TENNESSEE DEPARTMENT OF TRANSPORTATION



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| ORIGINAL SUBMITTAL DATE: |
| 07-31-14 REVISION DATES: |
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ROAD SAFETY AUDIT REPORT

S.R. 36

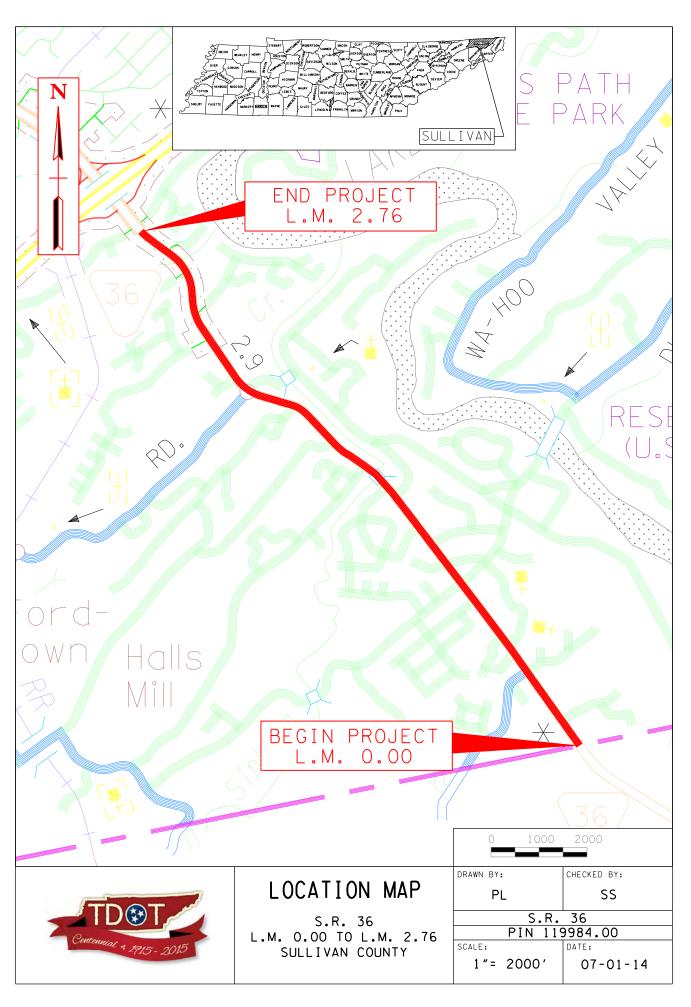
From: Washington County Line to North of Lakeside Lane,
(Log Mile 0.00 to Log Mile 2.76),
Sullivan County
PIN#119984.00

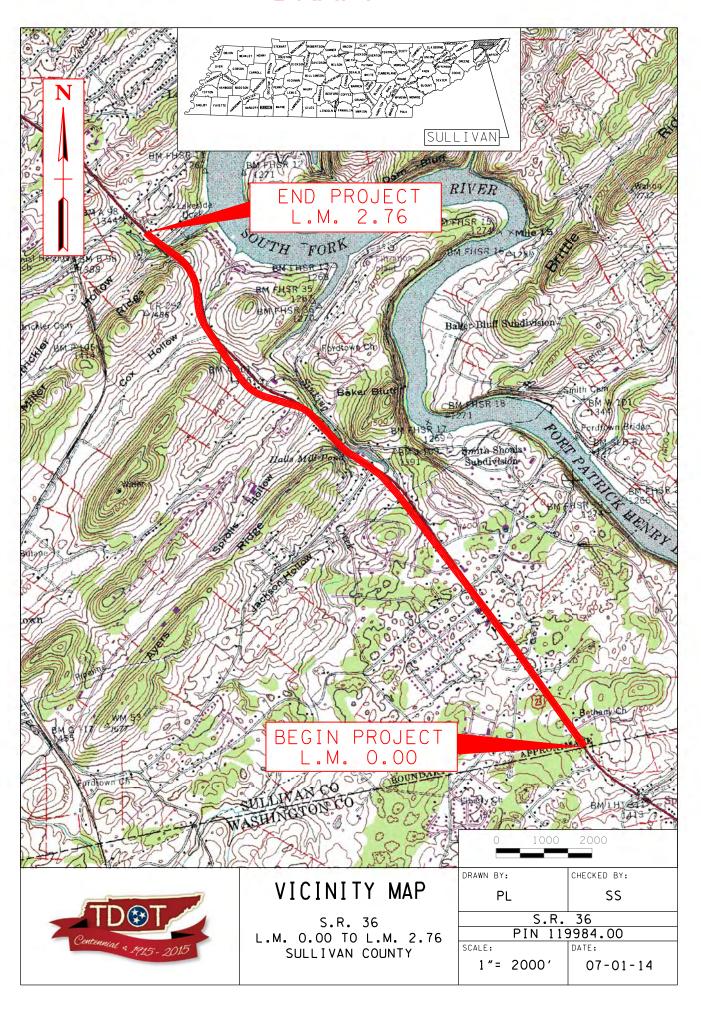
PREPARED BY GRESHAM, SMITH AND PARTNERS for the

