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SECTION 1 INTRODUCTION

The purpose of this manual is to provide directions and guidelines governing the development of Off-System Safety Improvement projects to be let to contract and constructed by Local Governments using Federal funds administered by the Georgia Department of Transportation.

DEFINITIONS

- **A POLICY ON THE GEOMETRIC DESIGN OF HIGHWAYS AND STREETS, 6TH EDITION, 2011** -- Commonly referred to as the “Green Book,” contains the current design research and practices for highway and street geometric design.
- **Ball-Bank Indicator (Inclinometer)** -- A device used to determine the appropriate advisory speed for a single or a set of horizontal curves
- **Barrier Lines** – Solid yellow line beside yellow skip line showing where passing is allowed or prohibited
- **Federal Bid Document** – A document detailing the work to be done by an independent Contractor for a Local Government (Sponsor) and meeting guidelines for a Federal funded construction project
- **Centerline Flip-Flop** – Point in passing zone where the barrier lines meet and passing ends each direction
- **Clear Zone** -- The AASHTO Roadside Design Guide defines a clear zone as the total roadside border area, starting at the edge of the traveled way, available for safe use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a nonrecoverable slope, and/or a clear run-out area. A recoverable slope is a slope on which a motorist may, to a greater or lesser extent, retain or regain control of a vehicle by slowing or stopping. A clear run-out area is the area at the toe of a non-recoverable slope available for safe use by errant vehicles. Slopes steeper than 1V:3H are not considered traversable and are not considered part of the clear zone.
- **Contract Agreement** – This is a contract for an Off-System Safety Project jointly signed and approved by both the Local Government (Sponsor) and the Georgia Department of Transportation.
- **DMI** – Electronic Distance Measuring Instrument
- **GEORGIA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, 2013** – GDOT Guidelines that govern the design and construction of roads and streets
- **Intersection Sight Distance (ISD)** – The length of highway along the intersecting road that gives drivers approaching intersections a sufficient, unobstructed view of the intersection and approaches to safely permit control of all vehicles through the intersection. ISD can be affected by the horizontal and vertical geometry of the approaches to the intersection.
• **MUTCD (MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES)** – A Federal guideline governing the use of all Traffic Control Devices and adopted by GDOT

• **ROADSIDE DESIGN GUIDE** – A Federal Guideline -- The guide is intended to be used as a resource document from which individual highway agencies can develop standards and policies. It focuses on safety treatments that can minimize the likelihood of serious injuries when a motorist leaves the roadway.

• **Passing Sight Distance (PSD)** – The length of highway made available to drivers on two-lane highways to pass slower vehicles as detailed in the MUTCD and the Green Book.

• **Sponsor** – The Local Government that is administering the Federal Off-System Safety Project (may also be known as the LG)

• **Stopping Sight Distance (SSD)** – The length of highway required for a driver to perceive an object in the road and safely stop to avoid a collision.

• **Stop Line (Bar)** – White Thermoplastic line used to establish a stopping point on a side road approach to an intersecting road – placed 4 feet to 30 feet from edge of intersecting roadway and at the point that provides optimum intersection sight distance.

• **Superelevation** – Banking of horizontal curve to maintain established speed design

• **Work Plan** – An attachment to the bid document that includes the details and plans developed from field studies that are needed for constructing an Off-System Safety Project

**REFERENCE GUIDES (Most Current)**

• **MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD)** – Current Edition can be found at [http://mutcd.fhwa.dot.gov](http://mutcd.fhwa.dot.gov)


• **GDOT STANDARDS & DETAILS** – Current Edition can be found at [http://standarddetails.dot.ga.gov/stds_dtls/](http://standarddetails.dot.ga.gov/stds_dtls/)
SECTION 2     GENERAL INFORMATION

I. Program Overview:

Over the past few years, off-system roads have accounted for over 40% of the fatalities in Georgia. Meeting Georgia’s goals for fatality reduction in Georgia will require a significant investment in improving safety off the state route system. The program focuses on low-cost safety improvements that can be implemented within the existing rights of way of off-system routes that are likely to reduce the frequency and severity of crashes.

II. Project/Route selection:

The program is intended to enhance off-system safety. It is not a grant program, and allocation of funds should not be based on even distribution among local jurisdictions or congressional districts. **Projects and routes should be selected based on safety need using a data-driven approach.** Crash summaries will be provided to each District annually to aid in project selection. Final roads selected for inclusion in Off-System Safety projects will flow through an established approval process.

III. Eligible Contract Items:

- Raised Pavement Markers – Centerline (on roads with 22-foot minimum width)
- Rumble Strips
  - Shoulder
  - Centerline
  - Edge line
- Pavement Markings
- Edge lines (on roads with 20-foot minimum width)
- Centerlines (on roads with 18-foot minimum width)
- Stop bars
- Signing
- Chevrons
- Vegetation Removal
- Guardrail – excluding routine upgrades
- Guardrail delineation
- Traffic Signals if Crash Warrants are met and adequate turn lanes exist
- Advance post-mounted flashing beacons for intersections or school zones
- Pedestrian considerations such as wheelchair ramps if their installation is overly burdensome on the Sponsor and only if no additional right-of-way is required

**NOTE:** Off-System Safety funds may not be used to purchase additional right-of-way, install turn lanes or additional pavement, relocate utilities, or to do any work outside of the limits of the existing certified right-of-way.
IV. GENERAL PROCESS STEPS:

1. The Office of Traffic Operations shall develop and provide to the Local Grants Office an annual Safety Report Card for each District detailing the counties within each District with the greatest safety needs based on available crash data. The annual report will be forwarded to each District Engineer and respective State Aid Coordinator (SAC) for review and use in developing Off-System Safety (OSS) projects in counties/cities identified as having the greatest needs. Once a preliminary list has been developed and at the direction of the District Engineer, the SAC will approach the identified Local Governments (LG) also known as the Sponsor, to discuss the development of projects in their county/city and to solicit their involvement in administering the Off-System Safety project. Items included in the discussion will center around:

   - The County’s Safety Report Card and identified high crash corridors
   - Other possible local road corridors identified by the LG as having problems (LG may be requested to provide crash data and crash history of roads)
   - Pavement condition on identified corridors
   - Possible needed prep work (patching/resurfacing) needed on the identified corridors prior to Off-System Safety project striping
   - Options for coordinating any needed improvements.
   - LG responsibilities

After the project list of roads has been completed by the LG (Sponsor) and the District, the SAC shall develop a prioritized Project List of roads (See Project Forms in Appendix A) for each selected LG. The Road Information List should include the Priority, Road Name, State Inventory Number, beginning and ending termini, work to be done (centerline, edgeline, stop lines, signage, or other allowable safety items), length of road, established speed limit, and total right-of-way (ROW) with the LG providing as much of this information as possible. The final list is then forwarded to the Local Grants Office for review. The Local Grants Engineer submits the package to the Approval Committee (Local Grants Administrator, State Traffic Engineer, and the Deputy Commissioner) for review and final approval.

2. The SAC shall work with the Sponsor to finalize the list of roads based on the following criteria:
   a. Safety Improvement Potential
   b. Existing pavement condition
   c. Upcoming resurfacing schedules

3. The SAC and/or LG (Sponsor) shall analyze available Crash Data (provided by the Office of Traffic Operations and/or from GEARs) for each road segment included in the project prior to field work beginning to determine type of crashes occurring in the study section.

4. The SAC and/or LG (Sponsor) shall develop maps for each listed road from GDOT County Road Maps.
5. The SAC and/or LG (Sponsor) shall prepare Preliminary Estimates for each project using the “estimated” general prices shown below:
   a. $6000.00 per mile (includes one lane each direction) for roads that will receive signage and pavement markings
   b. $4000.00 per mile (includes one lane each direction) for roads that will receive pavement markings only.
   Note: The above estimated prices are for projects using Highbuild Standard traffic paint. Prices should be adjusted for roads with more than two travel lanes and/or if Thermoplastic long lines are used. Prices should also be adjusted based on past similar projects in the District

6. Upon route selection and project approval, the **LG shall be responsible** for:
   a. Certifying the ROW
   b. Project Administration including:
      - Contract letting and contractor selection
      - Project Inspection
   c. Removal of signs that may be replaced or relocated
   d. Submitting for **reimbursement** as the work is completed. (It is important that the LG understands that this is not a grant program). A check is **not** provided up front, and the contract is for items of work rather than a dollar amount
   e. Repairing the road surface if needed prior to contractor beginning work
   f. Possible roadway data collection may be required for contract preparation
   g. A letter from LG on their letterhead stating there are no Utility/Railroad conflicts and if any are found, they will be resolved at the Sponsor’s expense prior to the completion of the project
   h. If there are existing ADA conflicts and the Sponsor is agreeable to do the work needed to resolve the conflicts, the Sponsor shall provide a letter on their letterhead stating the conflicts will be resolved by the completion of the project and at their expense. (Any work done on GDOT ROW requires a Special Encroachment Permit prior to work beginning.)
   
   **Note**: While Local Administered Project (LAP) Certification is not required to receive OSS funds, GDOT strongly recommends that LG remain informed about the GDOT’s processes and procedures regarding project delivery

7. The SAC shall prepare and send a request for project programming & PI Number to the Local Grants Engineer.

The following information should be submitted with the programming requests for each project.

- Description of proposed improvements
- County
- Municipality (if applicable)
- Congressional District(s) – note % if split
- Preliminary Engineering Cost Estimate (if applicable)
- Construction Cost Estimate
- Preliminary List of Routes
- Estimated total mileage
- Statement of need (specific to the county, city, routes selected and the proposed counter-measures)

8. The SAC and/or LG (Sponsor) shall begin the field work creating an inventory of all pertinent data on each project road (See Project Field Guide section of this document).

9. The SAC and/or LG (Sponsor) completes field data collection and then begins developing signing and special marking inventories, and striping quantities. The SAC then completes the Summary of Quantities for the project. (See Project Forms in Appendix A).

10. Using the Summary of Quantities and pay item prices obtained from previous projects and/or the Item Mean Summary, the SAC prepares a final project estimate adding 20% contingency. If the final estimate is higher than the funding amount originally set up, request the Office of Financial Management to increase the project funding to accommodate the new estimate.

11. The SAC then forwards a request to the Local Grants Engineer to have a Management Let Date established for the project. This let date is required for the Environmental and Right-of-Way, and Utility offices to schedule work on the certifications for the project. The project schedule is established by the State Scheduling Engineer in the Office of Program Control.

