide signs? ___Yes ___No
  If yes, specify____
  ____
- other information sources? ___Yes ___No
  If yes, specify____
  ____

If no to all of the above, go to (8)

(7a) Are the informational signs provided at the intersection clearly visible on the approach? ___Yes ___No

(7b) Are the informational signs provided at the intersection properly designed according to the specifications in the MUTCD? ___Yes ___No

(7c) Are the informational signs provided at the intersection properly located? ___Yes ___No

(8) Do other information sources (i.e., other signs, markings, delineators, brush/tree line, roadway, etc.) provide information suggesting that you do <u>not</u> have to turn at the intersection to stay on the signed route? ___Yes ___No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:______________
____
____
____
____

(9) Is the presently available information sufficient for you to recognize that you have to turn at the intersection ahead to stay on the signed route at a distance such that you can turn safely? ___Yes ___No

(10) Would the presently available information be sufficient to recognize that you have to turn at the intersection ahead to stay on the signed route:

- during nighttime conditions? ___Yes ___No
- when the roadside vegetation is at its densest growth? ___Yes ___No

PART III

SUGGESTED TREAMENTS

___ Install an advance route turn assembly (consisting of a route marker and an advance route turn arrow) in advance of the intersection
___ Install destination signs in advance of the intersection
___ Install a directional assembly (consisting of a route marker and a directional arrow) at the intersection
___ Install destination signs at the intersection
___ Install route confirmation signs beyond the intersection
___ Improve visibility of existing navigational guide signs
Specify sign____
___ Replace existing navigational guide signs with properly designed signs
Specify signs____
___ Relocate existing navigational guide signs
Specify sign____
-Move closer to intersection by ___ft
-Move back from intersection by ___ft
___ Improve visibility of the intersection
___ Correct for confusing, conflicting or misleading information:
____
____
____
___ Implement other treatment:
____
____
____

INFORMATION DEFICIENCY EVALUATION

RAILROAD-HIGHWAY GRADE CROSSINGS

PART I

LOCATION:________________MILES FROM
ROUTE ID______________________REFERENCE FROM____________________

APPROACH DIRECTION N S E W (circle)

DATE__________TIME__________AM PM INSPECTORS____________________

APPROACH SPEED DURING SURVEY________MPH

SPEED LIMIT: a) Posted____MPH or b) Estimated____MPH (one entry)

DECISION SIGHT DISTANCE (circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	220	275	345	420	500	585	680

PART II

(1) Is the railroad grade crossing clearly visible from decision sight distance?
___Yes ___No

If no, go to (3)

(2) Are the control devices (i.e., crossbucks, signals and/or gates) clearly visible from decision sight distance? ___Yes ___No

(3) Is there a railroad advance warning sign? ___Yes ___No

If no go to (5)

(4a) Is the railroad advance warning sign clearly visible on the approach?
___Yes ___No

(4b) Is the railroad advance warning sign designed according to the specifications in the MUTCD? ___Yes ___No

(4c) Is the railroad advance warning sign properly located? (i.e., neither too far upstream such that you would "forget" it or too close to the intersection such that you would not have sufficient time to make and execute a safe crossing decision) (Check Table of Placement Distances for Advance Warning Signs in MUTCD) ___Yes ___No

(4d) Is there a supplemental speed advisory plate attached to the railroad advance warning sign? ___Yes ___No

(5) Is the crossing controlled by train-activated signals and/or gates?
___Yes ___No

If yes, go to (7)

(6) Is there sufficient intersection sight distance both to the left and to the right for you to make a safe crossing decision?
___Yes ___No

(7) Do other informational sources (i.e., other signs, markings, roadway, telephone line, etc.) provide information suggesting either 1) that the situation ahead is not a railroad-highway grade crossing, 2) that the type of control at the grade crossing is different than it actually is, and/or 3) that the grade crossing is located further downstream?
___Yes ___No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:_______________
____
____
____
____

(8) Is the presently available information sufficient for you to recognize the railroad-highway grade crossing at a distance such that you can make a safe crossing decision and execute the selected maneuver?
___Yes ___No

(9) Would the presently available information be sufficient for you to make a safe crossing decision and to execute the selected maneuver:

- during nighttime conditions? ___Yes ___No
- when the roadside vegetation is at its densest growth? ___Yes ___No