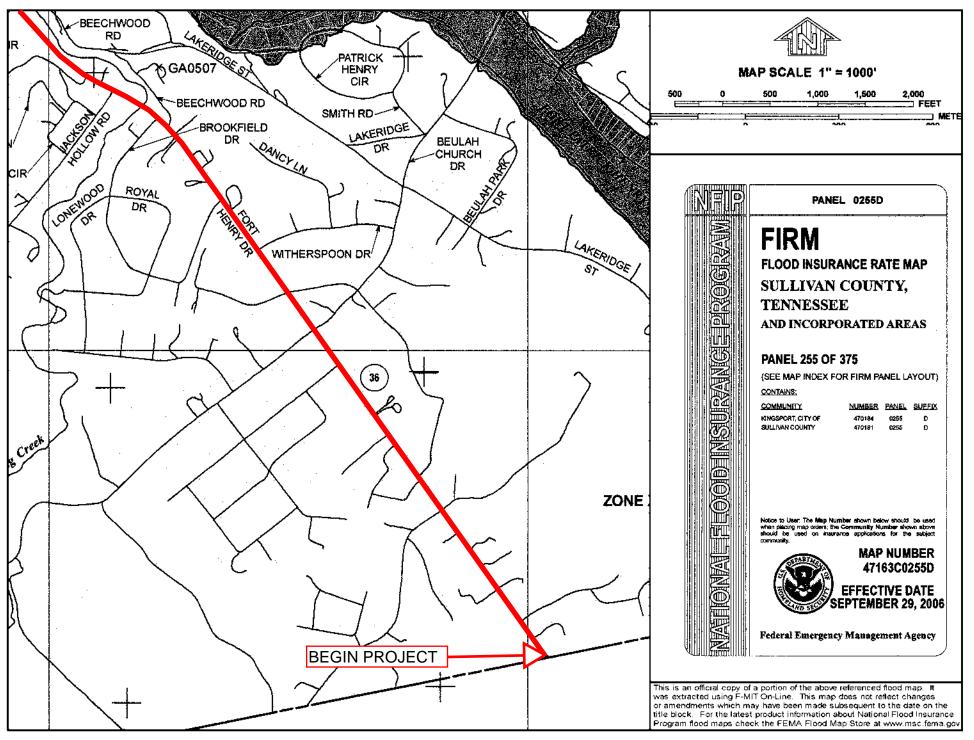
Strategic Transportation Investments Division

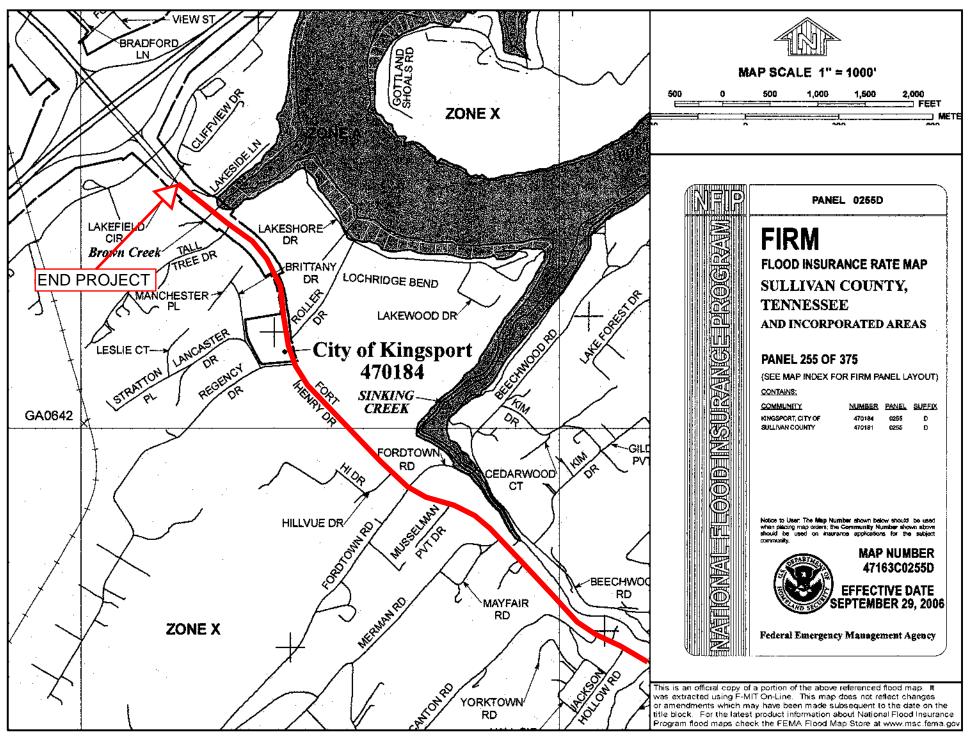
| Recommended by: | Signature | DATE |
|---|-----------|------|
| TRANSPORTATION DIRECTOR STRATEGIC TRANSPORTATION INVESTMENTS DIVISION | | |

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Sullivan County S.R. 36

L.M. 0.00-L.M. 2.76 PIN: 119984.00

PROJECT DESCRIPTION AND BACKGROUND

This project was identified through the Tennessee Department of Transportation (TDOT) safety needs identification process. The section of State Route (S.R.) 36 from log mile (L.M.) 0.00 to L.M. 2.76 is a two (2) lane rural roadway with twelve (12) foot travel lanes and predominantly two (2) to five (5) foot asphalt shoulders and a southbound truck lane at the Washington County line. S.R. 36 was added to the Hazard Elimination Safety Program (HESP) list because S.R. 36 has a severe crash rate of 0.142, which exceeds the statewide average severe crash rate of 0.093 for an Urban Other Principal Arterial.

There were a total of sixty-eight (101) crashes that occurred along S.R. 36 between 2010 to 2013, with two (2) fatality crashes involving two (2) fatalities, three (3) incapacitating injury crashes involving three (3) incapacitating injuries, thirty-three (33) non-incapacitating injury crashes, and sixty-three (63) property damage.