12. The SAC shall prepare the certification packages:
   a. Environmental Certification Request – Forward a request letter to the Local Grants Office for Environmental Certification. Include in the letter the type work to be done, if any earthwork is required, and if any of the project roads are adjacent to National Forest lands, Corp of Engineers property, or any historic/cultural properties. Include the Safety Action Project Road Information List and project maps in the request.
   b. Right-of-Way (ROW) Certification Request – The SAC can either prepare and deliver the ROW certification document to the Sponsor or send the Safety Action Project Road Information List to the District Local Government ROW Coordinator for preparation and action. Make sure the ROW is shown for each road on the Road Information List. Once the document has been properly signed by the Sponsor and returned to the District, the SAC shall forward a copy to the Local Grants Office for further processing and final certification.
   c. Utility/Railroad Certification Request –
      1. The SAC shall secure a letter from the Sponsor on their letterhead stating there are no Utility/Railroad conflicts and if any are found, they will be resolved at the Sponsor’s expense prior to the completion of the project.
      2. The SAC shall forward the Sponsor’s letter along with a request letter and the Safety Action Project Road Information List to the District Utilities Office requesting Utility/Railroad Certification for the project.
If there are existing ADA conflicts, the SAC should review the conflicts in the field and then discuss with the Local Grants Administrator. The Local Grants Administrator shall decide if the SAC will move forward to contact the Sponsor to see if they are willing to consider resolving the conflicts and if sufficient ROW is available for the upgrades. (Keep in mind, any work done on GDOT ROW requires a Special Encroachment Permit prior to work beginning.) If the Sponsor is contacted and agreeable to do the work needed to resolve the conflicts, the SAC shall proceed with obtaining a letter from the Sponsor stating the conflicts will be resolved by the completion of the project and at their expense. The Sponsor’s letter should be attached to the letter from the SAC that states the plans have been reviewed and the project is ready for construction. The SAC should track the progress and completion of ADA upgrades by the Sponsor to ensure compliance by completion of the Off-System Safety project.

13. Certification Process: Local let projects follow the GDOT letting schedule for processing projects. All certifications are due 11 weeks prior to the letting. The 1625 should have been requested around 13 weeks. The request package for authorization, including the plans reviewed and ADA letters or statements should also be submitted to the Office of Engineering Services at 11 weeks.

Prior to authorization of the project, environmental certifications are only good for six (6) months. For example: If the project is in the June letting (let date of 6/20/14), the environmental certification must be dated 12/20/13 or later. The date of the certification is the important date, not the date of the document. These dates can be, but are not always the same.

Another example: If the document was approved on 11/30/13 and the certification was done on 12/20/13, then the certification is good for the June letting. In this example, if the certification had been done on the same day the document was approved, it would not be good for the June letting.

NOTE: ROW and Utility certifications don’t expire.

Once the funds are authorized, no updated certifications are needed. It is expected that the Sponsors will let the projects soon after authorization.

14. The Office of Financial Management (OFM) F.I.R.E. Unit has recently mentioned that FHWA will be pulling back money from projects that have been authorized for a year but show no work or charges. This puts the project funding in danger of being “de-obligated”. Once authorized, every effort should be made to guide the Sponsor through the Bid Document development and advertisement process as quickly as possible.

15. The Local Grants Engineer shall submit a 1625 request at the appropriate time during the Certification process or earlier. Funds should show up on the Project Financial Report (PFR) when all certifications and the 1625 funding request are approved.
16. The SAC shall prepare the Contract Agreement using the boiler plate contract provided.

17. The SAC shall, when project authorization is confirmed, prepare a transmittal letter from the District Engineer to be delivered with four (4) copies of the Contract Agreement to the Sponsor for approval. Please note in the transmittal letter that all four (4) copies of the Contract Agreement must be returned to the SAC (still intact & stapled).

18. The SAC shall finalize a generic sample Federal Bid Document and the project Work Plan (See procedures below) using documents developed from the field work, other project information, and the Bid Document Checklist (See Appendix) while awaiting approval of the Contract Agreement by the Sponsor.

19. Once the Contract Agreements have been returned to the District Office and signed by the District Engineer, the SAC will forward three (3) of the signed Agreements to the Local Grants Office for processing. The fourth copy is to be filed in the District OSS project file.

20. The Local Grants Office shall review the submitted Contract Agreements and then route the contract package for signatures as follows:
   
   a. Enter the contract into the Contract Authorization Tracking System (CATS) and prepare a CATS cover sheet.
   b. Include a Project Financial Report (PFR) that reflects available funds in CST phase (authorized and “allotted”)
   c. Place contract budget coding information on the first page of each contract.
   d. Use the following information for FY-2014 contract coding. This information is subject to change each fiscal year.

   **FY-2014**
   
   **City Contracts:**
   Account Code – 707001
   Class – 315
   Dept. ID – 4840470001
   Program – 4180601

   **County Contracts:**
   Account Code – 707002
   Class – 315
   Dept. ID – 4840470001
   Program – 4180601

   e. Status of the approval can be tracked in CATS

21. The Local Grants Office shall forward two (2) copies of the fully approved Contract Agreement to the District when it has been executed by the Department.
22. The SAC shall deliver one (1) copy of the fully approved Contract Agreement to the Sponsor along with a Notice to Proceed letter from the District Engineer, the sample Federal Bid Document, and project Work Plan. The second copy of the approved Contract Agreement is to be filed in the District OSS project file.

23. The Sponsor is responsible for final development of the Bid Document in accordance with guidelines for Federal funded projects, State guidelines, and local requirements. The Department reserves the right to review the bid document prior to the bid advertisement.

24. The SAC shall review and approve the final Bid Document prior to official advertisement beginning.

25. The Sponsor shall advertise the project for no less than four (4) weeks with the ad being included in the Sponsor’s (County’s) legal organ for four consecutive weeks. The project may also be advertised on the Sponsor’s web site in conjunction with the legal organ advertisement.

26. The Sponsor, after opening bids and the “Apparent Low Bidder” is announced, shall forward a copy of the Bid Tab and Bid Packages to the SAC for review and approval.

27. The Sponsor shall award the project to the most reliable and responsible low bidder that meets the requirements of the Bid Document.

28. The Sponsor may issue a Notice to Proceed to the selected Contractor once the necessary Payment and Performance bonds are in hand.

29. The Sponsor can schedule the required Pre-Construction Conference and work may begin.

30. The Local Grants Engineer shall send the low bid information to the OFM Project Programming Manager, Windy Bickers the project is awarded.

31. Work Begins – The SAC shall document the date the Contractor begins work

32. The Sponsor is responsible for shoulder clipping and old sign removals.

33. The Contractor is responsible for all utility locates and bagging all signs that are to be removed.

34. The Contractor may submit monthly invoices to the Sponsor. The Sponsor shall pay the Contractor following inspection of the work (The Sponsor is responsible for all inspections of the project). Once the Contractor is paid, the Sponsor may submit an invoice to the SAC for reimbursement.

35. The SAC should monitor the work periodically for conformance with specifications and standards. The Sponsor is responsible for day-to-day contract oversight, measurement, and payment.

36. Work Ends – The SAC shall document the date the work stops and is complete on the project.

37. PROJECT CLOSE-OUT – Before a federally funded Off-System Safety project can be closed out, the Sponsor and their Contractor must ensure several steps are completed as listed below:
• The Contractor shall provide the Sponsor:
  1. Documentation of completed punch list work
  2. The date work was completed on the project
  3. The necessary materials certifications
  4. Copies of Contractor payrolls for compliance with Davis-Bacon Wage Act guidelines
  5. Completed final certified retro-reflectivity test results for all project roads
  6. A final invoice broken down by road requesting final payment

• The Sponsor shall, upon receiving the request for final payment:
  1. Complete project inspection along with a final project review to ensure all accomplished work complies with the Manual on Uniform Traffic Control Devices (current ed.), Georgia Department of Transportation Standard Specifications (2013 ed.), and project plans
  2. Ensure all required project documentation (including Project Diary) are in hand and in order for future auditing by the FHWA
  3. Make the final payment to the Contractor including any retained funds for the project
     Note: The Sponsor is responsible for any expenditures over the federally allotted funds as established for the project by the Department
  4. Forward the Sponsor’s Final Invoice to the Department for final reimbursement along with:
     a. A copy of the Contractor’s Final Invoice
     b. A Certification of Final Acceptance form that states the Sponsor has accepted the work and maintenance on the roads included in the project signed by the Sponsor’s Project Manager, County Manager, Commission Chairman, or other Sponsor designee
     c. The Off-System Safety Improvement Project Statement of Final Project Expenditures
     d. A Materials Certification letter on the Sponsor’s letterhead and signed by the Sponsor’s designee
     e. The date work was completed on the project

• The SAC shall, upon receiving the Sponsor’s request for final payment:
  1. Complete a review of the submitted project reimbursement requests
  2. Complete any cursory field reviews deemed necessary
  3. Forward the Sponsor’s Request for Final Reimbursement to the Local Grants Office for action
  4. Copy Windy Bickers, Project Programming Manager in OFM with the final invoice.

(Close-out document samples are included in the Appendix)

38. The Local Grants Engineer shall email the Project Programming Manager, Windy Bickers with the final acceptance date for the project.
V. DEVELOPING PROJECT INVENTORIES, ITEM SUMMARY, AND PROJECT ESTIMATE

1. Using the sample Sign Inventory (Excel) table (see PROJECT FORMS in Appendix A) and the information gathered on a particular section of road, begin building a Sign Inventory for each road. Info gathered in the field along with measured sight distance and advisory speed info will determine what type signs are needed along the study section.

2. Using the sample Special Pavement Marking Inventory (Excel) table (see PROJECT FORMS in Appendix A) and the information gathered on a particular section of road, begin building a Special Pavement Marking inventory for each road.

3. Once quantities have been determined for all potential pay items, use the Item Summary sheet (see PROJECT FORMS in Appendix A) to finalize the project quantities

4. Using the project quantities and estimated unit prices, prepare the Project Estimate
PROJECT
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SECTION 3  PROJECT FIELD GUIDE

I. DATA DOCUMENTATION

The necessary data collection and documentation will vary depending on the scope of the project. Below you will find a list of typical information that may be required to establish justification for Off-System Safety Project improvements.