(10) Does the crossing have a sufficiently rough surface such that it requires a deceleration to a crossing speed less than the approach speed?
___Yes ___No

If no, then stop

(11) Is the presently available information sufficient to allow you to select a safe and comfortable crossing speed and to safely cross?
___Yes ___No

(12) Would the presently available information be sufficient to allow you to select a safe and comfortable crossing speed and to safely cross:

- during nighttime conditions? ___Yes ___No
- when the roadside vegetation is at its densest growth? ___Yes ___No

PART III

SUGGESTED TREATMENTS

___ Install railroad advance warning sign
___ Improve visibility of railroad advance warning sign
___ Relocate railroad advance warning sign
-Move closer to crossing by ___ft
-Move back from crossing by ___ft
___ Replace non-standard warning sign with standard railroad advance warning sign
___ Install supplemental speed advisory plate;
suggested speed is ____MPH
___ Improve approach sight distance to:
___Left leg of crossing
___Right leg of crossing
___ Improve visibility of crossing control devices (i.e., crossbucks, signals, gates)
___ Correct for confusing, conflicting or misleading information:
____
____
____
___ Implement other treatment:
____
____
____

INFORMATION DEFICIENCY EVALUATION

UNCONTROLLED Y-INTERSECTION

PART I

ROUTE ID_______________________ INTERSECTING ROUTE_____________________________

APPROACH DIRECTION N S E W (circle)

DATE__________TIME__________ AM PM INSPECTORS____________________

APPROACH SPEED DURING SURVEY________MPH

SPEED LIMIT: a) Posted_____MPH or b) Estimated_____MPH (one entry)

DECISION SIGHT DISTANCE (circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	165	225	295	365	445	530	620

PART II

(1) Is the Y-intersection clearly visible from decision sight distance?
___Yes ___No

If yes, go to (4)

(2) Is there a Y-intersection warning sign present?
___Yes ___No

If no, go to (4)

(3a) Is the Y-intersection warning sign clearly visible on the approach?
___Yes ___No

(3b) Is the Y-intersection warning sign properly designed?
___Yes ___No

(3c) Is the Y-intersection warning sign properly located? (i.e., neither too far upstream such that you would "forget" it or too close to the intersection such that you would not have sufficient time to make and execute a safe route selection decision) (Check Table of Placement Distance for Advance Warning Signs in MUTCD) ___Yes ___No

(3d) Is there a supplemental speed advisory plate attached to the Y-intersection warning sign? ___Yes ___No

(4) Do other information sources (i.e., other signs, markings, delineators, brush/tree line, roadway, etc.) provide information suggesting either 1) that the situation ahead is not a Y-intersection or 2) that the Y-intersection is located further downstream? ___Yes ___No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:______________

____
____
____
____

(5) Is information provided that would enable you to make a safe route selection decision? ___Yes ___No

If no, go to (7)

(6a) What types of information are provided:

- advance route designation information? ___Yes ___No
- advance destination information? ___Yes ___No
- guidance information provided at the intersection? ___Yes ___No
- navigational information provided at the intersection? ___Yes ___No
- route confirmation information provided beyond the intersection? ___Yes ___No

(6b) Is the provided information clearly visible on the approach? ___Yes ___No

(6c) Is the provided information properly designed? ___Yes ___No

(6d) Is the provided information properly located? ___Yes ___No

(7) Is the presently available information sufficient for you to recognize the Y-intersection at a distance such that you can select your route and execute a safe turning maneuver? ___Yes ___No

(8) Would the presently available information be sufficient for you to recognize the Y-intersection and select your route:

- during nighttime conditions? ___Yes ___No
- when the roadside vegetation is at its densest growth? ___Yes ___No

PART III

SUGGESTED TREATMENTS

___ Install Y-intersection warning sign
___ Install supplemental speed advisory plate; suggested speed is ____MPH
___ Improve visibility of Y-intersection warning sign
___ Relocate Y-intersection warning sign
    -Move closer to curve by ___ft
    -Move back from curve by ___ft
___ Replace existing warning signs with standard Y-intersection warning sign
___ Install an advance route turn assembly (consisting of two route markers and two advance turn arrows) in advance of the Y-intersection
___ Install destination signs in advance of the Y-intersection
___ Install a directional assembly (consisting of two route markers and two directional arrows) at the fork of the Y directly in line with approaching traffic
___ Install a double-headed large arrow sign at the fork of the Y directly in line with approaching traffic
___ Install route confirmation signs beyond the Y-intersection
___ Improve visibility of existing navigational guide signs
    Specify sign____
___ Replace existing navigational guide signs with properly designed signs
    Specify sign____
___ Relocate existing navigational guide signs
    Specify sign____
    -Move closer to intersection by ___ft
    -Move back from intersection by ___ft
___ Improve visibility of the Y-intersection
___ Correct for confusing, conflicting or misleading information:
    ____
    ____
    ____
___ Implement other treatment:
    ____
    ____
    ____