ROAD SAFETY AUDIT (RSA) TEAM MEMBERS

| NAME | ORG. | PHONE # | EMAIL |
|-----------------|-------------------|--------------|------------------------------|
| Jeremy Bowlan | TDOT | 615-532-7123 | jeremy.bowlan@tn.gov |
| Stacy Weaver | TDOT – Reg. 1 | 865-594-2442 | stacy.weaver@tn.gov |
| Bill Albright | Kingsport MTPO | 423-224-2677 | billalbright@kingsporttn.gov |
| Troy Ebbert | Kingsport MTPO | 423-224-9332 | troyebbert@kingsporttn.gov |
| Tim Elsea | City of Kingsport | 423-224-2426 | timelsea@kingsporttn.gov |
| Matt Givens | TDOT | 615-532-4802 | matthew.givens@tn.gov |
| Jay Morgan | TDOT – Reg. 1 | 865-594-0714 | jay.morgan@tn.gov |
| Rick Kilby | TDOT – Reg. 1 | 423-282-0136 | ricky.r.kilby@tn.gov |
| Nathan Vatter | TDOT – Reg. 1 | 865-594-2456 | nathan.vatter@tn.gov |
| Chris Craig | First TN RPO | 423-722-5091 | ccraig@ftdd.org |
| Shap Stiles | GS&P | 865-521-6777 | shap_stiles@gspnet.com |
| Patrick Fiveash | GS&P | 865-521-6777 | Patrick_fiveash@gspnet.com |

INFORMATION USED IN REVIEW

- Crash Reports
- Field Review Comments
- TRIMS Crash Data (2010-2013)
- TRIMS Geometric Report
- Aerial Photographs
- Crash Summary
- County Highway Maps
- TRIMS Route Feature Report
- TRIMS Road Segment Report

PRE-BRIEF MEETING SUMMARY

A Pre-brief meeting was held at TDOT Headquarters at 1:00 P.M. on June 16, 2014. A summary of the topics and information discussed at the meeting is provided below:

1. Discussed Crash history and types of crashes.



Sullivan County S.R. 36 L.M. 0.00-L.M. 2.76

PIN: 119984.00

- Majority are rear-end crashes.
- 2. AADT is 12,374 vehicles per day on S.R. 36.
- 3. Intersection with Fordtown Road is through a horizontal curve (716' Radius).
- 4. Commercial Business on north side of S.R. 36 does not have a well-defined access point.
- Stop Controlled Intersection with Fordtown Road was analyzed by TDOT in 2013.

OBSERVATIONS

An onsite field review was held at 1:00 P.M. on June 19, 2014. The following discussions/observations were noted:

- Signing and striping needs to be updated.
- Install left turn Lanes at Fordtown Road.
- Add Raised concrete islands on the north side of the Fordtown Road intersection.
- Install guardrail on S.R. 36 between the intersections of Proffitt Lane/Beulah Church Drive and Brookfield Lane.
- Install Solar flashing beacons on intersection warning signs for Fordtown Road.
- Add guardrail delineation to all existing guardrail.
- A field review of the horizontal alignment along the corridor was performed. A traditional ball-bank indicator was used to analyze each curve. All curves within the limits of the project met the posted speed limit.

The RSAR recommended safety improvements are depicted on the aerial layout sheets included with this report.

The total estimated cost of the improvements listed in the report is \$207,800.00. No right-of-way acquisition is required. A maintenance agreement is not required. A local match is not required. These improvements will be let to contract.

Sullivan County S.R. 36 L.M. 0.00-L.M. 2.79

L.M. 0.00-L.M. 2.76 PIN: 119984.00

SITE PHOTOS - 06/19/2014



(L.M. 0.25) S.R. 36 looking north.



(L.M. 0.50) S.R. 36 looking north.

Sullivan County S.R. 36 L.M. 0.00-L.M. 2.7

L.M. 0.00-L.M. 2.76 PIN: 119984.00



(L.M. 0.88) S.R. 36 looking north.



(L.M. 1.25) S.R. 36 looking north.

Sullivan County S.R. 36 L.M. 0.00-L.M. 2.76 PIN: 119984.00



(L.M. 1.60) S.R. 36 looking north.



(L.M. 1.93) S.R. 36 looking north at Fordtown Road.

Sullivan County S.R. 36

L.M. 0.00-L.M. 2.76 PIN: 119984.00



(L.M. 2.36) S.R. 36 looking north.



(L.M. 2.60) S.R. 36 looking north at the end of the project.