II. ROADWAY GEOMETRICS

1. Road width checked at least at every mile
2. Pavement surface type and condition
3. Beginning and ending of each horizontal curve noting if the curve is slight/sharp, if the entire curve is visible from end to end, and the type and direction of the curve. Example: A reverse curve might be documented as: 2.03 -- begin curve right; 2.14 -- curve right to left; 2.26 -- end curve left
4. Design Speed of individual and/or sets of horizontal curves
5. Degree and Superelevation of horizontal curves if needed
6. Hillcrests and Sags
7. Steep Grade Sections (Measure the grade at the steepest point and length of section)
8. Public Side Roads (usually only County/City maintained roads/streets), their name & county road / city street number if posted.
9. Major private drives with extreme sight distance restrictions
10. Hazards in the clear zone and their locations along the road such as trees, utility poles, culvert headwalls, narrow shoulders, major drainage structures, steep and deep front slopes, embankments, etc. – Include the distance from the near edge of pavement to the near edge of the hazard
11. Beginning and end of existing Guardrail along with the presence or lack of Delineators; potential Guardrail locations, why warranted, and shoulder & front slope description
12. Existing bridge structures, general condition, deck width and type, length, type of handrails, advance signage, and presence or need of guardrail, and existing delineators.
13. Curb & Gutter sections
14. Existing ADA ramps and existing sidewalk (width) along with existing crosswalks (note type)
15. Round-a-bouts and associated markings and signage
III. SIGNS
1. Existing Traffic Control Signs, their location, direction they are facing, their type, legend, size, sheeting type, general condition, number of posts or structure type, and need
2. Type 2 and Type 3 Object Markers and all existing Delineators (especially at bridges/culverts)
3. Potential locations needing chevrons or single headed arrows
4. Special signs not included in the MUTCD but critical to driver expectation, and safe and efficient flow of traffic
5. Existing advance flashers for intersections or schools; the need for adding flashers based on crash history and/or the presence of restricted sight distance or public school facilities
6. Existing or the need for active radar signs

IV. PAVEMENT MARKINGS
1. Long Lines – Double Yellow Centerline, beginning of Passing each direction, ends of Barrier Lines, Flip-Flops of the Centerline, and sections of Single Skip Lines, passing lane markings
2. Turn lane markings and tapers
3. Need for Edgelines
4. Existing Special Pavement Markings (Stop Lines, lane arrows, words on the pavement, rumble strips, R/R markings & symbols, crosswalks, school zones, etc.) – Their location, lane location, direction, type (thermoplastic or paint), beginning and ending milelogs, length, and condition
5. Length and location of missing Stop Lines
6. Existing bike lanes – beginning and end; location of pavement marking symbols
7. Railroad Markings
8. Raised Pavement Markers

V. OTHER ITEMS TO DOCUMENT
1. Road-side Memorials – Check crash data for inclusion
2. Severely deteriorated sections of the road – Describe the condition
3. Severe shoulder drop-offs
4. Live stream crossings

VI. FIELD EQUIPMENT NEEDED FOR DATA COLLECTION
- Electronic Distance Measuring Instrument (DMI)
- Ball Bank Indicator
- Calculator
- Orange Traffic Cone (at least 24 inches tall)
- Rod marked in one-foot increments with special marking at 3.5 feet
- 30-foot retractable carpenter’s tape measure
- 100-foot steel measuring tape
- 4-foot carpenter’s level (or 4-foot Smart Level)
- Measuring wheel
- Emergency Equipment – Flashing Amber light, reflective safety vest, etc.

VII. DATA COLLECTION

1. Prepare Field Sheets including Field Notes Sheets, Curve Study Sheets, and Sight Distance Study Sheets (see PROJECT FORMS in Appendix A).
2. Check the cold tire pressure and make sure all four tires are equal in pressure. Vehicle must be sitting in flat and level area.
3. Set up the DMI (and calibrate if necessary) and level the Ball-Bank Indicator.
4. Set the DMI to show vehicle speed and then drive through the study section at posted or statutory speed limit noting severe curves, steep grades, sub-standard sight distance locations, narrow shoulder areas, road-side memorials, narrow and/or un-delineated bridges, and any other special outstanding features that may require traffic control devices. Random checks of the ball-bank indicator will give a general idea of the approximate speed design of the road.
5. Set the DMI to 0.000 and set up data collection sheets for the study section.
6. Begin data collection in the field starting at the same end shown in the Department’s Transportation Data Inventory (if possible).
7. Turn on available Safety Equipment (flashing amber lights mounted on top of vehicle, emergency flashers, etc.).
8. When safe, start the DMI at the edge of the intersecting road at the beginning end of the study section and proceed, stopping as necessary to document various items along the roadway.
9. After documentation is complete, compute the distances between the curves to set up Safe Curve Speed Sheets (see PROJECT FORMS in Appendix A) for speed checks to determine the type advance curve signs needed and the need for advisory speed plates.
10. Drive through the set-up curve sections each direction at least three (3) times using a Ball-Bank Indicator until the speed is determined that fits the guidelines used for determining advisory speeds (as found in the Green Book and/or MUTCD) – Document the speeds driven and the Ball-Bank Indicator readings on each run each direction on the Safe Curve Speed Sheets for future reference.
11. Set up the Sight Distance Study Sheets (see PROJECT FORMS in Appendix A) listing each publicly maintained side road in the study section. Check the Intersection Sight Distance for each side or cross road to determine the need for advance warning signs. This is done using a 2-foot traffic cone and a rod marked at 3.5 feet. Set the traffic cone 14.5 feet back into the
mouth of the side road from the edge of the study-road. Drive on each approach to the side road carefully watching until the top of the cone is visible from the driver’s position. Then get out of the vehicle walking toward the side road until you can see the 2-foot mark on the cone from the 3.5-foot mark (eye point) on the rod when standing in the middle of the approach lane. Using the vehicle DMI (or measuring wheel) to measure from the eye point location to the cone. Round the distance down considering any curvature in the road. Record the measurements on the Sight Distance Study Sheets and what is restricting the sight distance that is shorter than the distance shown for the posted speed limit on the Sight Distance chart included in the Appendix. Compare the measured distance to the Sight Distance chart to determine the need for advance warning signs.

If there are two side roads that are off-set by a short distance but one can be seen from the other, count the two as a single crossroad. Check the sight distance on each approach to the nearest of the two roads.

**VIII. DATA VERIFICATION**

1. Compare ending mileage measurement with Systems Inventory length. If off more than 0.10 mile in 10 miles (1 percent per mile), rerun to find discrepancy and/or to make adjustments as necessary. The mileage can also be verified by comparing the documented milelogs of publicly maintained side roads to the milelogs shown in the Systems Inventory. Doing this may identify the area that needs to be checked.

2. After developing the Signing and Special Pavement Markings Inventories, print out a copy of both documents and re-ride each road to verify recommended installation locations red-lining any changes. When complete, revise the official inventories to accommodate the changes before including in the Work Plan.
## PROJECT LIST
### ELBERT COUNTY

**PROJECT # 00XXXXX**

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<th>State Road Number</th>
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<th>To:</th>
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**P.I. NO. 00XXXXX**

10.43 5/1/2014
### ROADWAY PROJECT SUMMARY SHEET

#### OFF-SYSTEM

#### SIGN INVENTORY

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**NOTE:** ALL SIGN LOCATIONS ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, THE MUTCD, AND/OR THE SPONSOR ENGINEER'S DISCRETION
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NOTE: ALL SIGN LOCATIONS ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON FIELD CONDITIONS, THE MUTCD, AND/OR THE SPONSOR ENGINEER'S DISCRETION.
## ROADWAY PROJECT SUMMARY SHEET

### OFF-SYSTEM

### Project No. 00XXXXX

#### Special Pavement Markings

XXXXXX County

4/12/11

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## SUMMARY OF QUANTITIES
### PROJECT # 00XXXXX
#### XXXXXXXX COUNTY OFF-SYSTEM

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**PAGE 1 TOTALS**

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**PROJECT TOTALS**

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XXXXXXX COUNTY
OFF-SYSTEM

DATE:_________  PROJECT ___________________________  PRIORITY:_____

STREET:_____________  PROPOSAL:__________________________

LENGTH:_____________  WIDTH:_________  SPEED LIMIT:_________

TYPE PAVEMENT _____________________  CONDITION ___________________

TYPE STRIPING ______________________  CONDITION ___________________

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SAFE CURVE SPEED STUDY

LOCATION ID:  
COUNTY:  

POSTED SPEED (mph):  
PAVEMENT CONDITION:  
PAVEMENT TYPE:  

DATE:  
OBSERVER(S):  
WEATHER:  

REMARKS:  

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## SIGHT DISTANCE STUDIES

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**COUNTY:**

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**REMARKS:** Measured from 3.5 feet to 2.0 feet

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SUBMITTED BY: ________________________________________________

[SPONSOR]

SUBMITTED TO: GEORGIA DEPARTMENT OF TRANSPORTATION

DATE: ________________  INVOICE #: ________________

PROJECT NO: ________________

PI NO: ________________

COUNTY: ________________

TOTAL PROJECT BUDGET: $ ________________

FEDERAL SHARE: $ ________________

LOCAL SHARE: $0.00

PROJECT PAYMENT PROGRESS

Total Amt $ 

PREVIOUS INVOICES SUBMITTED: $ ________________ \ 

CURRENT INVOICE AMOUNT: $ ________________

TOTAL SUBMITTED TO DATE: $ ________________

PERCENT SUBMITTED TO DATE: _____% 

By signature below, I hereby certify that the above amount, supported by the attached detail statement, is for work completed on the above project. Reimbursement for the federal share of this invoice is requested.

[SPONSOR PROJECT MANAGER] ___________________________ DATE 

APPROVED FOR PAYMENT: ____________________________________________

[GDOT PROJECT MANAGER]
APPENDIX B

PROJECT CLOSE-OUT DOCUMENTS
SPONSOR’S

CERTIFICATION OF FINAL ACCEPTANCE

PROJECT NAME: Off-System Safety Improvement Project

PROJECT #: ___________ PI#: ___________ COUNTY: _______________

GDOT CONTRACT ID #: ______________________

I hereby certify that I, ________________________________, am the ___________________________ and duly authorized representative of ________________________________ whose address is, ________________________________ and it is also certified that:

- On behalf of the ________________________________, I performed a final inspection of the PROJECT and certify all punch list work is satisfactorily completed and accepted.
- The ________________________________ accepted the work from the CONTRACTOR on __________.
- The ________________________________ hereby assumes full responsibility for the continued operation and maintenance of the PROJECT.

The ________________________________ hereby certifies Sponsor’s Final Acceptance of the PROJECT and respectfully submits:

- Final Project Invoice
- Materials Certification Statement
- Other (please list) __________________________________________________________

________________________________________________________

________________________________________________________

_________________________ __________________________
DATE SIGNATURE
OFF-SYSTEM SAFETY IMPROVEMENT PROJECT
STATEMENT OF FINAL PROJECT EXPENDITURES

SUBMITTED BY: ________________________________________
[SPONSOR]

SUBMITTED TO: GEORGIA DEPARTMENT OF TRANSPORTATION

FINAL INVOICE SUMMARY

DATE: INVOICE #: 

PROJECT NO:

PI NO:

COUNTY:

TOTAL PROJECT BUDGET:

FEDERAL SHARE:

LOCAL SHARE: $0.00

PROJECT PAYMENT PROGRESS

PROJECT EXPENDITURES

Construction Expenditures $ 

Total Project Expenditures **$

By signature below, I hereby certify that the above payments were made for work completed as shown on the attached detailed statement and supporting documents.

_______________________________________ _____________________
[SPONSOR PROJECT MANAGER] DATE

APPROVED FOR PAYMENT: ____________________________________
[GDOT PROJECT MANAGER]

*Please be sure to include all supporting invoices and documents. Invoice will not be processed without the required documents and sponsor signature.

**Final payment – 100% of Total Project Expenditures not to exceed Federal Share.
(Date)

Mr. ____________________, District County Government Coordinator
Georgia Department of Transportation
(District Office Address)

RE: Materials Certification
   GDOT Project #00XXXXX
   Xxxxxxx County

Dear Mr. _________________:

This is to certify that the subject project was constructed in accordance with the Georgia Department of Transportation Standard Specifications & Supplemental Specifications, the Manual on Uniform Traffic Control Devices (current edition), the Davis-Bacon Wage Act, the approved Plans, and accepted engineering practices. The results of the tests on acceptance samples indicate the materials incorporated in the construction work and the construction operations controlled by sampling and testing were in conformance with the approved Plans and applicable Specifications.