INFORMATION DEFICIENCY EVALUATION

LOW WATER STREAM CROSSINGS

PART I

LOCATION:________________MILES FROM
ROUTE ID______________________REFERENCE POINT___________________

APPROACH DIRECTION   N S E W (circle)

AM
DATE_________TIME_________PM   INSPECTORS___________________

APPROACH SPEED DURING SURVEY_______MPH

SPEED LIMIT: a) Posted____MPH or b) Estimated____MPH (one entry)

DECISION SIGHT DISTANCE (circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	220	275	345	420	500	585	680

PART II

(1) Is the low water stream crossing clearly visible from decision sight distance?
___Yes ___No

If no, go to (3)

(2) From decision sight distance, can you see if there is water flowing in the crossing? ___Yes ___No

If yes, go to (5)

(3) Are there advance warning signs present? ___Yes ___No

If no, go to (5)

(4a) What warning signs are present:

- FLOOD AREA AHEAD? ___Yes ___No
- IMPASSABLE DURING HIGH WATER? ___Yes ___No
- Other warning signs? ___Yes ___No
  If yes, specify____
  ____

(4b) Are the warning sign(s) clearly visible on the approach:

- FLOOD AREA AHEAD? ___Yes ___No
- IMPASSABLE DURING HIGH WATER? ___Yes ___No
- Other warning signs:
  ______________________________ ___Yes ___No
  ______________________________ ___Yes ___No

(4c) Are the warning sign(s) properly designed:

- FLOOD AREA AHEAD? ___Yes ___No
- IMPASSABLE DURING HIGH WATER? ___Yes ___No
- Other warning signs:
  ______________________________ ___Yes ___No
  ______________________________ ___Yes ___No

(4d) Are the warning sign(s) properly located:

- FLOOD AREA AHEAD? ___Yes ___No
- IMPASSABLE DURING HIGH WATER? ___Yes ___No
- Other warning signs:
  ______________________________ ___Yes ___No
  ______________________________ ___Yes ___No

(4e) Are there any supplemental distance plaques attached to any of the pertinent warning signs? ___Yes ___No

If yes, specify which warning sign(s)_________________________
____
____

(4f) Are there any supplemental advisory speed plates attached to any of the pertinent warning signs? ___Yes ___No

If yes, specify which warning sign(s) and the speed(s)________
____
____

(5) Is there a DO NOT ENTER WHEN FLOODED regulatory sign present? ___Yes ___No

If no, go to (7)

(6a) Is the regulatory warning sign clearly visible on the approach? ___Yes ___No

(6b) Is the regulatory sign properly designed? ___Yes ___No

(6c) Is the regulatory sign properly located? ___Yes ___No

(7) Do other informational sources (i.e., roadway surface, brush/tree line, markings, edgelines, etc.) provide information suggesting: 1) that the situation ahead is <u>not</u> a low water stream crossing, 2) that the sag is shallower than it actually is, or 3) that the low water stream crossing is located further downstream than it actually is? ___Yes ___No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:______________

____

____

____

____

(8) Is the presently available information sufficient for you to recognize the low water stream crossing at a distance such that you can make a safe crossing decision and execute your selected maneuver? ___Yes ___No

(9) Would the presently available information be sufficient for you to recognize the low water stream crossing at a distance such that you can make a safe crossing decision and execute the selected maneuver:

- during nighttime conditions? ___Yes ___No
- when the roadside vegetation is at its densest growth? ___Yes ___No