RSAR NO PLANS COST ESTIMATE

Route: S.R. 36 RSAR

Description: From Washington County Line

To North of Lakeside Lane

County: Sullivan
Length: 2.76 Miles

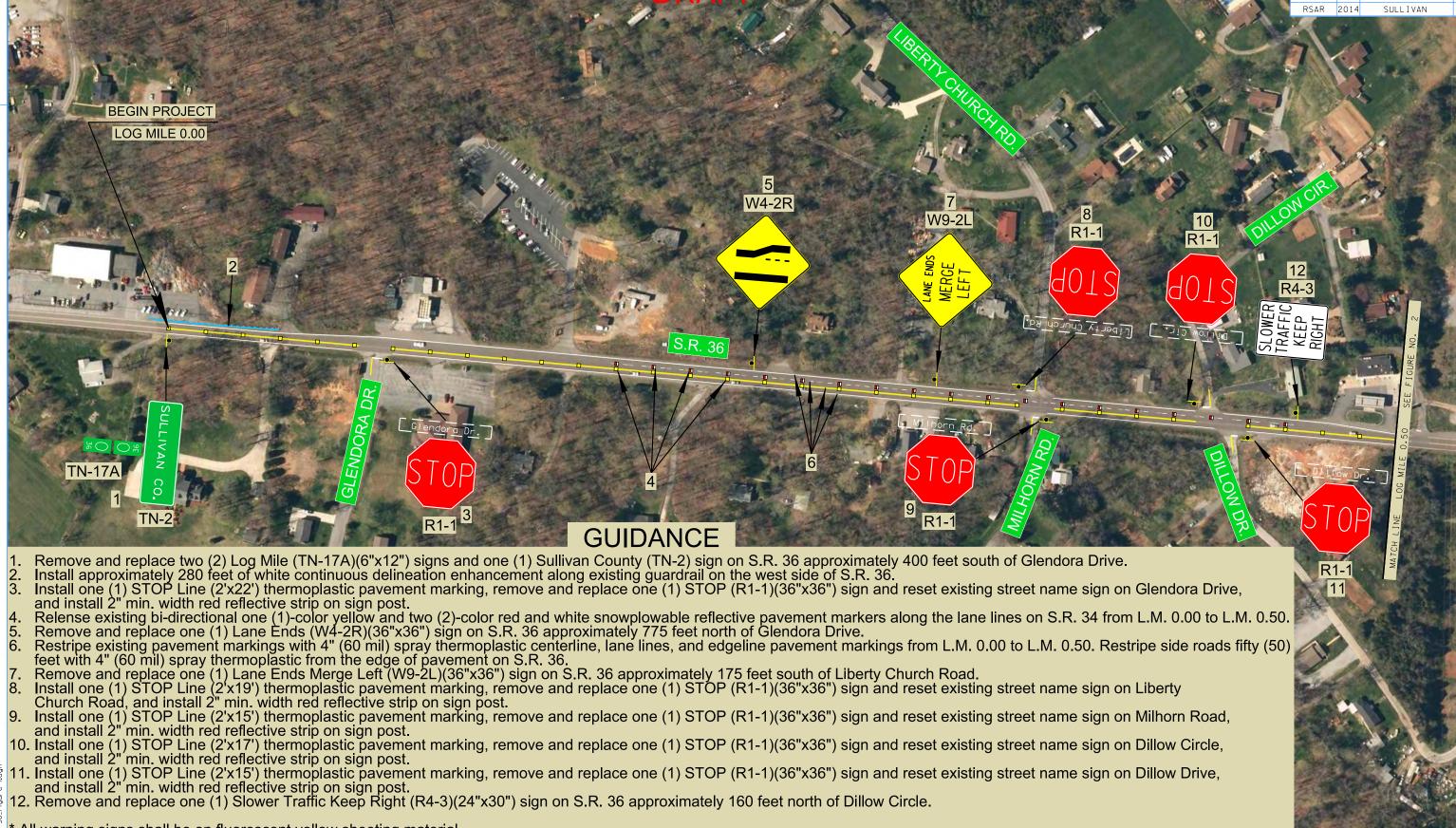
Date: July 31, 2014

| DESCRIPTION | LOCA | L | <u>s</u> | STATE | <u>F</u> | EDERAL | <u>TOTAL</u> |
|---|------|---|----------|-------|----------|---------|---------------|
| Right-of-Way | \$ | | \$ | | \$ | - | \$ |
| Clearing and Grubbing | \$ | - | \$ | - | \$ | = | \$ - |
| Earthwork | \$ | - | \$ | 450 | \$ | 4,050 | \$ 4,500 |
| Railroad Crossing or Separation | \$ | - | \$ | - | \$ | - | \$ - |
| Drainage | \$ | - | \$ | = | \$ | - | \$ - |
| Utilities | \$ | - | \$ | - | \$ | - | \$ - |
| Structures | \$ | - | \$ | - | \$ | - | \$ - |
| Pavement Removal | | | \$ | 600 | \$ | 5,200 | \$ 5,800 |
| Paving | \$ | - | \$ | 6,370 | \$ | 57,330 | \$ 63,700 |
| Roadway and Pavement Appurtenances | \$ | - | \$ | 1,440 | \$ | 12,960 | \$ 14,400 |
| Retaining Walls | \$ | - | \$ | - | \$ | - | \$ - |
| Topsoil | \$ | - | \$ | - | \$ | - | \$ - |
| Seeding | \$ | - | \$ | - | \$ | - | \$ - |
| Sodding | \$ | - | \$ | - | \$ | - | \$ - |
| Rip-Rap or Slope Protection | \$ | - | \$ | - | \$ | - | \$ - |
| Fencing | \$ | - | \$ | - | \$ | - | \$ - |
| Signing ¹ | | | | | \$ | 19,600 | \$ 19,600 |
| Pavement Markings ¹ | | | | | \$ | 59,700 | \$ 59,700 |
| Lighting ¹ | | | | | \$ | - | \$ - |
| Signalization ¹ | | | | | \$ | - | \$ - |
| Guardrail ¹ | | | | | \$ | 20,200 | \$ 20,200 |
| Pay Item Quantity Adjustment (15%) ² | | | | | \$ | - | \$ - |
| Maintenance of Traffic | | | \$ | - | \$ | 10,000 | \$ 10,000 |
| Mobilization (5%) | | | \$ | 440 | \$ | 9,500 | \$ 9,900 |
| CONSTRUCTION COST (rounded) | | | \$ | 9,300 | \$ | 198,500 | \$ 207,800 |
| Engineering and Contingency (10%) | | | | | \$ | _ | \$ - |
| TOTAL CONSTRUCTION COST (rounded) | | | \$ | 9,300 | \$ | 198,500 | \$ 207,800 |
| Preliminary Engineering (5%) | | | \$ | - | \$ | - | \$ - |
| PROJECT COST ³ (rounded) | \$ | - | \$ | 9,300 | \$ | 198,500 | \$ 207,800 |

¹ This safety item is 100% eligible and does not require a 10% funding match by the local agency.

² For estimating purposes pay items are adjusted for fluxuation of cost based on quantity.

³ For estimating future project costs, a compounded inflation rate of 7% should be applied from the date of this estimate.