MATERIAL TESTING & SUPPLIERS

SIGNS
Lyle Signs, Inc. – (assembly) – 200 Industrial Park; Desmet, SD 57231
Nichols Aluminum – (testing) – Decatur, AL
3M Brownwood Plant – (testing) – 4501 Hwy 377 South; Brownwood, TX 76801-5907

STRIPING
Swarco Industries – (glass beads & thermoplastic) – Columbia, TN
Safety Coatings, Inc. – (paint) – 20180 Safety Lane, P.O. Box 399; Foley, AL
Sherwin Williams – (paint) – 2325 Hollins Ferry Rd; Baltimore, MD 21230

ON-SITE INSPECTION – None Conducted

Should you have questions, please feel free to contact me at (706) 865-2235 or our Road Department at (706) 856-2510.

Sincerely,

____________________, Xxxxxxx County Manager

MJM:rkc
APPENDIX C

ROADWAY

GEOMETRICS

INFO
MEASURING THE DEGREE OF CURVATURE

- **TOOLS NEEDED**
  1. 100-foot Steel Measuring Tape
  2. 30-foot retractable carpenter’s Measuring Tape
  3. Claw Hammer
  4. Concrete Nails

- **PROCEDURE**
  1. Walk along the shoulder to the mid-point of the curve – the most severe section of the curve.
  2. When traffic allows and if an edge line is present on the outside of the curve, drive a concrete nail (leaving it sticking up) in the traffic edge of the line.
  3. Attach the end of the 100-foot steel tape to the nail and pull out 62 feet (chord length) around the curve and lay the shoulder edge of the tape on the traffic side of the edgeline. Be sure to pull out a couple extra feet of tape to allow you to lay the hammer on the tape to hold it in place.
  4. Walk back to the mid-point of the 62-foot chord (to the 31-foot mark) and, using the carpenter’s tape, measure from the traffic side of the edgeline over to the shoulder side of the steel tape. The distance measured in inches is the approximate degree of curve. Example – 2.5 inches equals a 2 degree 30 minute curve.

MEASURING THE SUPERELEVATION OF A CURVE

- **TOOLS NEEDED**
  1. 4-foot carpenter’s level
  2. Retractable carpenter’s tape or folding rule

- **PROCEDURE**
  1. Find the midpoint of the curve.
  2. After checking for traffic, lay the level transversely (perpendicular) to the lane.
  3. Raise the low end of the level until the middle bubble is centered.
  4. With the level bubble centered, using the retractable tape, measure from the bottom of the level down to the pavement.
  5. To determine the superelevation divide the measurement (in inches) by the length of the level in feet (4 feet). Superelevation can be read as a slope rate. Example: 1”/ 4’ = slope rate of 0.25 inches/foot. This information is useful when using math to determine the proper advisory speed for a curve. (Due to the danger and difficulty associated with measuring the degree of a curve to determine the curve radius and the superelevation of the curve, The Ball-Bank Indicator method for determining advisory speeds is simpler, quicker, and safer). Measuring the superelevation can determine if reverse superelevation is present which can contribute to roadway departures crashes.
MEASURING SIGHT DISTANCE -- WITHOUT MEDIANS

Minimum intersection sight distance criteria are provided in Table below. The line of sight establishes the boundary of a sight triangle within which there should be no sight obstruction.

![Diagram of sight distance](image)

<table>
<thead>
<tr>
<th>ARTERIAL SPEED, MPH</th>
<th>SIGHT DISTANCE (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 Lane</td>
</tr>
<tr>
<td>SDL=SDR</td>
<td>SDL</td>
</tr>
<tr>
<td>15</td>
<td>170</td>
</tr>
<tr>
<td>20</td>
<td>225</td>
</tr>
<tr>
<td>25</td>
<td>280</td>
</tr>
<tr>
<td>30</td>
<td>335</td>
</tr>
<tr>
<td>35</td>
<td>390</td>
</tr>
<tr>
<td>40</td>
<td>445</td>
</tr>
<tr>
<td>45</td>
<td>500</td>
</tr>
<tr>
<td>50</td>
<td>555</td>
</tr>
<tr>
<td>55</td>
<td>610</td>
</tr>
<tr>
<td>60</td>
<td>665</td>
</tr>
</tbody>
</table>

The sight distance criteria are based on the time required for a vehicle to make a left turn from a stop-controlled approach to the intersecting road (AASHTO Case B1). The time to execute the maneuver is based on recommendations contained in NCHRP Report 383, *Intersection Sight Distance*. The sight distances, for a two-lane road, are the distances traveled at the arterial speed during 7.5 seconds. The time is increased by 0.5 seconds for each additional lane to be crossed.

The sight distances given in the Table are for undivided highways. If the highway is divided, the effect of the median should be considered in determining the required sight distance. Based on the conditions, it may be feasible for the crossing maneuver to be done in two stages with a stop in the median. However, the intersection should only be treated in this manner if the signing and marking is accordingly provided. Otherwise, the sight distance requirements should be increased to account for the additional width that must be crossed. See ASSHTO Green Book, Chapter 9 Intersections, for adjustments due to grades greater than 3% and design vehicles other than passenger cars.
MEASURING THE GRADE OF A ROAD SECTION

- **TOOLS NEEDED**
  3. 4-foot carpenter’s level
  4. Retractable carpenter’s tape or folding rule

- **PROCEDURE**
  6. Find the midpoint of the grade section.
  7. Lay the level longitudinally with the road and in the middle of the lane if possible, on the road edge if traffic is too heavy.
  8. Raise the low end of the level until the middle bubble is centered
  9. With the level bubble centered, using the retractable tape, measure from the bottom of the level down to the pavement.
  10. To determine the grade divide the measurement (in inches) by the length of the level (48 inches). Move the decimal point two places to the right to gain the grade percentage. Example: 2.5”/48” = 0.052 or 5.2% grade
CLEAR ZONE REQUIREMENTS

Experience has shown that motorists occasionally run off the roadway and providing a traversable recovery area can lessen serious injury. AASHTO publishes a Roadside Design Guide that should be used as a reference when designing driveways.

Table 4-10 provides the clear zone distances as contained in the Roadside Design Guide. Driveways must be designed so that all areas within the Highway Right of Way have clear zones as defined in Table 4-10.

(from AASHTO 2002 Roadside Design Guide)

<table>
<thead>
<tr>
<th>DESIGN SPEED</th>
<th>DESIGN ADT</th>
<th>FILL SLOPES</th>
<th></th>
<th>CUT SLOPES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6:1 or Flatter</td>
<td>5:1 to 4:1</td>
<td>3:1</td>
<td>5:1 to 4:1</td>
</tr>
<tr>
<td>40 OR LESS</td>
<td>Under 750</td>
<td>7-10</td>
<td>7-10</td>
<td>**</td>
<td>7-10</td>
</tr>
<tr>
<td>750 – 1500</td>
<td>10-12</td>
<td>12-14</td>
<td>**</td>
<td>10-12</td>
<td>10-12</td>
</tr>
<tr>
<td>1500 – 6000</td>
<td>12-14</td>
<td>14-16</td>
<td>**</td>
<td>12-14</td>
<td>12-14</td>
</tr>
<tr>
<td>Over 8000</td>
<td>14-16</td>
<td>16-18</td>
<td>**</td>
<td>14-16</td>
<td>14-16</td>
</tr>
<tr>
<td>45 – 50</td>
<td>Under 750</td>
<td>10-12</td>
<td>12-14</td>
<td>**</td>
<td>8-10</td>
</tr>
<tr>
<td>750 – 1500</td>
<td>12-14</td>
<td>16-20</td>
<td>**</td>
<td>10-12</td>
<td>12-14</td>
</tr>
<tr>
<td>1500 – 6000</td>
<td>16-18</td>
<td>20-26</td>
<td>**</td>
<td>12-14</td>
<td>14-16</td>
</tr>
<tr>
<td>Over 6000</td>
<td>18-20</td>
<td>24-28</td>
<td>**</td>
<td>14-16</td>
<td>18-20</td>
</tr>
<tr>
<td>55</td>
<td>Under 750</td>
<td>12-14</td>
<td>14-18</td>
<td>**</td>
<td>8-10</td>
</tr>
<tr>
<td>750 – 1500</td>
<td>12-18</td>
<td>20-24</td>
<td>**</td>
<td>10-12</td>
<td>14-16</td>
</tr>
<tr>
<td>1500 – 6000</td>
<td>20-22</td>
<td>24-30</td>
<td>**</td>
<td>14-16</td>
<td>16-18</td>
</tr>
<tr>
<td>60</td>
<td>Under 750</td>
<td>16-18</td>
<td>20-24</td>
<td>**</td>
<td>10-12</td>
</tr>
<tr>
<td>Over 6000</td>
<td>30-32*</td>
<td>38-44*</td>
<td>**</td>
<td>20-22</td>
<td>24-26</td>
</tr>
<tr>
<td>65 – 70</td>
<td>Under 750</td>
<td>18-20</td>
<td>20-26</td>
<td>**</td>
<td>10-12</td>
</tr>
<tr>
<td>750 – 1500</td>
<td>20-24</td>
<td>28-36*</td>
<td>**</td>
<td>12-16</td>
<td>18-20</td>
</tr>
<tr>
<td>Over 6000</td>
<td>30-34*</td>
<td>38-48*</td>
<td>**</td>
<td>22-24</td>
<td>26-30</td>
</tr>
</tbody>
</table>

TABLE 4-10 CLEAR ZONE DISTANCES (IN FEET FROM EDGE OF TRAVELED WAY)

Notes: * Clear zones may be limited to 30°
** Fixed objects should not be present in the vicinity of the toe of these slopes. The width of the recovery zones should consider a number of factors including right of way availability, economic factors, safety needs, and accident history.

All areas located within the clear zones should remain clear of obstructions such as bridge abutments, poles, trees, etc. If obstructions are unavoidable, the design should include appropriate protection such as break-away design, guardrail installation, safety end treatments on culverts, etc. The Roadside Design Guide includes a table for horizontal curve adjustments, where the clear zone correction factor is applied to the outside of curves only. Curves flatter than a 2860 foot radius do not require an adjusted clear zone.
APPENDIX D

SIGN INFORMATION
SIGNING REQUIREMENTS:

Generally, only standard signs found in the *Manual on Uniform Traffic Control Devices* (Current Ed.) can be replaced and/or installed by the project. However, State and local highway agencies may develop special word message signs in situations where roadway conditions make it necessary to provide road users with additional regulatory, warning, or guidance information, such as when road users need to be notified of special regulations or warned about a situation that might not be readily apparent.

*Regulatory and warning signs should be used conservatively because these signs, if used to excess, tend to lose their effectiveness. If used, route signs and directional guide signs should be used frequently because their use promotes efficient operations by keeping road users informed of their location.*

1. All signs shall be installed as per current *Georgia Standards & Specifications and Supplemental Standards* and the *Manual on Uniform Traffic Control Devices* (Current Ed.).

2. The project contractor is responsible for utility locates for all sign locations and installations.

3. It may be necessary for the LG to establish speed limits on unregulated roads included in the project. Spot speed studies may be needed as part of Engineering Traffic Investigations (ETI’s) required by Georgia Code for enforcement using speed detection devices. ETI’s are not necessary for roads not covered by a Speed Detection Devices permit but local authorities should always consider having qualified personnel conduct speed studies on each road for the purpose of determining the proper speed to be posted on a section of roadway. Once a proper speed limit is determined for a section of roadway, it should be formally established in a regular meeting of the Local Government’s governing body and mentioned in the minutes of the meeting before appropriate signs are installed.
**Small Sign Installation Pocket Guide**

Conventional Signs - This guide has been developed for conventional size signs only. Larger conventional signs are 36"x48" speed limit sign (12 sq ft). Larger signs will require dual posts or更要双杆号表。

There are two factors needed for selecting the proper sign post type. They are:

1. **Area of sign (Sq. Ft.)**
2. **Length of post (Ft.)**

**Area of Sign**

The area of the sign can be found by multiplying the length (ft) by the width (ft). This calculation is simple for square and rectangular signs. Irregular shaped signs require using a chart or memorizing the area. Irregular shaped signs include stop, yield, no passing, railroad crossing and school signs.

**Signs Area Table**

<table>
<thead>
<tr>
<th>Sign Size (Sq. Ft.)</th>
<th>Sign Size (Sq. Ft.)</th>
<th>Sign Size (Sq. Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>12.0</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>16.0</td>
<td>16.0</td>
<td>16.0</td>
</tr>
</tbody>
</table>

**Length of Post**

The minimum length of post is the distance from the ground to the bottom of the sign added to the height of the sign and at least 3 more feet, the minimum distance to be installed in the ground.

Three (3) pound posts are easier and cheaper to install. Four (4) pound posts should not be used for most conventional sign installations. The 4 pound posts must be installed with breakaway footing which add to the cost and complexity of installing the heavier posts. Table 1 on the reverse side shows the cost effectiveness of dual 3.0 pound posts in comparison to 4.0 pound posts.

---

**2-Step Selection Guide**

All posts should be driven or installed at least three (3) feet into the ground. Determining the proper post length is as simple as two steps:

Step 1: 36" signs or smaller (9.0 sq ft or less) - Use a 3 post and up to 12' total post length. (Check Table 1 for smaller size signs - example: sign face of 4.5 sq ft can use a 18' length post.)

Step 2: 36", 48", or 60" signs (between 16 and 9 sq ft) - Use dual 3 # posts and up to 17' total post length. (Check Table 1 or smaller size signs - example: sign face of 10.5 sq ft can use dual 23' length posts.)

**Table 1**

<table>
<thead>
<tr>
<th>Post Size</th>
<th>Post Length (Ft)</th>
<th>Post Diameter (In)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>9.0</td>
<td>6.0</td>
</tr>
<tr>
<td>12.0</td>
<td>12.0</td>
<td>8.0</td>
</tr>
<tr>
<td>15.0</td>
<td>15.0</td>
<td>9.0</td>
</tr>
</tbody>
</table>

(Sources: Material Steel Corp., 80-kilowatt steels, 70 mph pressures. This table only applies to 80-kilowatt steels, other steel poles will need different length posts for the design sign area.)

If you have any problems with the Two Step Post Selection Guide ask your traffic engineer.

**Examples of Post Length Selections Using the Three Step Selection Guide**

**Problem #1:**

Sign Area: 36" x 36" speed limit sign on a rural road. The road is 5 feet higher than the ground level and 12' from the edge of the road. Choose the minimum length and weight post.

**Solution:**

Sign Area: 36" x 36" sign is Z by 3' and has a sign area of 6 sq ft. See Sign Area Table, regular shaped signs. Minimum length post: 3' (foundation in ground) + 5' (rural area, ground to bottom of sign) + 5' (ground to road height) + 3' (sign height) = 16' post length. Choose weight of post - Check step one, sign is less than 9.0 sq ft and length is more than 13 feet; go to Table 1, sign is 6.0 sq ft, Table 1 allows a 6.0 sq ft sign face for a 12' length post from ground to sign bottom, add 3' for foundation and 3' from sign bottom to the top of sign (total allowed post length of 18'). Choose dual 36" post = 10' length.

**Sign Size**

<table>
<thead>
<tr>
<th>Sign Size</th>
<th>&quot;X&quot; Dimension</th>
<th>&quot;Y&quot; Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>24&quot;x24&quot;</td>
<td>22&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>36&quot;x36&quot;</td>
<td>29&quot;</td>
<td>13&quot;</td>
</tr>
<tr>
<td>48&quot;x48&quot;</td>
<td>34&quot;</td>
<td>16&quot;</td>
</tr>
</tbody>
</table>

**Mounting Guide for Gold Shaped Signs**

<table>
<thead>
<tr>
<th>Sign Size</th>
<th>&quot;X&quot; Dimension</th>
<th>&quot;Y&quot; Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>48&quot;x48&quot;</td>
<td>40&quot;</td>
<td>16&quot;</td>
</tr>
<tr>
<td>60&quot;x60&quot;</td>
<td>45&quot;</td>
<td>15&quot;</td>
</tr>
<tr>
<td>48&quot;x48&quot;</td>
<td>27&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>18&quot;x18&quot;</td>
<td>22&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>36&quot;x36&quot;</td>
<td>50&quot;</td>
<td>16&quot;</td>
</tr>
<tr>
<td>36&quot;x36&quot;</td>
<td>44&quot;</td>
<td>19&quot;</td>
</tr>
</tbody>
</table>

---

Georgia's Local Technical Assistance Program (800) 575-5645
Figure 2A-2. Examples of Heights and Lateral Locations of Sign Installations

A - ROADSIDE SIGN IN RURAL AREA

B - ROADSIDE SIGN IN RURAL AREA

C - ROADSIDE SIGN IN BUSINESS, COMMERCIAL, OR RESIDENTIAL AREA

D - WARNING SIGN WITH ADVISORY SPEED PLAQUE IN RURAL AREA

*Where parking or pedestrian movements are likely to occur

E - ROADSIDE ASSEMBLY IN RURAL AREA

F - SIGN ON NOSE OF MEDIAN

G - FREEWAY OR EXPRESSWAY SIGN WITH SECONDARY SIGN

H - OVERHEAD SIGN

Note: See Section 2A.19 for reduced lateral offset distances that may be used in areas where lateral offsets are limited, and in business, commercial, or residential areas where sidewalk width is limited or where existing poles are close to the curb.
Figure 2A-3. Examples of Locations for Some Typical Signs at Intersections

A - ACUTE ANGLE INTERSECTION

B - CHANNELIZED INTERSECTION

C - MINOR CROSSROAD

D - URBAN INTERSECTION

E - DIVISIONAL ISLAND

F - WIDETHROAT INTERSECTION

Note: Lateral offset is a minimum of 6 feet measured from the edge of the shoulder, or 12 feet measured from the edge of the traveled way. See Section 2A.19 for lower minimums that may be used in urban areas, or where lateral offset space is limited.
Figure 2A-4. Relative Locations of Regulatory, Warning, and Guide Signs on an Intersection Approach

A – Single-lane approach

B – Multi-lane approach

U.S. ROUTE 46
DEFENSE HWY

WOOD AVE

Note: See Chapter 2D for information on guide signs and Part 3 for information on pavement markings

See Table 2C-4 for the recommended minimum distance

See Section 2C.46 for the application of the W2-1 sign

See Section 2B.22 for the application of Intersection Lane Control signs

2009 Edition Part 2 Figure 2A-4. Relative Locations of Regulatory, Warning, and Guide Signs on an Intersection Approach
Off System Safety Warning Sign Placement:

Advanced placement of signs for complex driving situations: Typical conditions are locations where the road user must use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends.

<table>
<thead>
<tr>
<th>MPH</th>
<th>FEET IN ADVANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>225</td>
</tr>
<tr>
<td>25</td>
<td>325</td>
</tr>
<tr>
<td>30</td>
<td>460</td>
</tr>
<tr>
<td>35</td>
<td>565</td>
</tr>
<tr>
<td>40</td>
<td>670</td>
</tr>
<tr>
<td>45</td>
<td>775</td>
</tr>
<tr>
<td>50</td>
<td>885</td>
</tr>
<tr>
<td>55</td>
<td>990</td>
</tr>
<tr>
<td>&gt;55</td>
<td>MUTCD, Table 2C-4</td>
</tr>
</tbody>
</table>

Advanced placement of signs for potential stop situations: Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs.

<table>
<thead>
<tr>
<th>MPH</th>
<th>FEET IN ADVANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40</td>
<td>100</td>
</tr>
<tr>
<td>40</td>
<td>125</td>
</tr>
<tr>
<td>45</td>
<td>175</td>
</tr>
<tr>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>55</td>
<td>325</td>
</tr>
<tr>
<td>&gt;55</td>
<td>MUTCD, Table 2C-4</td>
</tr>
</tbody>
</table>
**Advanced placement of signs for decrease speed for warning condition:** Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn, or Reverse Curve.

<table>
<thead>
<tr>
<th>MPH</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40</td>
<td>POC* to 100</td>
<td>POC* to 100</td>
<td>POC* to 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>100</td>
<td>100</td>
<td>POC* to 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>125</td>
<td>100</td>
<td>100</td>
<td>POC* to 100</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>200</td>
<td>175</td>
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<td>100</td>
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</tr>
<tr>
<td>55</td>
<td>275</td>
<td>225</td>
<td>200</td>
<td>125</td>
<td>POC* to 100</td>
</tr>
<tr>
<td>&gt;55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Refer to MUTCD Table 2C-4</td>
</tr>
</tbody>
</table>

*Point of Curvature*
Section 2C.06 Horizontal Alignment Warning Signs

Support:
01 A variety of horizontal alignment warning signs (see Figure 2C-1), pavement markings (see Chapter 3B), and delineation (see Chapter 3F) can be used to advise motorists of a change in the roadway alignment. Uniform application of these traffic control devices with respect to the amount of change in the roadway alignment conveys a consistent message establishing driver expectancy and promoting effective roadway operations. The design and application of horizontal alignment warning signs to meet those requirements are addressed in Sections 2C.06 through 2C.15.

2009 Edition Part 2 Figure 2C-1. Horizontal Alignment Signs and Plaques

![Figure 2C-1. Horizontal Alignment Signs and Plaques](image)

Note: Turn arrows and reverse turn arrows may be substituted for the curve arrows and reverse curve arrows on the W1-10 series signs where appropriate.

Standard:
02 In advance of horizontal curves on freeways, on expressways, and on roadways with more than 1,000 AADT that are functionally classified as arterials or collectors, horizontal alignment warning signs shall be used in accordance with Table 2C-5 based on the speed differential between the roadway's posted or statutory speed limit or 85th-percentile speed, whichever is higher, or the prevailing speed on the approach to the curve, and the horizontal curve's advisory speed.
Table 2C-5. Horizontal Alignment Sign Selection

<table>
<thead>
<tr>
<th>Type of Horizontal Alignment Sign</th>
<th>Difference Between Speed Limit and Advisory Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 mph</td>
</tr>
<tr>
<td>Turn (W1-1), Curve (W1-2), Reverse Turn (W1-3), Reverse Curve (W1-4), Winding Road (W1-5), and Combination Horizontal Alignment/Intersection (W1-10) (see Section 2C.07 to determine which sign to use)</td>
<td>Recommended</td>
</tr>
<tr>
<td>Advisory Speed Plaque (W13-1P)</td>
<td>Recommended</td>
</tr>
<tr>
<td>Chevrons (W1-8) and/or One Direction Large Arrow (W1-6)</td>
<td>Optional</td>
</tr>
<tr>
<td>Exit Speed (W13-2) and Ramp Speed (W13-3) on exit ramp</td>
<td>Optional</td>
</tr>
</tbody>
</table>

Note: Required means that the sign and/or plaque shall be used, recommended means that the sign and/or plaque should be used, and optional means that the sign and/or plaque may be used.

See Section 2C.06 for roadways with less than 1,000 AADT.

Option:
03 Horizontal Alignment Warning signs may also be used on other roadways or on arterial and collector roadways with less than 1,000 AADT based on engineering judgment.

Section 2C.07 Horizontal Alignment Signs (W1-1 through W1-5, W1-11, W1-15)

Standard:
01 If Table 2C-5 indicates that a horizontal alignment sign (see Figure 2C-1) is required, recommended, or allowed, the sign installed in advance of the curve shall be a Curve (W1-2) sign unless a different sign is recommended or allowed by the provisions of this Section.

02 A Turn (W1-1) sign shall be used instead of a Curve sign in advance of curves that have advisory speeds of 30 mph or less (see Figure 2C-2).
Figure 2C-2. Example of Warning Signs for a Turn

Notes:
1. See Table 2C-4 for advance placement distance guidelines
2. See Table 2C-5 for the selection of horizontal alignment signs
3. See Table 2C-6 for spacing of WI-8 signs
4. A 25-mph advisory speed is shown for illustrative purposes only
Guidance:
03 Where there are two changes in roadway alignment in opposite directions that are separated by a tangent distance of less than 600 feet, the Reverse Turn (W1-3) sign should be used instead of multiple Turn (W1-1) signs and the Reverse Curve (W1-4) sign should be used instead of multiple Curve (W1-2) signs.

Option:
04 A Winding Road (W1-5) sign may be used instead of multiple Turn (W1-1) or Curve (W1-2) signs where there are three or more changes in roadway alignment each separated by a tangent distance of less than 600 feet.

05 A NEXT XX MILES (W7-3aP) supplemental distance plaque (see Section 2C.55) may be installed below the Winding Road sign where continuous roadway curves exist for a specific distance.

06 If the curve has a change in horizontal alignment of 135 degrees or more, the Hairpin Curve (W1-11) sign may be used instead of a Curve or Turn sign.

07 If the curve has a change of direction of approximately 270 degrees, such as on a cloverleaf interchange ramp, the 270-degree Loop (W1-15) sign may be used instead of a Curve or Turn sign.

Guidance:
08 When the Hairpin Curve sign or the 270-degree Loop sign is installed, either a One-Direction Large Arrow (W1-6) sign or Chevron Alignment (W1-8) signs should be installed on the outside of the turn or curve.

Section 2C.08 Advisory Speed Plaque (W13-1P)

Option:
01 The Advisory Speed (W13-1P) plaque (see Figure 2C-1) may be used to supplement any warning sign to indicate the advisory speed for a condition.

Standard:
02 The use of the Advisory Speed plaque for horizontal curves shall be in accordance with the information shown in Table 2C-5. The Advisory Speed plaque shall also be used where an engineering study indicates a need to advise road users of the advisory speed for other roadway conditions.

03 If used, the Advisory Speed plaque shall carry the message XX MPH. The speed displayed shall be a multiple of 5 mph.

04 Except in emergencies or when the condition is temporary, an Advisory Speed plaque shall not be installed until the advisory speed has been determined by an engineering study.

05 The Advisory Speed plaque shall only be used to supplement a warning sign and shall not be installed as a separate sign installation.

06 The advisory speed shall be determined by an engineering study that follows established engineering practices.
Support:
07 Among the established engineering practices that are appropriate for the determination of the recommended advisory speed for a horizontal curve are the following:

A. An accelerometer that provides a direct determination of side friction factors
B. A design speed equation
C. A traditional ball-bank indicator using the following criteria:
   1. 16 degrees of ball-bank for speeds of 20 mph or less
   2. 14 degrees of ball-bank for speeds of 25 to 30 mph
   3. 12 degrees of ball-bank for speeds of 35 mph and higher

08 The 16, 14, and 12 degrees of ball-bank criteria are comparable to the current AASHTO horizontal curve design guidance. Research has shown that drivers often exceed existing posted advisory curve speeds by 7 to 10 mph.

Guidance:
09 The advisory speed should be determined based on free-flowing traffic conditions.

10 Because changes in conditions, such as roadway geometrics, surface characteristics, or sight distance, might affect the advisory speed, each location should be evaluated periodically or when conditions change.

Section 2C.09 Chevron Alignment Sign (W1-8)

Standard:
01 The use of the Chevron Alignment (W1-8) sign (see Figures 2C-1 and 2C-2) to provide additional emphasis and guidance for a change in horizontal alignment shall be in accordance with the information shown in Table 2C-5.

Option:
02 When used, Chevron Alignment signs may be used instead of or in addition to standard delineators.

Standard:
03 The Chevron Alignment sign shall be a vertical rectangle. No border shall be used on the Chevron Alignment sign.

04 If used, Chevron Alignment signs shall be installed on the outside of a turn or curve, in line with and at approximately a right angle to approaching traffic. Chevron Alignment signs shall be installed at a minimum height of 4 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way.
Guidance:
05 The approximate spacing of Chevron Alignment signs on the turn or curve measured from the point of curvature (PC) should be as shown in Table 2C-6.

<table>
<thead>
<tr>
<th>Advisory Speed</th>
<th>Curve Radius</th>
<th>Sign Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 mph or less</td>
<td>Less than 200 feet</td>
<td>40 feet</td>
</tr>
<tr>
<td>20 to 30 mph</td>
<td>200 to 400 feet</td>
<td>80 feet</td>
</tr>
<tr>
<td>35 to 45 mph</td>
<td>401 to 700 feet</td>
<td>120 feet</td>
</tr>
<tr>
<td>50 to 60 mph</td>
<td>701 to 1,250 feet</td>
<td>160 feet</td>
</tr>
<tr>
<td>More than 60 mph</td>
<td>More than 1,250 feet</td>
<td>200 feet</td>
</tr>
</tbody>
</table>

Note: The relationship between the curve radius and the advisory speed shown in this table should not be used to determine the advisory speed.

06 If used, Chevron Alignment signs should be visible for a sufficient distance to provide the road user with adequate time to react to the change in alignment.

Standard:
07 Chevron Alignment signs shall not be placed on the far side of a T-intersection facing traffic on the stem approach to warn drivers that a through movement is not physically possible, as this is the function of a Two-Direction (or One-Direction) Large Arrow sign.

08 Chevron Alignment signs shall not be used to mark obstructions within or adjacent to the roadway, including the beginning of guardrails or barriers, as this is the function of an object marker (see Section 2C.63).

Section 2C.10 Combination Horizontal Alignment/Advisory Speed Signs (W1-1a, W1-2a)

Option:
01 The Turn (W1-1) sign or the Curve (W1-2) sign may be combined with the Advisory Speed (W13-1P) plaque (see Section 2C.08) to create a combination Turn/Advisory Speed (W1-1a) sign or combination Curve/Advisory Speed (W1-2a) sign (see Figure 2C-1).

02 The combination Horizontal Alignment/Advisory Speed sign may be used to supplement the advance Horizontal Alignment warning sign and Advisory Speed plaque based upon an engineering study.

Standard:
03 If used, the combination Horizontal Alignment/Advisory Speed sign shall not be used alone and shall not be used as a substitute for a Horizontal Alignment warning sign and Advisory Speed plaque at the advance warning location. The combination Horizontal Alignment/Advisory Speed sign shall only be used as a supplement to the advance Horizontal Alignment warning sign. If used, the combination Horizontal Alignment/Advisory Speed sign shall be installed at the beginning of the turn or curve.
Guidance:
04 The advisory speed displayed on the combination Horizontal Alignment/Advisory Speed sign should be based on the advisory speed for the horizontal curve using recommended engineering practices (see Section 2C.08).

Section 2C.11 Combination Horizontal Alignment/Intersection Signs (W1-10 Series)

Option:
01 The Turn (W1-1) sign or the Curve (W1-2) sign may be combined with the Cross Road (W2-1) sign or the Side Road (W2-2 or W2-3) sign to create a combination Horizontal Alignment/Intersection (W1-10 series) sign (see Figure 2C-1) that depicts the condition where an intersection occurs within or immediately adjacent to a turn or curve.

Guidance:
02 Elements of the combination Horizontal Alignment/Intersection sign related to horizontal alignment should comply with the provisions of Section 2C.07, and elements related to intersection configuration should comply with the provisions of Section 2C.46. The symbol design should approximate the configuration of the intersecting roadway(s). No more than one Cross Road or two Side Road symbols should be displayed on any one combination Horizontal Alignment/Intersection sign.

Standard:
03 The use of the combination Horizontal Alignment/Intersection sign shall be in accordance with the appropriate Turn or Curve sign information shown in Table 2C-5.

Section 2C.12 One-Direction Large Arrow Sign (W1-6)

Option:
01 A One-Direction Large Arrow (W1-6) sign (see Figure 2C-1) may be used either as a supplement or alternative to Chevron Alignment signs in order to delineate a change in horizontal alignment (see Figure 2C-2).

02 A One-Direction Large Arrow (W1-6) sign may be used to supplement a Turn or Reverse Turn sign (see Figure 2C-2) to emphasize the abrupt curvature.

Standard:
03 The One-Direction Large Arrow sign shall be a horizontal rectangle with an arrow pointing to the left or right.

04 The use of the One-Direction Large Arrow sign shall be in accordance with the information shown in Table 2C-5.

05 If used, the One-Direction Large Arrow sign shall be installed on the outside of a turn or curve in line with and at approximately a right angle to approaching traffic.

06 The One-Direction Large Arrow sign shall not be used where there is no alignment change in the direction of travel, such as at the beginnings and ends of medians or at center piers.

07 The One-Direction Large Arrow sign directing traffic to the right shall not be used in the central island of a roundabout.
Guidance:
08 If used, the One-Direction Large Arrow sign should be visible for a sufficient distance to provide the road user with adequate time to react to the change in alignment.

Section 2C.63 Object Marker Design and Placement Height

Support:
01 Type 1, 2, and 3 object markers are used to mark obstructions within or adjacent to the roadway. Type 4 object markers are used to mark the end of a roadway.

Standard:
02 When used, object markers (see Figure 2C-13) shall not have a border and shall consist of an arrangement of one or more of the following types:

**Figure 2C-13 Object Markers**

Type 1—a diamond-shaped sign, at least 18 inches on a side, consisting of either a yellow (OM1-1) or black (OM1-2) sign with nine yellow retroreflective devices, each with a minimum diameter of 3 inches, mounted symmetrically on the sign, or an all-yellow retroreflective sign (OM1-3).
Type 2—either a marker (OM2-1V or OM2-1H) consisting of three yellow retroreflective devices, each with a minimum diameter of 3 inches, arranged either horizontally or vertically on a white sign measuring at least 6 x 12 inches; or an all-yellow horizontal or vertical retroreflective sign (OM2-2V or OM2-2H), measuring at least 6 x 12 inches.

Type 3—a striped marker, 12 x 36 inches, consisting of a vertical rectangle with alternating black and retroreflective yellow stripes sloping downward at an angle of 45 degrees toward the side of the obstruction on which traffic is to pass. The minimum width of the yellow and black stripes shall be 3 inches.

Type 4—a diamond-shaped sign, at least 18 inches on a side, consisting of either a red (OM4-1) or black (OM4-2) sign with nine red retroreflective devices, each with a minimum diameter of 3 inches, mounted symmetrically on the sign, or an all-red retroreflective sign (OM4-3).

Support:
03 A better appearance can be achieved if the black stripes are wider than the yellow stripes.

04 Type 3 object markers with stripes that begin at the upper right side and slope downward to the lower left side are designated as right object markers (OM3-R). Object markers with stripes that begin at the upper left side and slope downward to the lower right side are designated as left object markers (OM3-L).

Guidance:
05 When used for marking obstructions within the roadway or obstructions that are 8 feet or less from the shoulder or curb, the minimum mounting height, measured from the bottom of the object marker to the elevation of the near edge of the traveled way, should be 4 feet.

06 When used to mark obstructions more than 8 feet from the shoulder or curb, the clearance from the ground to the bottom of the object marker should be at least 4 feet.

07 Object markers should not present a vertical or horizontal clearance obstacle for pedestrians.

Option:
08 When object markers or markings are applied to an obstruction that by its nature requires a lower or higher mounting, the vertical mounting height may vary according to need.

Support:
09 Section 9B.26 contains information regarding the use of object markers on shared-use paths.

**Section 2C.64 Object Markers for Obstructions Within the Roadway**

**Standard:**
01 Obstructions within the roadway shall be marked with a Type 1 or Type 3 object marker. In addition to markers on the face of the obstruction, warning of approach to the obstruction shall be given by appropriate pavement markings (see Section 3B.10).

Option:
02 To provide additional emphasis, a Type 1 or Type 3 object marker may be installed at or near the approach end of a median island.

03 To provide additional emphasis, large surfaces such as bridge piers may be painted with diagonal stripes, 12 inches or greater in width, similar in design to the Type 3 object marker.
Standard:
04 The alternating black and retroreflective yellow stripes (OM3-L, OM3-R) shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction. If traffic can pass to either side of the obstruction, the alternating black and retroreflective yellow stripes (OM3-C) shall form chevrons that point upwards.

Option:
05 Appropriate signs (see Sections 2B.32 and 2C.25) directing traffic to one or both sides of the obstruction may be used instead of the object marker.

Section 2C.65 Object Markers for Obstructions Adjacent to the Roadway

Support:
01 Obstructions not actually within the roadway are sometimes so close to the edge of the road that they need a marker. These include underpass piers, bridge abutments, handrails, ends of traffic barriers, utility poles, and culvert headwalls. In other cases there might not be a physical object involved, but other roadside conditions exist, such as narrow shoulders, drop-offs, gores, small islands, and abrupt changes in the roadway alignment, that might make it undesirable for a road user to leave the roadway, and therefore would create a need for a marker.

Standard:
02 If a Type 2 or Type 3 object marker is used to mark an obstruction adjacent to the roadway, the edge of the object marker that is closest to the road user shall be installed in line with the closest edge of the obstruction.

03 Where Type 3 object markers are applied to the approach ends of guardrail and other roadside appurtenances, sheeting without a substrate shall be directly affixed to the approach end of the guardrail in a rectangular shape conforming to the size of the approach end of the guardrail with alternating black and retroreflective yellow stripes sloping downward at a angle of 45 degrees toward the side of the obstruction on which traffic is to pass.

04 Type 1 and Type 4 object markers shall not be used to mark obstructions adjacent to the roadway.

Guidance:
05 Standard warning signs in this Chapter should also be used where applicable.

Section 2C.66 Object Markers for Ends of Roadways

Support:
01 The Type 4 object marker is used to warn and alert road users of the end of a roadway in other than construction or maintenance areas.

Standard:
02 If an object marker is used to mark the end of a roadway, a Type 4 object marker shall be used.
Delete Subsection 636.4.D and substitute the following:

A. **Delineators**

1. **Type 1 Delineators** (reflectorized guide markers) to be paid for are the number specified, including posts, rivets, and spacers, that are furnished, placed, and completed and accepted. Installation shall be as per the plans, Ga. Standard 9030C, and/or Ga. Details T-22A and T-22B. Color shall be red, white, or yellow as specified in the plans or directed by the Engineer.

2. **Type 1A Delineators** (reflectorized guardrail washers) to be paid for are the number specified that are furnished, placed on existing guardrail, and completed and accepted. Installation shall be as per the plans and Ga. Standard 4360. Color shall be white or yellow as specified in the plans or directed by the Engineer.

3. **Type 2 Delineators** (reflectorized guide markers) to be paid for are the number specified, including posts, rivets, and spacers, that are furnished, placed, and completed and accepted. Installation shall be as per the plans, Ga. Standard 9030C, and/or Ga. Details T-22A and T-22B. Color shall be red, white, or yellow as specified in the plans or directed by the Engineer.

4. **Type 3 Delineators** (Type 2 Object Markers or OM2) to be paid for are for the number specified, including posts, rivets, and spacers, that are furnished, placed, and completed and accepted. Installation and use shall be as per the plans and shall be the same as detailed for a Type 2 Object Marker as shown on Ga. Standard 9030C; and shall include one triple reflector unit (or equivalent) to be placed on one side of the post facing approaching traffic. Color shall be white or yellow as specified in the plans or directed by the Engineer.

5. **Type 3A Delineators** (Type 3 Object Markers or OM-3 L/R) to be paid are the number specified, including posts, rivets, and spacers, that are furnished, placed, and completed and accepted. Installation and use shall be as per the plans and shall be the same as detailed for a Type 3 Object Marker as shown on Ga. Standard 9030C and/or Ga. Detail T-22A and T-22B. Payment for EACH shall be for and include one 12”x36” Type 3 Object Marker sign (TP IX sheeting) and two (2) yellow triple reflector units, rivets, and spacers to be installed on the same post at each specified location.

**Installation Clarification:** Two (2) Type 3 delineator yellow triple reflector units (also shown as Type 2 Object Markers OM2 on Ga. Std. 9030C) are to be installed on the same post under a Type 3 Object Marker (OM-3 left or right) with one triple reflector unit on the front of the post and one on the back of the same post. Each reflector shall be 3 ¼” diameter center mount sealed prismatic reflex reflectors housed in aluminum backing with single grommeted hole in center of each reflector (as detailed and described in Ga. Std. 9030C).

9/25/2013
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>UNITS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>636-5010</td>
<td>EA</td>
<td>DELINEATOR, TP 1</td>
</tr>
<tr>
<td>636-5011</td>
<td>EA</td>
<td>DELINEATOR, TP 1A</td>
</tr>
<tr>
<td>636-5020</td>
<td>EA</td>
<td>DELINEATOR, TP 2</td>
</tr>
<tr>
<td>636-5030</td>
<td>EA</td>
<td>DELINEATOR, TP 3</td>
</tr>
<tr>
<td>636-5031</td>
<td>EA</td>
<td>DELINEATOR, TP 3A</td>
</tr>
</tbody>
</table>
**ReflectORIZED Washer Details**

- **Reductive Washer Details**
- **Top Edge**
- **Bottom Edge**
- **Reductive Washer Location**
- **Spacing of ReflectORIZED Washers**
  - **At Turnouts**
  - **Intermediate Spacing**
  - **Fixed Spacing**

**Noise Stripping Details**

- **Typical Guardrail Installation**
- **Along Roadside**

**General Notes**

- ReflectORIZED Washers are required on all new and rehabilitated guardrail systems, as well as on all existing guardrails that are being retrofitted. Washers shall be installed in such a manner as to ensure proper alignment and to prevent damage to the guardrail system.

**Department of Transportation**

- **State of Oregon**

**Table: ReflectORIZED Guardrail Washers and Anchorages Noise Stripping**

- **No Scale**
- **Preliminary Design Application**
- **Number**: 4360
GENERAL NOTES:

1. OBJECT MARKERS SHALL BE PLACED IN A STRAIGHT LINE PLANE WITH THE FIRST UNIT OFFSET AS SHOWN.

2. ALL OBJECT MARKERS SHALL COMPLY TO GEORGIA STANDARD 9000-C AND SECTION 30 OF THE MUTCD. OBJECT MARKERS SHALL BE FOR SECTION 30 OF THE MUTCD.

3. REFLECTIVE SHEETING FOR OBJECT MARKERS SHALL BE TYPE 3.

4. TREATMENT SHOWN IS MANUAL. ADDITIONAL DELINIATION MAY BE ADDED AT THE ENGINEER’S DISCRETION.

5. DELINIATION DETAILS APPLY WHERE BRIDGE WIDTH ON ENDED HIGHWAY IS LESS THAN IS REQUIRED BY HIGHWAY ENGINEERING. SHOULDER MARKERS APPLY TO SAME IF SHOULDERS ARE PAVED.

6. SEE GEORGIA STANDARD 9000-C FOR DELINIATION AT FULL WIDTH BRIDGES.

7. DIAGONAL STRIPES SHALL BE WHITE ON OUTSIDE SHOULDER AND YELLOW ON INSIDE SHOULDER.

8. TYPE 3 RAISED MARKER MARKERS SHALL BE CLEAR-MARK ON OUTSIDE SHOULDER AND YELLOW-MARK ON INSIDE SHOULDER.

9. CLEAN AND YELLOW FACE OF TYPE 3 RAISED MARKER MARKERS SHALL BE DIRECTED TOWARDS APPROACHING TRAFFIC.
GENERAL NOTES:
1. STYLE OF FRAMING IS OPTIONAL. ALTERNATE DESIGNS ARE ACCEPTABLE.
   CONSULT APPROVAL OF THE ENGINEER. FRAMES SHALL BE INSTALLED SO AS TO
   PERM THE ASSEMBLY IN A PERPENDICULAR POSITION.
2. FRAMING STRAPS SHALL BE GALVANIZED STEEL OR ALUMINUM.
3. STEEL FRAMES DEedes 1234256: NEE CONN. SPECIES IS GALVANIZED
   IN ACCORDANCE WITH A-307, DESIGNATION A-123.
4. ALUMINUM SHALL BE ALLOY 6061-T6.
5. BOLTS, WELDS, NUTS, AND SCREWS SHALL COMPLY WITH THE STANDARD
   REQUIREMENTS OR FORE合い SPECIAL PROVISIONS.
6. FRAMING STRAPS ON A SINGLE POST ERECTION SHALL NOT BE BOLTED
   TO THE POST.
APPENDIX E

PAVEMENT MARKING INFORMATION
STRIPING REQUIREMENTS:

Materials

Pavement marking material is typically thermoplastic or paint; however, preformed material with contrast should be used on bridges and all other concrete surfaces. Widths for longitudinal lines, hatching, and stop bars are defined in the GDOT Signing and Marking Details. Striping should be offset two (2) inches from the longitudinal joint. Pavement marking material should conform to Policies and Procedures (P&P) 6146-2 for maintenance activities.

Table 1 Pavement Marking Material Selection Matrix

<table>
<thead>
<tr>
<th>AADT</th>
<th>Asphalt</th>
<th>Concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 Lanes</td>
<td>&gt;2 Lanes</td>
</tr>
<tr>
<td>n &lt; 8,000</td>
<td>H or T</td>
<td>H or T</td>
</tr>
<tr>
<td>8,000 ≥ n &lt;15,000</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>≥ 15,000</td>
<td>T</td>
<td>T / P</td>
</tr>
</tbody>
</table>

H – High build Paint and Wet Weather Paint Traffic Stripe (652)

T – Standard and Wet Weather Thermoplastic Traffic Stripe (653)

F – Preferred Plastic Pavement Markings (657)

P – Standard and Wet Weather Polyurea Traffic Strip (658)

1. *8” contrast markings shall be used for all lane lines on PCC surfaces (includes skip and edge lines).
2. Words and symbols shall be thermoplastic (653) or preformed material (657). Raised pavement markers (654) shall be used as determined by the contract.
3. Preformed plastic pavement marking material should not be used on pavements with open-graded surface treatment.
4. Wet Reflective material shall be used on all interstates and freeways. Wet Reflective material should also be used on routes where lane departure crashes exceed the statewide average for comparable routes or where the analysis of crash data indicates a need. The State Traffic Engineer or State Maintenance Engineer may request use of wet reflective markings on a case-by-case basis.

Above Table from GDOT Signing & Marking Guidelines

All Pavement Markings shall be installed as per current Georgia Standards & Specifications and Supplemental Standards and the Manual on Uniform Traffic Control Devices (Current Ed.).
Section 3B.02 No-Passing Zone Pavement Markings and Warrants

Standard:

01 No-passing zones shall be marked by either the one direction no-passing zone pavement markings or the two-direction no-passing zone pavement markings described in Section 3B.01 and shown in Figures 3B-1 and 3B-3.

02 When center line markings are used, no-passing zone markings shall be used on two-way roadways at lane-reduction transitions (see Section 3B.09) and on approaches to obstructions that must be passed on the right (see Section 3B.10).

03 On two-way, two- or three-lane roadways where center line markings are installed, no-passing zones shall be established at vertical and horizontal curves and other locations where an engineering study indicates that passing must be prohibited because of inadequate sight distances or other special conditions.

04 On roadways with center line markings, no-passing zone markings shall be used at horizontal or vertical curves where the passing sight distance is less than the minimum shown in Table 3B-1 for the 85th-percentile speed or the posted or statutory speed limit. The passing sight distance on a vertical curve is the distance at which an object 3.5 feet above the pavement surface can be seen from a point 3.5 feet above the pavement (see Figure 3B-4). Similarly, the passing sight distance on a horizontal curve is the distance measured along the center line (or right-hand lane line of a three-lane roadway) between two points 3.5 feet above the pavement on a line tangent to the embankment or other obstruction that cuts off the view on the inside of the curve (see Figure 3B-4).

Table 3B-1. Minimum Passing Sight Distances for No-Passing Zone Markings

<table>
<thead>
<tr>
<th>85th-Percentile or Posted or Statutory Speed Limit</th>
<th>Minimum Passing Sight Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 mph</td>
<td>400 feet</td>
</tr>
<tr>
<td>30 mph</td>
<td>500 feet</td>
</tr>
<tr>
<td>35 mph</td>
<td>550 feet</td>
</tr>
<tr>
<td>40 mph</td>
<td>600 feet</td>
</tr>
<tr>
<td>45 mph</td>
<td>700 feet</td>
</tr>
<tr>
<td>50 mph</td>
<td>800 feet</td>
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<td>55 mph</td>
<td>900 feet</td>
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<td>60 mph</td>
<td>1,000 feet</td>
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<tr>
<td>65 mph</td>
<td>1,100 feet</td>
</tr>
<tr>
<td>70 mph</td>
<td>1,200 feet</td>
</tr>
</tbody>
</table>
Figure 3B-4. Method of Locating and Determining the Limits of No-Passing Zones at Curves

A - No-passing zone at VERTICAL CURVE

Legend

Direction of travel

Minimum passing sight distance for 85th-perc, posted, or statutory speed
Pavement profile
Line of sight
3.5 ft
No-passing zone, a to b (in direction indicated)

Profile View

Note: No-passing zones in opposite directions may or may not overlap, depending on alignment

a, a' Begin no-passing zone
Sight distance becomes less than minimum measured between points 3.5 feet above pavement

b, b' End no-passing zone
Sight distance again exceeds minimum

B - No-passing zone at HORIZONTAL CURVE

Minimum passing sight distance for 85th-perc, posted, or statutory speed
Line of sight
3.5 ft
No-passing zone, a to b (in direction indicated)

Plan View

Note: No-passing zones in opposite directions may or may not overlap, depending on alignment

a, a' Begin no-passing zone
Sight distance becomes less than minimum measured between points 3.5 feet above pavement

b, b' End no-passing zone
Sight distance again exceeds minimum
GENERAL NOTES:
1. Spacing of Type 2 arrow is representative of spacing for Type 1, Type 2, Type 4, & Type 6 arrows.
2. All turning lanes shall have a minimum of 2 arrows.
3. Ground mounted or overhead signing shall be supplemented by Type 1 word.
OFF-SYSTEM SAFETY INITIATIVE – PROJECT PROCEDURES MANUAL

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GENERAL NOTES:
1. BICYCLE LANE SYMBOLS SHALL BE PLACED ON THE FAR SIDE OF
   ROAD INTERSECTION & JUST BEHIND THE BICYCLE RAMP OR SIDE OF
   INTERSECTING ROAD RAMP. ADDITIONAL SYMBOLS MAY BE
   PLACED IN LINE UNINTERRUPTED SECTIONS OF ROADWAY
   BASED ON ENGINEERING JUDGMENT.
2. ALL BICYCLE LANE PAINTING MARKING, INCLUDING EDGE LINE,
   SHALL BE PAINT.
3. FOR ADDITIONAL INFORMATION REFER TO MANUAL. UNIFORM
   TRAFFIC CONTROL DEVICES. CURRENT EDITION. ALSO, AGRIC GUIDES
   FOR THE DEVELOPMENT OF BICYCLE FACILITIES. CURRENT EDITION.
GENERAL NOTES

1. FORM SHALL BE FULL WIDTH OF LANE.
   (NOT TO EXCEED CENTER LINE OR
   EDGE LINE PAVEMENT MARKINGS INCLUDING:
   IF APPLICABLE, RAISED PAVEMENT MARKERS)

2. SEE SECTION 429 OF THE CURRENT EDITION OF
   THE STANDARD SPECIFICATIONS CONSTRUCTION
   OF TRANSPORTATION SYSTEMS FOR MATERIALS,
   CONSTRUCTION REQUIREMENTS, MEASUREMENT, AND PAYMENT.

3. FORM SHOWN FOR REQUIRED SIZE AND SPACING OF
   RUMBLE STRIPS. OTHER MATERIALS FOR CONSTRUCTION
   OF FORM MAY BE USED AS APPROVED BY THE ENGINEER.

4. THERMOPLASTIC REFLECTORIZED PAVEMENT MARKING
   CONFORMING IN ACCORDANCE TO SECTION 653 MAY BE USED
   IN LIEU OF ASPHALT CONCRETE. THE USE OF THERMOPLASTIC
   SHALL BE APPROVED BY THE DISTRICT MAINTENANCE ENGINEER.
APPENDIX F

BID DOCUMENT CHECKLIST
BID DOCUMENT CHECKLIST FOR OFF-SYSTEM SAFETY PROJECTS
03/18/2014

COVER SHEET
• Name of project
• Project and P.I. numbers
• Include County name in Sponsor line, if the Sponsor is not a county.

GENERAL REQUIREMENTS
• Advertise the project for bid according to requirements of O.C.G. A., Title 32, Chapter 2, excluding that provision which provides for negotiations. The minimum advertising period is at least four weeks before bid opening and one week after the first advertising notice. We recommend the first advertisement be made four weeks prior to bid opening. Sponsors must follow Title 32 and not Title 36 for bidding procedures. No negotiating allowed between opening of bids and execution of the construction contract with the contractor.
• Include a sentence indicating that the GDOT Standard Specifications Construction of Transportation Systems, 2013 Edition, and the Manual on Uniform Traffic Control Devices (current ed.) apply to the contract. Since the Contract Agreements between the Sponsor and the State require the use of the GDOT Standard Specifications, the only additional specifications would be for those items not included in the GDOT Standard Specifications but possibly required by the Sponsor.
• Bidders submitting bids in excess of $2,000,000 must be prequalified with GDOT.
• A bid bond is required. (Section 102.08)
• Performance and payment bonds are required as per Section 103.05. This results in a performance bond of 100% of the contract amount and a payment bond of 110% of the contract amount.
• Add the following sentence as the basis of the contract award: If the Contract is awarded, it will be awarded to the lowest reliable bidder whose proposal shall have met all the prescribed requirements. (Section 103.02)
• Specify how the lowest bidder will be determined if the proposal includes a base bid and alternates. Usually include language such as the low bid will be determined based on the sum of the base bid and any alternates.
• If bidding using unit prices, assure the item list in the proposal matches the detailed estimate in the plans.
• Include a time of period of the contract, usually number of calendar days following the Notice to Proceed with Construction given by the Sponsor to the Contractor.
• Include provision for liquidated damages conforming to Section 108.08.
• Include provision for a preconstruction conference with, at a minimum, the Sponsor, The Contractor, and the District Off-System Safety Coordinator.
• Determine if Davis-Bacon wage rates apply to the project. Davis-Bacon applies unless the project is located off highway right-of-way or if the road is functionally classified as a local road or rural minor collector. If Davis-Bacon applies, include a copy of the current wage rate determination in the proposal. The web site for the wage rates is: http://www.access.gpo.gov/davisbacon/. To find the wage rate determination, select the county in which the project is located and then select HIGHWAY.
• DBE goals are not included in the Sponsor Off-System Safety projects and bid documents at this time but could be included in future projects.
• Include the required contract provisions, which are available from the District Traffic Operations office and/or the District Off-System Safety Coordinator.