PART III

SUGGESTED TREATMENTS

___ Install FLOOD AREA AHEAD warning sign
___ Install IMPASSABLE DURING HIGH WATER warning sign
___ Install DO NOT ENTER WHEN FLOODED regulatory sign
___ Improve visibility of advance warning sign(s)
___ Improve visibility of DO NOT ENTER WHEN FLOODED regulatory sign
___ Replace existing warning signs with standard FLOOD AREA AHEAD and IMPASSABLE DURING HIGH WATER warning signs
___ Relocate advance warning signs
Specify sign_______________________________
-Move closer to crossing by ___ft
-Move back from crossing by ___ft
___ Install supplemental speed advisory plate; suggested speed is ____MPH
___ Relocate DO NOT ENTER WHEN FLOODED regulatory sign
-Move closer to crossing by ___ft
-Move back from crossing by ___ft
___ Improve visibility of low water stream crossing
___ Install depth gauge at crossing
___ Correct for confusing, conflicting or misleading information:

____

____

____

___ Implement other treatment:

____

____

____

INFORMATION DEFICIENCY EVALUATION

HEIGHT/WEIGHT LIMIT RESTRICTIONS

PART I

ROUTE ID__________________ LOCATION:______________MILES FROM REFERENCE POINT________________

APPROACH DIRECTION N S E W (circle)

DATE________TIME________AM PM INSPECTORS________________

APPROACH SPEED DURING SURVEY_______MPH

SPEED LIMIT: a) Posted____MPH or b) Estimated____MPH (one entry)

DECISION SIGHT DISTANCE (circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	220	275	345	420	500	585	680

PART II

(1) Before entering onto this route segment, were there signs informing you that there is a height/weight restriction downstream present? ___Yes ___No

If no, go to (3)

(2) Is the information sufficient for you to realize that there is a height/weight restriction on the route downstream before entering the route segment? ___Yes ___No

(3) Is alternate route information provided? ___Yes ___No

If no, go to (5)

(4) Is the information sufficient for a bus, recreational vehicle or truck driver to determine what his alternative route is and to safely execute the selected maneuver? ___Yes ___No

(5) Is the situation a vehicle height restriction? ___Yes ___No

If yes, go to (11)

(6) Is the bridge or culvert clearly visible from decision sight distance? ___Yes ___No

If no, go to (8)

(7) From decision sight distance, can you perceive the weight limit restriction(s)?
___Yes ___No

If yes, go to (10)

(8) Is there a warning sign providing the necessary information present?
___Yes ___No

If no, go to (10)

(9a) Is the warning sign accurate? ___Yes ___No

(9b) Is the warning sign clearly visible on the approach?
___Yes ___No

(9c) Is the warning sign properly designed? ___Yes ___No

(9d) Is the warning sign properly located (Check Table of Placement Distances for Advance Warning Signs)? ___Yes ___No

(9e) Is there a supplemental advisory speed plate attached to the warning sign?
___Yes ___No

(10) Do other informational sources provide information suggesting: 1) that the situation ahead is not a weight restricted bridge, 2) that the weight limit is higher than it actually is, or 3) that the weight restricted bridge is located further downstream than it actually is? ___Yes ___No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:________________

____

____

____

____

Go to (16)

(11) Is the overhead structure clearly visible from decision sight distance?
___Yes ___No

If no, go to (13)

(12) From decision sight distance, can you perceive the clearance to the overhead structure? ___Yes ___No

If yes, go to (15)

(13) Is there a low clearance warning sign present? ___Yes ___No

If no, go to (15)

(14a) Is the low clearance warning sign accurate? ___Yes ___No

(14b) Is the low clearance warning sign clearly visible on the approach?
___Yes ___No

(14c) Is the low clearance warning sign designed according to the specifications in the MUTCD? ___Yes ___No

(14d) Is the low clearance warning sign properly located (Check Table of Placement Distances for Advance Warning Signs in MUTCD)?
___Yes ___No

(14e) Is there a supplemental advisory speed plate attached to the warning sign?
___Yes ___No

(15) Do other informational sources provide information suggesting: 1) that the situation ahead is not a low overhead clearance, 2) that the clearance is higher than it actually is, or 3) that the low overhead clearance is located further downstream than it actually is? ___Yes ___No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:_______________

____
____
____
____

(16) Is the presently available information sufficient for a bus, recreational vehicle or truck driver to recognize the height/weight limit restriction at a distance such that he can make a safe crossing decision and execute his selected maneuver?
___Yes ___No

(17) Would the presently available information be sufficient for a bus, recreational vehicle or truck driver to recognize a height/weight limit restriction at a distance such that he can make a safe crossing decision and execute his selected maneuver:

