



MEMORANDUM

TO: All District Engineers

DATE: November 9, 2005

FROM: Carlos A. Lopez, P.E.

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SUBJECT: TxTAP Work Zones

On October 21, 2005, TRF asked for comments concerning the new Work Zone Category on the Texas Traffic Operations Assessment Program. We received responses from 7 districts. The Work Zone categories of the FY 2006 Consistency Guide and Minimum Requirements (**attached changes denoted in red**) were revised based upon these comments.

Also, the percentages used to calculate Traffic Operations Overall score were revised. The FY 2006 TxTAP Traffic Operations Overall score will be calculated using the following percentages (**changes from FY 2005 percentages denoted in red**):

Component	Element	Element Score
Roadside Signs (27%)	Approach Signing	6%
	Departure Signing	4%
	Sign Reflectivity	6%
	Breakaway	3%
	Sign Height	4%
	Lateral Placement	2%
	Message & Panels	2%
Delineators & Object Markers (18%)	Delineation	5%
	Barrier Markers	5%
	Object Markers	4%
	Mailbox Markers	4%
Striping		20%
RPMs		10%
Shoulder Texturing		5%
Railroad Crossing (5 %)	Warning Signs	3%
	Pavement Markings	2%
Signals (10%)	Operation	3%
	Faces	4%
	Pedestrian Elements	2%
	Maintenance	1%

Work Zones (5%)	WZ Speed Limits	1%
	Signs/ Arrow Panels/ PCMS	1%
	Channelizing devices/ delineation	1%
	Pavement Markings	1%
	Barricades	1%
Overall		100%

If you have any questions or need additional information, please feel free to call Darren McDaniel at (512) 416-3331 or me at (512) 416-3200.

Attachments

cc: Administration
District Traffic Engineers
Zane Webb, P.E., MNT
TTA

2006 TxTAP Consistency Guide

November 9, 2005

Category	+ 1	+ 0.5	3.0	- 0.5	- 1	- 2
Roadside Signs						
Approach Signing		Good guide signing	In accordance with Chapter 4 of Sign Crew Field Book	Signing out of sequence Sign too close / far from intersection	Missing required sign Incorrect sign	
Departure Signing		Good guide signing	In accordance with Chapter 5 of Sign Crew Field Book	Signs in no sign zone Confirmation too far (> 2 miles from int.) Signing out of sequence	Confirmation missing	
Sign Reflectivity	Very bright signs New signs (2004 - 2005)	Good high intensity / prismatic sheeting Bright sign(s) New signs (2003)	No faded signs Letters/ plaques legible	Faded / dirty sign(s) Damaged sign(s) Buttons on large sign(s)	50-99% faded / dirty	100% faded / dirty
Breakaway			All breakaway w/ < 4" stub height	Non-breakaway sign(s) Stub height(s) > 4"	50-99% non-breakaway	100% non-breakaway
Sign Height			All signs 7' & straight	Twisted / leaning sign(s) Sign(s) < 7'	50-99% twisted / leaning 50-99% signs < 7'	100% twisted / leaning 100% signs < 7'
Lateral Placement			No signs too close	Sign(s) too close Too far from roadway Tree blocking sign(s)	50-99% signs too close	100% signs too close
Messages and Panels			In accordance with TxMUTCD and Sign Crew Field Book	Signs spaced too closely Bad message Missing sign panel Wrong color	Exit panel wrong side Advance text different than exit text	

2006 TxTAP Consistency Guide

November 9, 2005

Category	+ 1	+ 0.5	3.0	- 0.5	- 1	- 2
Delineators & Object Markers						
Delineation	Very bright del / chev	Chevrons on curve Delineators on < 25 curve (Non-Freeway) Bright del / chevrons Bi-directional del/chev	Delineators on ramps and freeway curves Non-freeway curve w/RPMs	Faded / missing / incorrect / damaged delineator(s)	No delineation on ramp No delineation on freeway curve	
Barrier Markers	Bright barrier markers BMs present on bridge rail and guardrail	Bi-directional BMs present on guardrail	OMs on barrier	Faded / dirty OM / BM Damaged OM / BM Wrong color BM		No OMs and BMs
Object Markers	Very bright OMs	Bi-directional OMs Bright OMs	OM at culverts, trees, etc	Faded / incorrect / leaning / damaged OM	Missing OM	
Mailbox Markers	Very bright mailbox markers	Bi-directional markers Bright mailbox markers	OM on all mailboxes	Faded / incorrect / damaged/ unmarked mailbox marker(s)	50-99% mailboxes unmarked	100% mailboxes unmarked
Striping						
Present & Reflective	Very bright	Bright	Visible w/ minimal wear	Faded / dirty Guidemarks / tabs Broken ylw in dbl. ylw Thin stripe / bad retrace TW> 20' w/o white edge Some paving / crack seal over stripe	Very faded Excessive paving / crack seal over stripe	No striping Wrong color
RPM						
Present & Reflective	Very bright w/ 0% missing	Bright	< 10% missing / non-reflective	10-49% missing / sunken/ non-reflective Double RPMs	50-99% missing / sunken / non-reflective	No RPMs
Shoulder Texturing						
Shoulder Texturing		Milled-in or rolled-in on rural 4 lane divided roadway	Profile marking or buttons on rural 4 lane divided roadway		No shoulder texturing on rural 4 lane divided roadway	

2006 TxTAP Consistency Guide

November 9, 2005

Category	+ 1	+ 0.5	3.0	- 0.5	- 1	- 2
RR-Crossing						
Warning Sign	Automated flashers Very bright	Enhanced signing Bright	Reflective	Faded / damaged / incorrect sign	Missing	
Pavement Markings	Very bright	Enhanced markings Bright Present w/speed limit <40 mph	Visible with minimal wear	Faded / dirty Not across from sign	Missing (≥ 40mph)	
Signals						
Operation		Uninterruptible Power Supply (UPS) VIVDS Spread spectrum radio TS-2 Controller	Efficient traffic signal operation	Ped indication w/o pushbuttons Inefficient use of memory on/lock calls Inefficient use of min green (>10 sec) Inefficient use of communication equipment (Clock > 5minutes off) Isolated Fixed Time	Inefficient use of vehicle detection devices Inefficient use of min recall Inefficient use of max recall Inefficient use of min green (>20 sec) Inefficient use of communication equipment (clock off)	
Faces	LEDs (All Heads)	Some LEDs Good back plates	Proper mounting	Mounted too high / low Mounted too far / close No sway cable (no LED)	No sway cable (w/ LED) Dark spot on lens Damaged head / visor	Indication out
Pedestrian Elements		LED ped heads Bright crosswalks / stop bars	Stop bars	Faded crosswalks / stop bars Ped indication faded/ out Small push buttons Faded / missing sign for push button Some stop bars missing	No stop bars	
Maintenance		Clean cabinet / neat wiring	Filter present		Missing filter	

2006 TxTAP Consistency Guide

November 9, 2005

Category	+ 1	+ 0.5	3.0	- 0.5	- 1	- 2
Work Zones						
Speed Zone		Enhanced sign (WZ Plaque, Orange Border etc.) Supplemented by PCMS/ Speed Trailer Signs spaced < 1/2 max spacing	Proper Use of Construction Speed Zones Signs covered when not necessary Regular posted speed appropriate (no Construction Speed Zone)	Signs spaced > 2 miles apart (40 mph >) 1 mile apart (35 mph <) Speed transition > 15 mph No commission minute or city ordinance	Speed limit posted when conditions don't warrant	
Signs / Arrow panels / PCMS	Very bright signs	Good high intensity / prismatic sheeting Bright sign(s)	Letters/ plaques legible All breakaway All signs 7' & straight No signs too close In accordance with TxMUTCD and Standard Sheets	Faded / dirty sign(s) Damaged sign(s) Non-breakaway sign(s) Twisted / leaning sign(s) Sign(s) < 7' Sign(s) too close Too far from roadway Tree blocking sign(s) Signs spaced too closely Bad message / Non-applicable sign(s) Missing sign panel Wrong color Incorrectly covered sign Sign laid down/turned Type A warning light with Type E sheeting Wooden posts not white PCMS/Arrow Panel with less than 4 drums or barrier PCMS/Arrow Panel bulbs out	50-100% faded / dirty 50-100% non-breakaway 50-100% twisted/leaning 50-100% signs < 7' 50-100% signs too close PCMS/Arrow Panel without channelizing devices or barrier Missing at required location	

Category	+ 1	+ 0.5	3.0	- 0.5	- 1	- 2
Work Zones						
Channelizing Devices / Delineation	Very bright barrels, cones, etc.	Bright barrels, cones, etc. Good use of barrier delineation	Devices properly aligned and spaced In accordance with TxMUTCD and Standard Sheets	Faded / dirty / incorrect barrels, cones, etc. Damaged barrels, cones, etc. Improper flagging operation	50-100% faded / dirty Cones with no reflective sheeting used at night Untreated Concrete Traffic Barrier	
Pavement Markings	Very bright	Bright	Visible w/ minimal wear	Faded / dirty Thin stripe Some paving over stripe Poor removal of striping Tabs/buttons worn or missing 10%-49%	Very faded Excessive paving over stripe Tabs/buttons worn or missing 50%-99%	Wrong color No pavement markings or tabs (unless signed)
Barricades	Very bright	Bright	In accordance with TxMUTCD, CWZTCD and Standard Sheets	Faded / dirty barricade(s) Damaged barricade(s) Incorrect position / color / size / stripe direction / ballast	Sign / warning device mounted on barricade Missing at required location	

Meets Requirements Standards

SCFB- Sign Crew Field Book

SMV- Signs and Markings Volume of the Traffic Operations Manual

TMUTCD- Texas Manual on Uniform Traffic Control Devices 1980

Compliant Work Zone Traffic Control Devices list (CWZTCD)

Roadside Signs:

Approach Signing-

- SCFB Chapter 4, “Approach Placement”

Table 4-1. Approach Placement Distances

Type of Sign	High Speed (45 mph >)	Low Speed (40 mph <)
Highway Intersection*	1950-2125	1570-1700
Junction Assembly**	1625-1800	1300-1430
Advance Turn Assembly**	1300-1475	1050-1180
Advance Traffic Control*	975-1150	790-920
Destination Sign*	650-825	520-650
Directional Assembly	6-50/Alt.	6-50

*Optional ** Must use Junction and/or Advance Turn

Departure Signing-

- SCFB Chapter 5, “Departure Placement”
 - No Sign Zone (0-200 ft from intersection) with exceptions (SCFB 5-6)
 - Route Confirmation (200-325 ft from intersection)
 - Speed Limit (if different than speed limit on any approaches)

Departure Placement Distances

Type of sign	Distance
Confirmation	200 ft
Speed Limit	≥ 325 ft confirmation
Guide Sign *	≥ 325 ft from speed limit or confirmation

*Optional

Sign Reflectivity-

- Background is Clean with High Intensity or Prismatic (Overhead Signs) Sheeting
- All lettering is reflective and the message is clearly legible
- All shields reflective and able to determine type and number of highway
- No removable copy (buttons) on large signs
- Sign panel is not damaged (missing corner, etc.)

Breakaway-

- SMV Chapter 3 and SMD Standard Sheets
 - Fiberglass Reinforced Plastic Anchor (max 16 ft²)
 - Universal Anchor System
 - Breakaway Pipe Collar Coupling
 - Triangular Slip Base
 - Driveable Support (wedge)
 - Franklin Industries “Eze-Erect”
 - Maximum 4” stub height
 - No wing channel posts

Sign Height-

- SCFB Chapter 3, “Lateral Placement and Height”
 - Mounting height of 7’ from roadway (except overhead)
 - Sign structure is straight and perpendicular to travel way

Lateral Placement-

- SCFB Chapter 3, “Lateral Placement and Height”
 - 12 ft from edge of travel lane
 - 6 ft from edge of pavement
 - 5 ft from guardrail
 - 2 ft from curb
 - As far as practical (when lateral restrictions exist)

Message and Panels-

- In accordance with TMUTCD, SCFB & SMV
 - Advance guide signs have same exact text as exit sign
 - Exit panels mounted on right side for right exits and left side for left exits
 - Sign faces and text/ symbols proper color
 - ◆ Regulatory (White, Red, Black)
 - ◆ Warning (Yellow)
 - ◆ Guide (Green)
 - ◆ Motorist Services (Blue)
 - ◆ Recreation (Brown)
 - ◆ Construction (Orange)
 - Correct sign spacing

Delineators and Object Markers

Delineation-

- Delineator Placement on Horizontal Curves - SCFB (Chapter 7, Section 3)
 - 2-8 feet from edge of pavement
 - 4 to 4.5 foot mounting height (3’ to 4’ on standard sheets)
 - Spaced 20 to 300 foot apart
 - 3 delineators in the straightaway portion leading into and out of the curves
- D-SW on right/ one side for curves/ ramps on freeways or expressways

Barrier Markers-

- Barrier Reflectors - SCFB (Chapter 7 Section 4&5)-
(*MBGF, Concrete Barriers, Bridge Rail*)
 - Delineators and/or barrier reflectors may be used (except on freeway curves)
 - Minimum of 3 delineators or barrier reflectors when used
 - Maximum spacing of 100 feet between delineators or barrier reflectors when used
 - End where guardrail flares away from roadway when used
- Barrier Object Markers - SCFB (Chapter 7, Section 2 & 5)-
 - [Type 3] Narrow Bridge with or without guardrail
 - [Type 3] Full width bridge without guardrail
 - [Type 3] Guardrail (Single Guardrail Terminal (SGT))
 - [Type 2] Full width bridge with guardrail
 - [Type 2] Guardrail (turndown)

Object Markers-

- Object Markers are right color
- [Type 2] Object Markers at culverts, trees, etc.

Mailbox Markers-

- Type 2 Yellow Object Markers on all Mailboxes (SCFB 8-17)
 - Series of three 3" reflectors
 - 6" X 12" marker with reflective sheeting
 - 12" strip of sheeting

Striping:

- Visible with minimal wear
- Proper width and colors used
- Proper spacing between double stripes, broken lines, etc
- Centerline on all roadways (SMV 10-14)
- White edge lines on all roadways with a traveled way > 20 feet (SMV 10-17)
- No broken yellow in between double yellow centerline
- Old guidemarks removed
- Retrace completely over old stripe
- No paving / crack seal over striping
- Tabs removed after striping in place

Raised Pavement Markings

- Visible with minimal wear
- Proper colors used
- Old RPMs removed to keep spacing consistent
- Position guidance at a minimum used on all roads except on Caprock (SMV 10-14)

Shoulder Texturing

- Four lane divided rural highways
- Milled or rolled in, buttons, profile pavement markings, jiggle bars (not encouraged)

Railroad Crossings

RR Crossing Warning Signs-

- Railroad Crossing Advance Warning (Black on Yellow) signs are present and reflective

RR Crossing Pavement Markings-

- RRxing pavement markings are visible with minimal wear (≥ 40 MPH)
- RRxing pavement markings are directly opposite the advance warning sign

Signals

Signal Operations-

- Coordinated System
- Vehicle detection (Loops)
- Push buttons (if Pedestrian Heads are present)

Signal Faces-

- Correct arrangement with 12" lenses
- No dark spot on lenses
- 15 to 19 foot mounting height
- Between 40 and 150 feet from stop bar
- Span Wire Signals controlled by sway cable

Pedestrian Elements-

- Pedestrian pushbuttons proper size with crossing sign
- Crosswalks visible with minimal wear if present
- Stop bars present and visible with minimal wear
- No dark spot on pedestrian lenses

Signal Maintenance-

- Filter in cabinet
- Wires maintained

Work Zones

Speed Zone-

- Speed zone posted in area of work
- Conditions warrant speed reduction (BC (3)-03)
- Signs covered when not necessary (BC (3 & 4) -03)
- Regular posted speed appropriate for conditions (BC (3)-03)
- Speed transition ≤ 15 m.p.h. (Procedures for Establishing Speed Zones 3-20)
- Speed limit sign spacing frequency
 - 40 m.p.h. > .2 – 2 mi.
 - 35 m.p.h. < .2 – 1 mi.
- Commission minute or city ordinance passed for work zone speed limit.

Signs / Arrow panels / PCMS-

- Work Zone Signs
 - **Message is clearly legible (BC (4)-03)**
 - Sign faces proper color and reflective
 - All lettering uppercase
 - Non-applicable signs properly removed or covered.
 - No signs on skids turned 90° to roadway.
 - Signs on square metal tubing may be turned 90°.
 - No burlap used to cover signs.
 - Sign panel not damaged (missing corner, etc.)
 - TY A warning lights not used with TY E fluorescent sheeting.
 - Mounting height 7 ft. – 9 ft. (Long term), 1 ft. – 2 ft. (Short term) (BC (4)-03).
 - Lateral placement (Long term) (BC (4)-03)
 - 12 ft. from edge of travel lane
 - 6 ft. from edge of pavement
 - 2 ft. from curb
 - Sign supports straight, plumb and perpendicular to travel way (BC (4)-03)
 - All signs breakaway (BC (5)-03)
 - No more than 2 posts within a 7 ft. circle
 - 4 inch max stub height for wing channel and square metal tubing supports
 - No nails used to attach signs to wooden supports
 - Drilled holes required for 4" X 6" posts
 - Correct type of sign support weights when used (no rocks, concrete, steel, etc. (BC (4) – 03)
 - All sign posts are single piece (no splices)
 - Wooden sign posts painted white
- Arrow Panels (BC (6) – 03, TMUTCD 1998 Part VI Reprint)
 - Used for lane closures on multilane roadways
 - Not used on two-lane two-way roadway for one-way operation (**except in caution mode**)
 - Not used on multilane roadway to laterally shift traffic
 - Minimum mounting height of 7 ft. from roadway (except for vehicle mounted panels)
 - Located behind channelizing devices when in use
 - Removed from right-of-way or behind concrete traffic barrier when not in use
 - Correct panel display for application
 - **Bulbs and dimmers working properly**
- PCMS (BC (6) – 03, TMUTCD 1998 Part VI Reprint)
 - No scrolling text or flashing messages
 - No message splitting, each message must be understood by itself
 - Maximum of 2 phase message
 - **Correct abbreviations used**
 - **Bulbs and dimmers working properly**
 - Minimum mounting height of 7 ft. from roadway
 - Minimum of 4 plastic drums perpendicular to traffic on upstream side of PCMS when not behind concrete traffic barrier.

Channelizing Devices / Delineation-

- TY C delineators for concrete traffic barrier and attenuators are correct color (BC (6) -03)
 - 40 ft. maximum spacing on CTB
 - 20 ft. maximum spacing on Low Profile Concrete Barrier (LPCB)
 - End treatment on CTB
 - Minimum of 3 delineators on end treatments

- Channelizing devices properly aligned and spaced (BC (8) – 03)
 - Plastic drums and cones(BC (7&9)-03, CWZTCD)
 - Drums have minimum reflective orange/white/orange/white stripes
 - No plywood, aluminum or metal sign substrates used on drums
 - No **open top** or metal drums used as channelizing devices or sign supports
 - Only steady burn warning lights used in a series for delineation
 - No warning lights mounted on drums together with signs, VPs, or chevrons
 - Mailboxes may be mounted on drums in accordance with CWZTCD- Section K
 - All cones used during nighttime have 2 reflectorized bands
 - Edgeline channelizers have 4 reflectorized bands that match color of edgeline
 - Opposing traffic lane dividers (OTLD) (BC (8)-03, CWZTCD)
 - Used to convert normal one-way roadways to two-way operations
 - Maximum 500 ft. spacing used with other channelizing devices (tubular markers or vertical panels)
 - Every 5th channelizing device is a OTLD
 - Chevrons (BC (8)-03, CWZTCD)
 - Used on sharp curves or turns
 - Spacing such that driver always has 3 in view
 - Flagging (TMUTCD 1998 Part VI Reprint)
 - Wearing high visibility clothing
 - Stationed appropriately and in advance of the work area
 - Facing traffic
 - Using correct hand signaling device (Stop/Slow paddle, lights, red flag)
 - Using correct signaling procedures.

Pavement Markings-

- Visible with minimal wear
- Proper width, pattern and colors used (BC (11) – 03)
- Existing striping removed and no conflicting pavement marking patterns (BC (10) – 03)

Barricades-(BC (9) – 03, CWZTCD)

- No signs or warning lights mounted on barricades
- Barricades not placed parallel to traffic unless out of the clear zone
- TY III barricades used at roadways closed to traffic
- When required, correct type of weight used (no rocks, concrete, steel, etc.) (BC (9) – 03)
- **Signs mounted a minimum of 10 ft behind barricade**