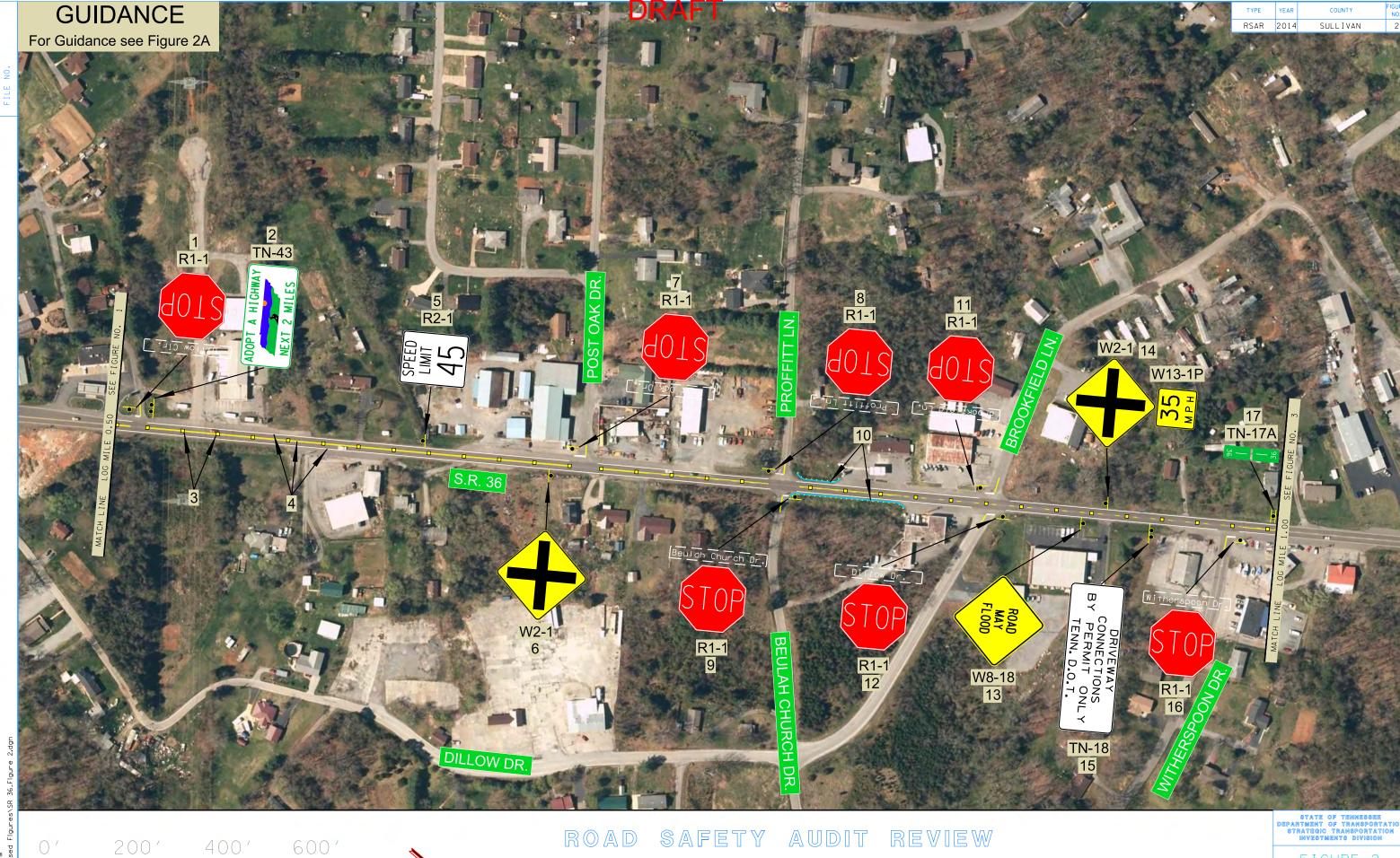
* All warning signs shall be on fluorescent yellow sheeting material.



AUDIT REVIEW

L.M. 0.00 TO L.M. 2.76 SULLIVAN COUNTY

FIGURE 1 L.M. 0.00 TO L.M. 0.50



7/22/2014 12:52:35 PM

S.R. 36 L.M. 0.00 TO L.M. 2.76 SULLIVAN COUNTY FIGURE 2 S.R. 36 AND L.M. 0.50 TO L.M. 1.00

GUIDANCE

Install one (1) STOP Line (2'x13') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Dillow Circle,

- Install one (1) STOP Line (2'x13') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Dillow Circle, and install 2" min. width red reflective strip on sign post.

 Remove and replace one (1) Adopt A Highway (TN-43)(36"x24") sign on S.R. 36 approximately 950 feet south of Post Oak Drive.

 Relense existing bi-directional one (1)-color yellow snowplowable reflective pavement markers along the lane lines on S.R. 34 from L.M. 0.50 to L.M. 1.00.

 Restripe existing pavement markings with 4" (60 mil) spray thermoplastic centerline and edgeline pavement markings from L.M. 0.50 to L.M. 1.00. Restripe side roads fifty (50) feet with 4" (60 mil) spray thermoplastic from the edge of pavement on S.R. 36.

 Remove and replace one (1) Speed Limit 45 MPH (R2-1)(30"x36") sign on S.R. 36 approximatley 400 feet south of Post Oak Drive.

 Remove and replace one (1) Intersection Warning (W2-1)(36"x36") sign on S.R. 36 approximatley 45 feet south of Post Oak Drive.

 Install one (1) STOP Line (2'x26') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Proffitt Lane, and install 2" min. width red reflective strip on sign post.

 Install one (1) STOP Line (2'x14') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Beulah Church

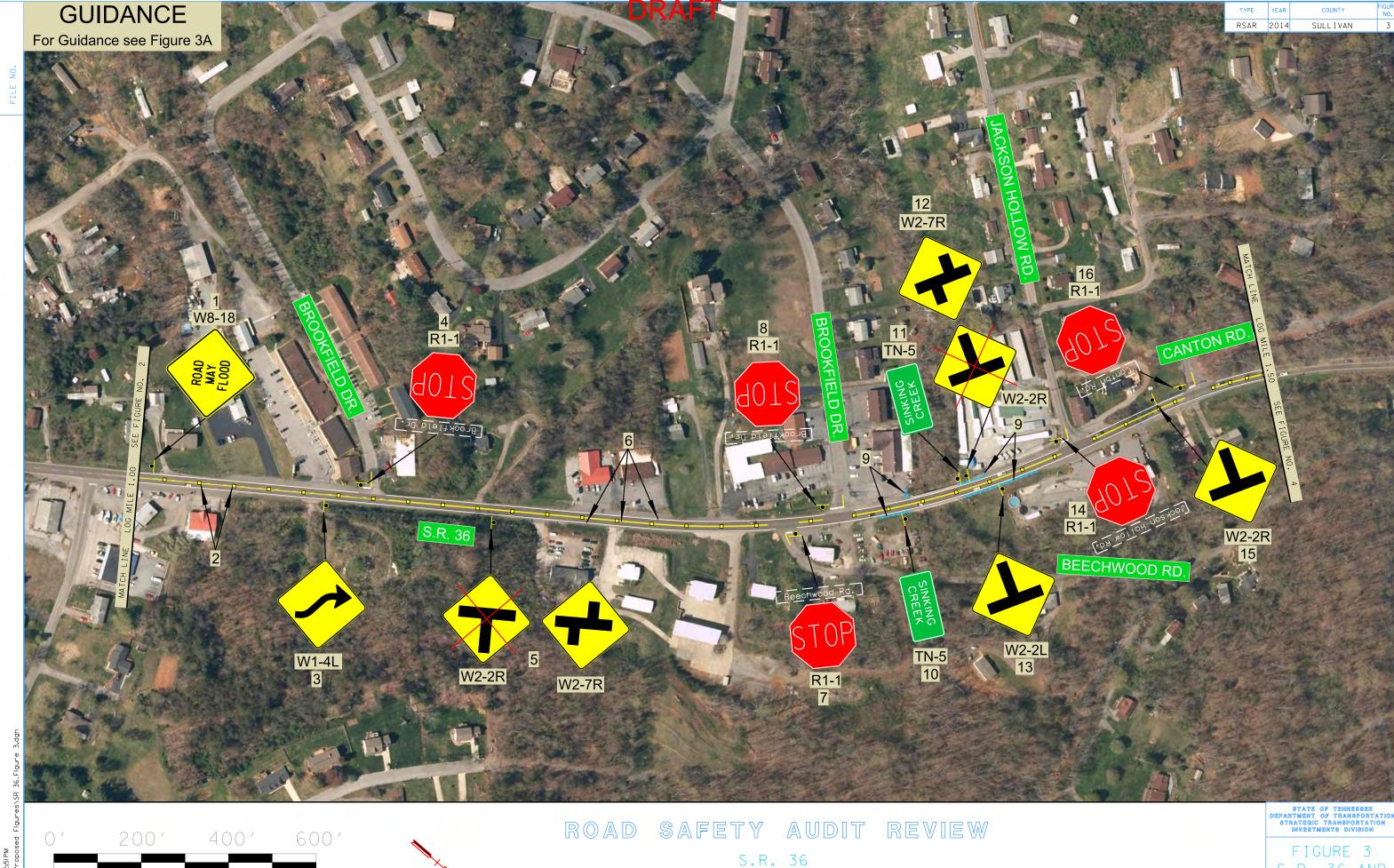
and install 2" min. width red reflective strip on sign post.
 Install one (1) STOP (Ine (2'x14') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Beulah Church Drive, and install 2" min. width red reflective strip on sign post.
 Install approximately 100 feet of guardrail with two (2) Type In Line end terminals on the east side of S.R. 36. Install 373 feet of white continuous delineation enhancement along the proposed guardrail.
 Install one (1) STOP Line (2'x21') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Brookfield Lane, and install 2" min. width red reflective strip on sign post.
 Install one (1) STOP Line (2'x19') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Dillow Drive, and install 2" min. width red reflective strip on sign post.
 Remove and replace one (1) Road May Flood (W8-18)(36"x36") sign on S.R. 36 approximately 171 feet north of Dillow Drive.
 Remove and replace one (1) Intersection Warning (W2-1)(36"x36") sign and one (1) Advisory Speed (W13-1P)(18"x18") plaque on S.R. 36 approximately 222 feet north of Brookfield lane

15. Remove and replace one (1) Driveway Connections By Permit Only Tenn. D.O.T. (TN-18) sign on S.R. 36 approximatley 327 feet north of Dillow Drive.

16. Install one (1) STOP Line (2'x20') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Witherspoon Drive, and install 2" min. width red reflective strip on sign post.

17. Remove and replace two (2) Log Mile (TN-17A)(6"x12") signs on S.R. 36 approximately 73 feet north of Witherspoon Drive.

All warning signs shall be on fluorescent yellow sheeting material.



L.M. 0.00 TO L.M. 2.76

SULLIVAN COUNTY

FIGURE 3 S.R. 36 AND L.M. 1.00 TO L.M. 1.50

GUIDANCE

Remove and replace one (1) Road May Flood (W8-18)(36"x36") sign on S.R. 36 approximately 470 feet south of Brookfield Drive.
Relense existing bi-directional one (1)-color yellow snowplowable reflective pavement markers along the lane lines on S.R. 34 from L.M. 1.00 to L.M. 1.50.
Remove and replace one (1) Reverse Curve Warning (W1-4L)(36"x36") sign on S.R. 36 approximately 77 feet south of Brookfield Drive.
Install one (1) STOP Line (2'x19') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Brookfield Drive, and install 2" min. width red reflective strip on sign post.

Remove one (1) Intersection Warning (W2-2R)(36"x36") sign and install one (1) Intersection Warning (W2-7R)(36"x36") sign on S.R. 36 approximately 245 feet north of Brookfield Drivé.

Brookfield Drive.
 Restripe existing pavement markings with 4" (60 mil) spray thermoplastic centerline and edgeline pavement markings from L.M. 1.00 to L.M. 1.50. Restripe side roads fifty (50) feet with 4" (60 mil) spray thermoplastic from the edge of pavement on S.R. 36.
 Install one (1) STOP Line (2'x16') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Beechwood Road, and install 2" min. width red reflective strip on sign post.
 Install one (1) STOP Line (2'x31') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Brookfield Drive, and install 2" min. width red reflective strip on sign post.
 Install approximately 350 feet of white continuous delineation enhancement along existing guardrail on both sides of S.R. 36.
 Remove and replace one (1) Sinking Creek (TN-5) sign on S.R. 36 approximately 105 feet north of Brookfield Drive.
 Remove one (1) Intersection Warning (W2-2R)(36"x36") sign and install one (1) Intersection Warning (W2-7R)(36"x36") sign on S.R. 36 approximately 273 feet north of Brookfield Drive.

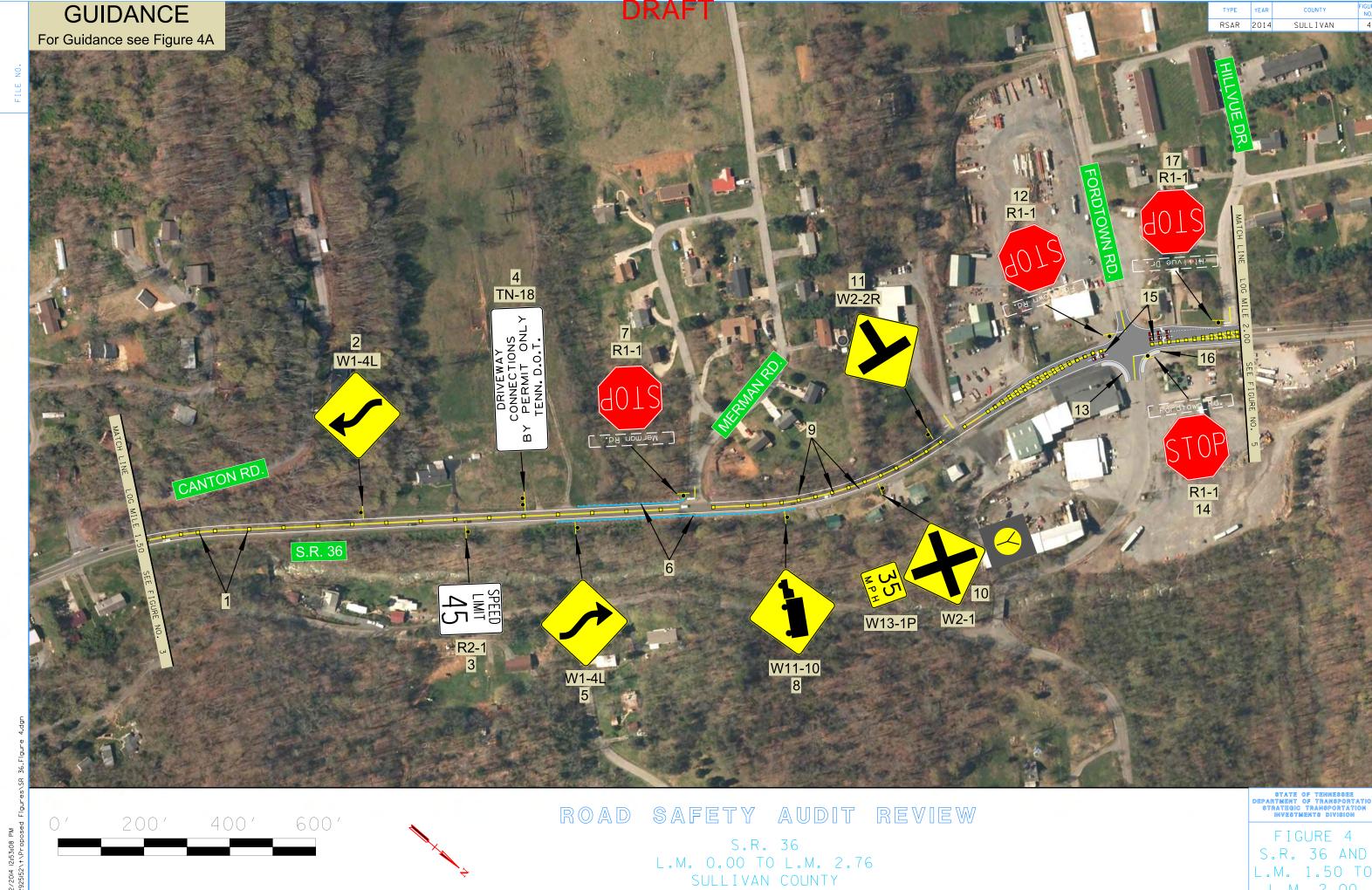
Brookfield Drivé.

13. Remove and replace one (1) Intersection Warning (W2-2L)(36"x36") sign on S.R. 36 approximately 332 feet north of Brookfield Drive.
14. Install one (1) STOP Line (2'x18') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Jackson Hollow Road, and install 2" min. width red reflective strip on sign post.

15. Remove and replace one (1) Intersection Warning (W2-2R)(36"x36") sign on S.R. 36 approximately 175 feet north of Jackson Hollow Road.

16. Install one (1) STOP Line (2'x14') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Canton Road, and install 2" min. width red reflective strip on sign post.

* All warning signs shall be on fluorescent yellow sheeting material.