- during nighttime conditions? ___Yes ___No
- when the roadside vegetation is at its densest growth? ___Yes ___No

PART III

SUGGESTED TREATMENTS

___ Install signs upstream of the last intersection where the truck driver can turn before encountering the height or weight restriction, which provide information about the downstream restriction
___ Install signs providing information on alternate routes at that location
___ Improve visibility of truck route signs
___ Relocate existing truck route signs
___ Install LOW OVERHEAD CLEARANCE warning sign
___ Install supplemental speed advisory plate;
suggested speed is ____MPH
___ Install signs informing truck drivers of the downstream weight restriction
___ Improve visibility of the LOW OVERHEAD CLEARANCE warning sign
___ Replace non-standard warning sign with standard LOW OVERHEAD CLEARANCE warning sign
___ Relocate LOW OVERHEAD CLEARANCE warning sign
-Move closer to structure by ___ft
-Move back from structure by ___ft
___ Improve visibility of weight limit regulatory signs
___ Replace non-standard regulatory sign with the applicable standard weight limit regulatory sign
___ Relocate weight limit regulatory sign
-Move closer to structure by ___ft
-Move back from structure by ___ft
___ Improve sight distance to height/weight restriction
___ Improve visibility of height/weight restriction
___ Install hazard panels on overhead structure
___ Install hazard panels on weight restricted bridge
___ Correct for confusing, conflicting or misleading information:
____
____
____
___ Implement other treatment:
____
____
____

INFORMATION DEFICIENCY EVALUATION

OTHER SITUATIONS

PART I

LOCATION:________________MILES FROM
ROUTE ID________________________REFERENCE POINT________________

APPROACH DIRECTION N S E W (circle)

DATE__________TIME__________ AM PM INSPECTORS____________________

APPROACH SPEED DURING SURVEY________MPH

SPEED LIMIT: a) Posted_____MPH or b) Estimated_____MPH (one entry)

DECISION SIGHT DISTANCE (circle one set)

SPEED (max of above)	30	35	40	45	50	55	60
DSD (feet)	220	275	345	420	500	585	680

DESCRIBE SITUATION____
____
____

PART II

(1) Is the [specific situation] clearly visible from decision sight distance?
___Yes ___No

If yes, go to (4)

(2) Is there a [situation-specific] warning sign present?
___Yes ___No

If no, go to (4)

(3a) Is the warning sign accurate? ___Yes ___No

(3b) Is the warning sign clearly visible on the approach?
___Yes ___No

(3c) Is the warning sign properly designed? ___Yes ___No

(3d) Is the warning sign properly located (Check Table of Placement Distances for Advance Warning Signs in MUTCD)? ___Yes ___No

(3e) Is there a supplemental speed advisory plate attached to the warning sign?
___Yes ___No

(4) Do other informational sources (i.e., markings, delineators, brush/tree line, etc.) provide information suggesting either: 1) that the situation ahead is not a [specific situation] or 2) that the [specific situation] is located further downstream than it actually is? ___Yes ___No

If yes, then identify those sources and describe how they provide confusing, conflicting or misleading information:______________

____

____

____

____

(5) Is the presently available information sufficient for you to recognize that a [specific situation] is downstream? ___Yes ___No

(6) Would the presently available information be sufficient for you to recognize that a [specific situation] is downstream:

- during nighttime conditions? ___Yes ___No
- when the roadside vegetation is at its densest growth? ___Yes ___no

(7) Is the presently available information sufficient for you to decide on an appropriate control action and to execute the selected maneuver?
___Yes ___No

(8) Would the presently available information be sufficient for you to decide on an appropriate control action and to execute the selected maneuver:

- during nighttime conditions? ___Yes ___No
- when the roadside vegetation is at its densest growth? ___Yes ___No

PART III

SUGGESTED TREATMENTS

___ Install [situation-specific] warning sign
___ Improve visibility of [situation-specific] warning sign
___ Relocate advance warning sign
-Move closer to situation by ___ft
-Move back from situation by ___ft
___ Replace non-standard warning sign with standard warning sign
___ Install supplemental speed advisory plate;
suggested speed is ____MPH
___ Improve visibility of situation
___ Correct for confusing, conflicting or misleading information:

___ Implement other treatment: