Spring 2013

Traffic Technical Training

Locating NO Passing Zones

BUREAU OF TRAFFIC OPERATIONS

Matt Rauch, PE

State Signing Engineer

Bureau of Traffic Operations

Traffic Engineering

(608) 266-0150 or (608) 516-6319 (Cell)

matt.rauch@dot.wi.gov

Contact: Matt Rauch 266-0150

(05) Traffic marking tech - no passing zones

Rewrite section 648 to define prescriptive requirements for locating no-passing zones on horizontal & vertical curves, to specify that survey vehicles run in the center of the driving lane, and to clarify other established procedures.

Replace the entire text with the following:

648.1 Description

(1) This section describes locating and marking both ends of no-passing zones on the pavement surface independently from existing no-passing zones.

648.2 Materials

(1) Furnish paint that will be readily visible for at least one year. Use white on asphalt and black on concrete.

648.3 Construction

648.3.1 Equipment

(1) Furnish two vehicles equipped with two-way communications equipment, full-width flashing yellow light bars with 360 degree visibility, and distance measuring instruments (DMI). Ensure that DMI have an accuracy of at least 10 foot per mile and decrease the measured distance when the vehicle backs up.

(2) Provide a target on the lead vehicle 42 inches above the roadway offering a sharp cutoff when it appears and disappears. Ensure that the observer's eye in the trailing vehicle is 42 inches above the roadway.

648.3.2 Locating No-Passing Zones

(1) Establish no-passing zones where there is inadequate sight distance, at locations the contract specifies, and at engineer-directed special locations. Check with the engineer before beginning work to determine if there are special no-passing zones to mark under the contract.

(2) Survey the roadway by maintaining the no-passing sight distance between the lead and trailing vehicle both traveling in the center of the driving lane. Establish both ends of no-passing zones, to an accuracy of 50 feet, when the target on the lead vehicle disappears from sight. If the no-passing zone is less than 500 feet long, extend the zone to 500 feet by lengthening at its beginning in each traffic direction. Conform to the no-passing zone sight distance requirements as follows:

POSTED SPEED LIMIT	NO-PASSING ZONE SIGHT DISTANCE	MINIMUM DISTANCE[1] BETWEEN ZONES
25 - 30 mph	0.10 miles/528 feet	0.10 miles/528 feet
35 - 40 mph	0.13 miles/686 feet	0.10 miles/528 feet
45 - 50 mph	0.16 miles/845 feet	0.13 miles/686 feet
55 mph	see[2]	0.15 miles/792 feet

[1] If the distance between 2 successive no-passing zones is less than the minimum distance between zones, connect the 2 zones.

[2] The no-passing zone sight distance is specified in the special provisions.

(3) Establish no-passing zones from the inside radius of horizontal curves. Do not allow the line-of-sight to extend outside the shoulder.

(4) Establish no-passing zones for vertical curves on runs made in the northbound or eastbound directions. Stop when the lead vehicle target disappears from sight. Back the lead vehicle up to reveal a full silhouette of the lead vehicle, from the bottom of the bumper up. Reestablish the sight distance by backing up the trailing vehicle to locate the beginning of the no-passing zone.

(6) Establish 500-foot long no-passing barrier lines as the plans show for approaches to the following:

1. Railroad crossings.
2. Bridges that are less than 24 feet wide.
3. Truck climbing, intersection bypass, and passing lanes or other transitions in the number of lanes.
4. Roundabouts and intersections with a stop sign or traffic signal facing traffic on the highway being surveyed.
5. Interchanges and intersections with state trunk highway or U.S. highways.
   - Terminate intersection no-passing barrier lines at stop lines, marked crosswalks, stop signs, or signals. If none of these features are present, terminate at the theoretical stopping point.

(2)

(7) If the contract specifies, also establish no-passing zones on detour routes. Unless the engineer directs otherwise, use state trunk highway criteria to locate no-passing zones on county trunk highways and local roads on the detour route. Base the locations on posted detour speed limits.

(8) In addition to no-passing zones the contract specifies, also establish special no-passing zones where the the engineer directs.

(9) Check the correctness of no-passing zones leading into and out of the project limits. Ensure that the minimum distance between zones and sight distance are correct.

648.3.3 No-Passing Zone Marks

(1) Spray paint T's and dots on the roadway to mark the beginning and end of all no-passing zones. Make T's one foot by one foot with at least a 2-inch wide line with a 3 to 4 inch diameter dot on the centerline adjacent to the T stem.

648.3.4 No-Passing Zone Log

(1) Upon completing the work, furnish the engineer 4 copies of department form DT2124. Locate features to the 1/100 of a mile. For east-west roads, log entries from west to east. For north-south roads, log entries from south to north. Log the following:

- Date of survey.
- Cardinal direction of travel.
- Beginning and ending of each no-passing barrier line in both directions.
- Sight distance and speed criteria for each zone.
- Location of features requiring 500-foot no-passing barrier lines specified in 648.3.2.
- Useful geographical references including but not limited to county and regional boundary lines, county trunk highways, and starts and ends of all bridges.

648.4 Measurement

(1) The department will measure Locating No-Passing Zones by the mile acceptably completed, measured as the actual centerline length of road surveyed and reported to the nearest 1/100 of a mile.

648.5 Payment

(1) The department will pay for measured quantities at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
648.0100	Locating No-Passing Zones	MI

(2) Payment is full compensation for all the work required under this section.

==========

ORIGINATOR Director, Bureau of Traffic Operations		3-2-2
CHAPTER 3	Markings	
SECTION 2	Applications	
SUBJECT 2	No-Passing Zone Standards	

A. General

No-passing zones are marked and signed on state maintained highways to indicate where a driver cannot safely complete a passing maneuver under normal light and weather conditions. In addition to the zones required by inadequate sight distance, certain other conditions warrant short zones or no-passing zone extensions which are marked by no-passing barrier lines. Although sufficient sight distance may be present at these locations, the passing operation is not appropriate under state law or for safety reasons as documented in an engineering study.

Unmarked zones (where passing is allowed) allow the driver to make a decision based on rules of the road and circumstances, such as oncoming traffic, reduced visibility due to fog, low light, rain or smoke, turning traffic, or vehicles entering from side roads or driveways. **No-passing zones *should not* be marked to eliminate all possible conflicts.**

Wisconsin Statute 346.10 allows passing another vehicle in a rural (non-business regional, non-residential regional) intersection, unless the intersection is designated by signals, stop signs, yield signs, or warning signs. Routinely marking zones through minor intersections and/or driveways would significantly reduce legal passing areas available to the driver, increasing non-compliance and unsafe passing in less favorable locations where adequate sight distance may not be available.

B. No-Passing Zone Criteria

No-passing zones **shall** be marked at all locations on the State Highway system that have insufficient sight distance for a vehicle to safely complete a passing maneuver under normal light and weather conditions. **The establishment of these zones shall be based exclusively on the sight distance required for the posted speed and the highway characteristics.**

The following criteria **shall** be used to mark no-passing zones:

SIGHT DISTANCE

Each Region has either a No-Passing Zone Sight Distance Map or spreadsheet listing the sight distance criteria on The State Trunk Highways. Either is available from your Regional Traffic Section. Typical sight distances are shown in the following table, but other criteria such as ADT or geometrics *may* change or alter those requirements.

Speed Limit	Sight Distance	Min. Between Zones
25 or 30 MPH	0.10 mile	0.10 mile
35 or 40 MPH	0.13 mile	0.10 mile
45 or 50 MPH	0.16 mile	0.13 mile
55 MPH	0.21 mile(see notes below)*	0.15 mile

* When authorized by the designated Regional Signing/Marking Engineer, the 55 MPH spotting sight distance ***may*** **be increased from 0.21 to 0.26 miles** on certain higher volume highway segments, due to higher frequency of crashes and/or a demonstrated history of excessive speeding above the posted limit.

* When authorized by the designated Regional Signing/Marking Engineer, the 55 MPH spotting sight distance ***may*** **be decreased from 0.21 to 0.16 miles** on certain lower volume highway segments with poor alignment that significantly reduces safe passing opportunities. Factors to be considered include:

- Current high percent of solid yellow with concern for driver compliance
- Adequate lane and shoulder widths
- Infrequent intersections and access conflicts
- Lower ADT with minimal congestion and traffic peaks
- Lower prevailing speeds
- Greater speed differentials due to large agricultural machinery, heavy trucking, significant tourism traffic and sightseers, etc.
- Below average crash history

The specific characteristics and factors leading to the increase or decrease of the spotting sight distance from the DOT 55 MPH standard of 0.21 mile, *should* be documented in the Region.

C. Marking No-Passing Zones

The following process **shall** be used when actually spotting the roadway:

1. MARKING AND ESTABLISHING NO PASSING ZONES

   An odometer or other measuring device **shall** be adjusted to have an error of no more than 0.01 mile in 2.00 miles.

- When a depression is encountered following a vertical crest the crew *should* anticipate a blind spot and check to see that the terminus of the zone allows for it.
- The beginning and end of all no-passing zones **shall** be marked on the roadway by the marking of T's and dots with white spray paint (for asphalt) and black spray paint (for concrete). T's **shall** be 12" X 12" and 2" stroke. Dots **shall** be 3" - 4" in diameter. The material used to mark the road **shall** be durable enough to be readily visible for one year after application.
- The termini of no-passing zones **shall** be spotted to an accuracy of +/- 50 feet (0.01 mile).
- When the distance between two successive no-passing zones is less than the minimum distance shown in the table, the two zones **shall** be connected.
- On horizontal curves, no part of the line of sight **shall** extend outside the shoulder. No passing zones **shall** be located and marked on the inside radius of horizontal curves. If the horizontal curve requires a No Passing Zone, the starts and ends of the zones **shall** be recorded in the cardinal direction. On vertical curves, whenever the target light disappears from sight, the lead vehicle **shall** back up to reveal a full silhouette of the rear of the car (from the bottom of the bumper up) and then establish sight distance between the 2 vehicles before marking the roadway.
- If the vertical sight distance is interrupted for a distance less than 500 feet in length, the zone *should* be extended to 500 feet by lengthening the zone at its beginning for each direction of traffic.

2. EQUIPMENT

Use vehicles that place the observer's eye 42 inches above the roadway. The height of the observer's eye and the target used in determining no-passing zone termini **shall** be 42 inches. Care must be taken so that whatever type of target is used, illuminated or not, the 42 inch height point offers sharp cutoff when it disappears and appears.
At the ends of a highway section, the spotters **shall** check the correctness of the no-passing zones leading into and out of the project limits.

3. RECORDING OF NO PASSING ZONES

The WisDOT Standard No Passing Zone Log (form DT2124) shall be used to record the No Passing Zones. Include the following data on the No Passing Zone Log Sheets:

- Date of survey on each sheet.
- County and Route that locating is being performed.
- The cardinal direction of travel (for east west roads, record in the easterly direction, for north south roads, locate in the northerly direction).
- All starts and ends are logged in miles to the nearest $1/100^{th}$ of a mile.
- The beginning and ending of each no-passing zone barrier line in both directions.

- The sight distance and speed criteria for each zone.
- The location of landmarks (intersecting U.S., State and County trunk highways, bypass lanes, truck climbing lanes, passing lanes, county boundary lines, railroad crossings, starts and ends of bridges and regional boundaries).

D. No-Passing Barrier Line Criteria

1. No-passing barrier lines, 500 feet in length, **shall** be marked on an undivided STH approach in the following intersection situations:

   - The STH traffic is controlled by a stop sign.
   - The intersection with the STH is controlled by a signal.
   - The intersection with the STH is controlled by a roundabout.
   - At a T-intersection with a standard bypass lane that allows vehicles proceeding straight to pass to the right of a left turning vehicle without leaving the paved portion of the highway as per SDD 15C8-b, a 500-foot barrier line **shall** be installed prior to the start of the bypass taper.

2. A no-passing barrier line **shall** be marked in the following non-intersection situations:

   - In advance of a divided highway. The marking configuration **shall** extend a barrier line 500 feet in advance of the island or median nose so passing is prohibited entering into the divided highway. This is illustrated on the Standard Detail Drawing titled "Signing and Marking For Two Lane to Four Lane Divided Transitions", located in the Facilities Development Manual. (SDD 15C21)

   - In advance of a painted median island. The marking configuration **shall** extend a barrier line 500 feet in advance of the separation of the double yellow center line. This is illustrated on the Standard Detail Drawing titled "Median Island Marking", located in the Facilities Development Manual. (SDD 15C18)

   - Bridges having a width less than 24 feet. The marking **shall** include a 500 foot barrier in advance of the actual structure as shown on the Standard Detail Drawing titled “Traffic Control Devices for Two-Lane Bridges”, located in the Facilities Development Manual. (SDD 15C6)

   - Railroad grade crossings. The barrier line **shall** be placed 500 feet prior to each approach (unless markings are not required, as provided in the WMUTCD). The configuration of the marking is shown on the Standard Detail Drawing titled “Pavement Marking Details for Railroad-Highway Grade Crossings” and located in the Facilities Development Manual. (SDD 15C9)

- Passing Lanes. The pavement marking configuration **shall** extend a barrier line 500 feet in advance of the beginning of the taper. This is illustrated on the SDD 15C8-c and SDD 15C8-d, "Pavement Marking (Climbing Lane & Passing Lane)", located in the Facilities Development Manual. A bypass lane for an intersection is **not** considered a passing lane under this guideline.

- Truck Climbing Lanes. The pavement marking configuration **shall** extend a barrier line 500 feet in advance of the beginning of the taper. This is illustrated on the SDD 15C8-c and SDD 15C8-d, "Pavement Marking (Climbing Lane & Passing Lane)", located in the Facilities Development Manual.

- Undivided 4 lane roadways. Any stretch of roadway with this configuration **shall** have the opposing lanes designated by a barrier line for its entire length and **shall** have barrier lines of 500 feet in length on the approaches to this section.

3. No-passing barrier lines *may* be marked with the approval of the designated Regional Signing/Marking Engineer in the following situations. When marked, they *should* be documented in the Region.

   - At any intersection when justified by an engineering study. Appropriate reasons include a crash history related to passing maneuvers or demonstrated operational problems. The 500-foot barrier line would end at the near edge line of intersecting road and *may* be placed in only one direction based on operational need. This is illustrated on the SDD 15C8-13b, "Pavement Marking (Intersections)", located in the Facilities Development Manual.

   - In low speed urban areas, double yellow barrier lines *may* be placed when justified by an engineering study. Criteria for the engineering study include curb and gutter, reduced speed, parking allowed, poor stopping sight distance, closely spaced driveways or intersections, and high pedestrian volumes. The double yellow lines *should* be installed from the start of the curb and gutter to the end of curb and gutter through the urban area. When urban double yellow lines are used, 500-foot barrier lines **shall** be placed on the approaches to this special layout, unless a longer no-passing zone takes precedence.

   - At a T-intersection with roadway pavement that allows vehicles proceeding ahead to legally pass to the right of a left turning vehicle without leaving the paved portion of the roadway, a 500-foot barrier line prior to the start of the bypass taper will be optional based on engineering judgment.

E. Marking No-Passing Barrier Lines

Barrier lines, as designated above, **shall** have a minimum length of 500 feet.

On State Trunk Highway approaches with stop or signal control, the barrier line would end at the stop line, theoretical stopping point or marked crosswalk. Each approach on the State Trunk Highway *should* be considered separately.

Barrier lines **shall** be connected into adjacent no-passing zones when there is less than minimum distance between zones, as described in the NO-PASSING ZONE CRITERIA section of this policy.

Where allowable barrier lines are justified, the traffic engineer **shall** give the crew locating no-passing zones specific directions as to where barrier lines are to be placed.

F. Signing

A No-Passing Zone pennant sign (W14-3) **shall** be installed as required in TGM 2-3-38, supplementing zones established under this guideline. This sign **shall** be placed no more than 50 feet from the start of the no-passing barrier line unless it's impossible due to location on a bridge deck or other exception.

Sign quantities for moving the existing W14-3 sign **shall** be paid for separately and listed in the Permanent Signing Miscellaneous Quantities Sheet in the plan. If moved, the sign location **shall** be based on placement of the beginning of the revised no passing zone.

NO PASSING ZONE LOG

Wisconsin Department of Transportation
DT2124 2/2013

Page _____ of _____

County		Ending
Highway	From	Crew Chief
Date (m/d/yy)	To	Assistant

DIRECTION OF SURVEY

North: East:

SIGHT DISTANCE	RESTRICTED SIGHT DISTANCE BEGIN	RESTRICTED SIGHT DISTANCE END	TIE POINT	LOG MILE	RESTRICTED SIGHT DISTANCE BEGIN	RESTRICTED SIGHT DISTANCE END	COMMENTS

(10)

NO PASSING ZONE LOG

Wisconsin Department of Transportation
DT2124 2/2013

County		Ending
Jackson		
Highway	From	Crew Chief
USH 12	West Construction Joint	J.L.E.
Date (m/d/yy)	To	Assistant
10/10/12	Monroe County Line	M.R.R.

DIRECTION OF SURVEY — North: | East: X

SIGHT DISTANCE	RESTRICTED SIGHT DISTANCE BEGIN	RESTRICTED SIGHT DISTANCE END	TIE POINT	LOG MILE	RESTRICTED SIGHT DISTANCE BEGIN	RESTRICTED SIGHT DISTANCE END	COMMENTS
16			Const. Joint	0.00			
	0.00	0.08					
21			55 speed zone	0.11			
	0.45	0.62			0.24	0.41	Extend Zone
	0.86	1.13			0.65	0.92	
	2.06	2.23			1.85	2.02	Extend Zone
	2.92	3.11			2.71	2.90	
	4.23	4.39			4.02	4.18	Extend Zone
	4.78	4.99			4.56	4.78	
	5.20	5.38			4.99	5.17	
	6.09	6.19			5.88	5.98	New Zone
	6.71	7.44			6.50	7.23	
	7.60	8.17			7.39	7.96	
	9.79	9.90			9.58	9.69	New Zone
	10.14	10.26			9.93	10.05	
16	10.87	11.35	45 speed zn.	11.22	10.66	11.19	
			CTH O	11.42			
			CTH O	11.61			
21			55 speed zone	11.93			

permanent marking.

Removable tape is similar to non removable reflectorized tape but has the capability of adhering to the pavement throughout the construction season under all climatic and traffic conditions and then being easily removed intact or in large pieces, without residue and without grinding, blasting, or solvents. Its greatest use is on surface courses where revisions in traffic flow are necessary and where removal must be easily and quickly accomplished without a trace.

Black removable tape is used to cover pre-existing pavement marking. Reflectorized paint is commercial traffic marking paint that obtains reflectorization through dropping or spraying glass beads onto the paint. It's greatest use is on binder or lower courses, other surfaces which will be covered or removed, or when the temporary marking location coincides with the location of the future permanent marking.

Temporary raised pavement markers supplement temporary pavement marking lines in shifts, crossovers, temporary lanes, and bypasses where wet reflective removable tape is not being used, especially on higher-speed roadways.

Wet reflective removable tape is used alone as temporary pavement marking lines in shifts, crossovers, temporary lanes and bypasses.

6-50.1.3 Same Day Pavement Markings

For marking location conform to standard spec 646.3.1. For epoxy materials conform to standard spec 646.2.4. For high contrast raised patterned tapes or 4 inch raised patterned tapes conform to the contract special provisions materials subsections.

Same day pavement markings are only for centerlines, including no-passing zones on the upper surface layer placed on conventional two-lane highways that are open to all traffic and that have surfaces capable of retaining markings. These markings are placed the same day the existing markings are obliterated or when the upper surface layer is placed.

6-50.2 Equipment

1. Solventborne and Waterborne Acrylics

   These are normally applied with truck-mounted equipment. The paint is heated to a temperature recommended by the manufacturer. The heat should be uniformly maintained during the application operation. Continuous mixing and agitation should be provided. The paint tank should have a calibrated dipstick for measuring the quantity of paint.

2. Epoxy

   This material is generally sprayed on at temperatures according to manufacturer recommendations. Relief valves and an automatic thermostat are to be provided to maintain a constant temperature level through all applicator components and to prevent overheating and possibility of explosion. A means for continuous mixing and agitation is to be provided.

3. Glass Beads Dispenser

   This unit must be equipped with an automatic cutoff synchronized with the cutoff for the marking material.

Non-removable reflectorized tape is commercial traffic marking tape. It usually requires extensive effort to remove it by blasting, grinding, heating, burning or solvents, and may leave a detrimental residue. It is unsuitable for use where the markings or residue from its removal will mislead traffic. It is generally not used on surface courses, except at specific described locations. Its greatest use is found on binder or lower layer courses, or other surfaces to be covered or removed.

6-50.3 Locating Pavement Markings

Pavement markings are to be located by the contractor as the plans show, by special provisions, or as directed by the engineer.

The manager should review the proposed locations prior to the markings being applied. Questions may be directed through the engineer to the region traffic engineer. The engineer's review should include material types, colors, locations, widths, width tolerances, positioning tolerances, sequencing or staging, special installations and omitted markings that may require change orders.

Standard spec 648.3.2 states the procedure for submitting spotting log sheets to construction personnel. Two of the three copies should be forwarded to the Bureau of Highway Operations by the region.

6-50.3.1 Locating No Passing Zones

Locating No Passing Zone Checklist based on standard spec 648:

1. The project personnel responsible for inspecting the marking should contact the Regional Pavement Marking

Coordinator for special zones at least one month before spotting takes place. Are there any special zones and have they been placed according to the project special provision?

2. Have the two spotting contractor personnel report to the project engineer prior to work.
3. Is the required equipment as per 648.3.1(3) on the spotting vehicle?
   - 2 vehicles that place the observer's eye height at 42" above the pavement?
   - A target light mounted at 42" above the roadway and offers a sharp cut off when it disappears and reappears. Example would be a flashing light.
   - Are both vehicles equipped with:
     - Warning lights.
     - Distance Measuring Instruments, accurate to 52 feet in 2 miles per spec. Ability to subtract when traveled in reverse.
     - Two- way communication between vehicles.
     - Slow moving vehicles emblem.
4. Are the spotting marks legible and durable? Is the backup lath placed away from any construction activity?
5. Are barrier lines located according to standard spec 648.3.2 and the plans?
6. Are the no-passing zones leading into and out of the project limits correct, according to standard spec 648.3.2?
7. Is the line of sight within the shoulder, avoiding future vegetation growth or obstructions?
8. Is the minimum distance between the zones available or do the zones need to be closed?
9. Did the spotter hand over 4 copies of the spotting log with the following items?
   - Speed criteria stated?
   - The direction of spotting and the location of permanent landmarks such as side roads?
   - Locating features to the 1/100 of a mile for each road surveyed.
   - The beginning and ending of each no-passing barrier line in both directions.
10. Hand over 3 copies of the spotting log to the Regional Pavement Marking Coordinator.

http://dotmedia.wi.gov/main/Viewer/?peid=52779d79ab1f4c14a77988dc54c200ea

A video is available from the regional pavement marking coordinators that shows examples of errors found in the field:

1. Carry Over – When the distance between the ending of a no passing zone and the beginning of a zone on the same side of the road falls below a minimum distance. The zone is then painted shut and called a carryover.
   - The minimum distance/points between zones is the following:
   - 25 to 40 mph is 528 feet or 10 points.
   - 45 to 50 mph is 686 feet or 13 points.
   - 55 mph is 792 feet or 15 points.
2. Bypass line is not marked with a carry over.
3. Curve – there are 2 examples pertaining to line of sight on curves looking across the right of way. We assume that the spotting was done before the grass had grown back, and this is why the line-of-sight is not to extend outside the shoulder.
4. Line of Sight – 2 examples.
5. Dips in the Road – 3 examples.

6-50.4 Application

6-50.4.1 Permanent Markings

The approved types of pavement marking materials are to be placed at or above the following minimum pavement temperatures, expressed in degrees Celsius, and the following minimum initial wet thicknesses, expressed in mils, unless a rate of application is provided for in the contract:

(2) On the day the signs are to become operational, have a representative familiar with the operation and repair of the signs available at the project site. The representative shall remain available until all signs are operating satisfactorily.

D Measurement

(1) The department will measure Traffic Control Signs Portable Changeable Message per each unit complete per day.

(2) Any day in which the changeable message boards are not working properly for more than 6 hours will result in one day being deducted from the quantity measured for payment, plus an additional $100 that the contractor will be liable to the department.

E Payment

(1) The department will pay for measured quantities at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
643.1050.S	Traffic Control Signs Portable Changeable Message	Day

(2) Payment is full compensation for furnishing, maintaining and installing the complete unit; and for furnishing all labor, tools, equipment, services and incidentals necessary to complete the contract work.

(100906) 643-050

27. Locating No-Passing Zones, Item 648.0100.

For this project, the spotting sight distance in areas with a 55 mph posted speed limit is 0.21 miles. (051206) 648-005

28. Construction Staking Subgrade, Item 650.4500.

Conform to standard specification 650 as modified in this special provision.

Replace standard specification 650.3.3 with the following:

650.3.3 Subgrade

650.3.3.1 General

(1) Under the Construction Staking Subgrade bid item the contractor may substitute global positioning system (GPS) machine guidance for conventional subgrade staking on all or part of the work. The engineer may require the contractor to revert to conventional subgrade staking methods for all or part of the work at any point during construction if, in the engineer's opinion, the GPS machine guidance is producing unacceptable results.

650.3.3.2 Subgrade Staking

(1) Set construction stakes or marks at intervals of 100 feet, or more frequently, for rural sections and at intervals of 50 feet, or more frequently, for urban sections. Include additional stakes at each cross-section as necessary to match the plan cross-section, achieve the required accuracy, and to support construction operations. Also set and