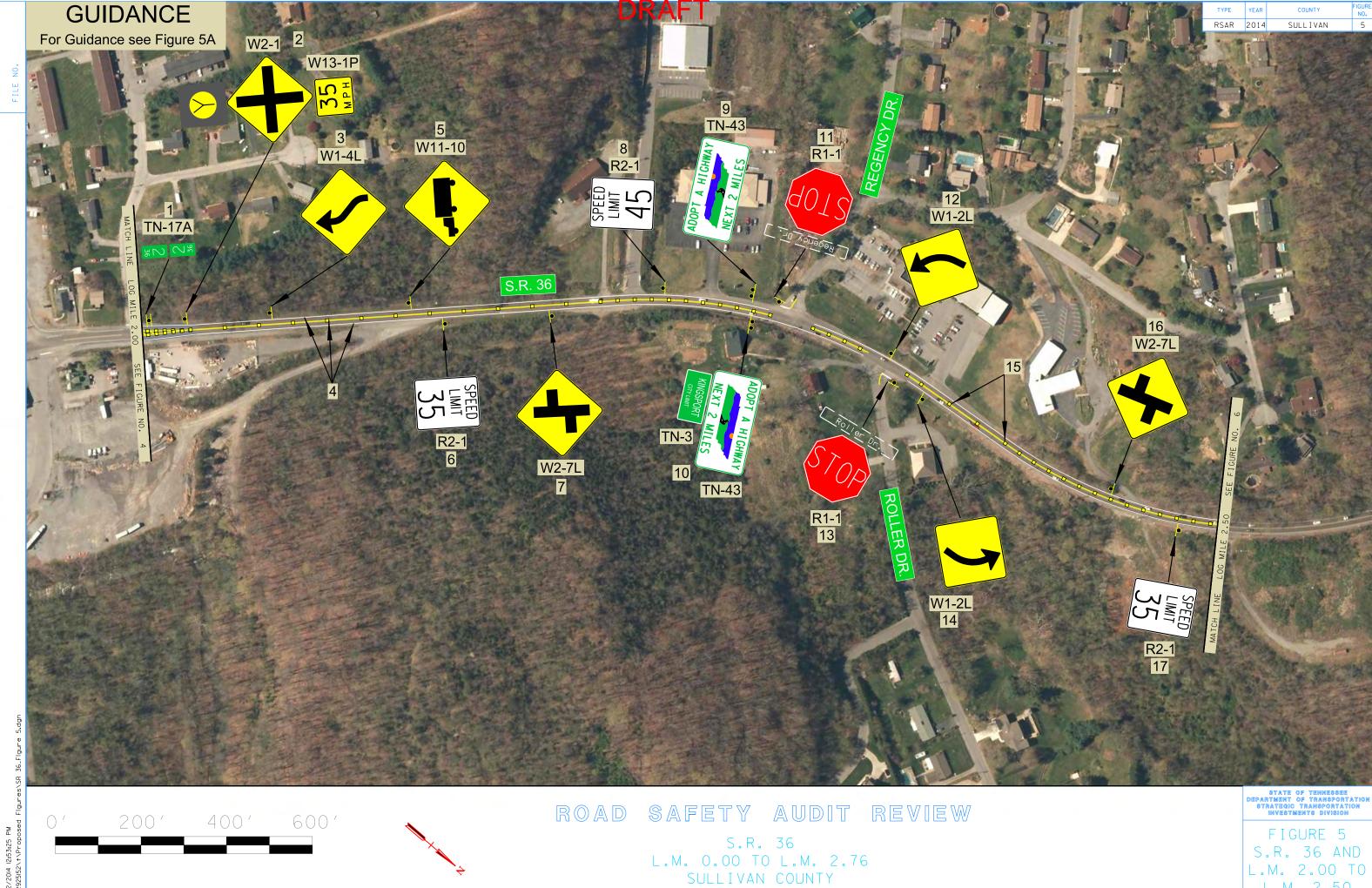


L.M. 1.50 TO L.M. 2.00

GUIDANCE

- Relense existing bi-directional one (1)-color yellow snowplowable reflective pavement markers along the lane lines on S.R. 34 from L.M. 1.50 to L.M. 2.00.
 Remove and replace one (1) Reverse Curve Warning (W1-4L)(36"x36") sign on S.R. 36 approximately 735 feet south of Merman Road.
 Remove and replace one (1) Driveway Connections By Permit Only Tenn, D.T. (TN-18) sign on S.R. 36 approximately 600 feet south of Merman Road.
 Remove and replace one (1) Driveway Connections By Permit Only Tenn, D.T. (TN-18) sign on S.R. 36 approximately 600 feet south of Merman Road.
 Remove and replace one (1) Reverse Curve Warning (W1-4L)(36"x36") sign on S.R. 36 approximately 245 feet south of Merman Road.
 Install approximately 820 feet of white continuous delineation enhancement along existing guardraii on both sides of S.R. 36.
 Install one (1) STOP Line (2"x18") thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Merman Road, and install 2" min. width red reflective strip on sign post.
 Remove and replace one (1) Truck Warning (W11-10)(36"x36") sign on S.R. 36 approximately 170 feet north of Merman Road.
 Restripe existing pavement markings with 4" (60 mill) spray thermoplastic cornellative lane lines, and edgelline pavement markings from L.M. 1.50 to L.M. 2.00. Restripe side roads fifty (50) feet with 4" (60 mill) spray thermoplastic from the edge of pavement on S.R. 36.
 Remove and replace one (1) Intersection Warning (W2-1)(36"x36") sign, one (1) Advisory Speed (W13-1P)(18"x18") plaque, and install one (1) Solar Powered Yellow Beacon on S.R. 36 approximately 395 feet north of Merman Road.
 Remove and replace one (1) Intersection Warning (W2-2)(36"x36") sign on S.R. 36 approximately 553 feet north of Merman Road.
 Remove and replace one (1) Intersection Warning (W2-2)(36"x36") sign on S.R. 36 and Fordtown Road.
 Install one (1) STOP Line (2"x32") thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name si

- * All warning signs shall be on fluorescent yellow sheeting material.



L.M. 2.50

RSAR 2014 SULLIVAN

GUIDANCE

- Remove and replace two (2) Log Mile (TN-17A)(6"x12") signs on S.R. 36 approximately 1450 feet south of Regency Drive.

 Remove and replace one (1) Intersection Warning (W2-1)(36"x36") sign, one (1) Advisory Speed (W13-1P)(18"x18") plaque, and install one (1) Solar Powered Yellow Beacon on S.R. 36 approximately 1362 feet south of Regency Drive.

 Remove and replace one (1) Reverse Curve Warning (W1-4L)(36"x36") sign on S.R. 36 approximately 1163 feet south of Regency Drive.

 Restripe existing pavement markings with 4" (60 mil) spray thermoplastic centerline and edgeline pavement markings from L.M. 2.00 to L.M. 2.50. Restripe side roads fifty (50) feet with 4" (60 mil) spray thermoplastic from the edge of pavement on S.R. 36.

 Remove and replace one (1) Truck Warning (W11-10)(36"x36") sign on S.R. 36 approximately 838 feet south of Regency Drive.

 Remove and replace one (1) Speed Limit 35 MPH (R2-1)(30"x36") sign on S.R. 36 approximately 503 feet south of Regency Drive.

 Remove and replace one (1) Intersection Warning (W2-TL)(36"x36") sign on S.R. 36 approximately 503 feet south of Regency Drive.

 Remove and replace one (1) Adopt A Highway (TN-43)(36"x24") sign on S.R. 36 approximately 233 feet south of Regency Drive.

 Remove and replace one (1) Adopt A Highway (TN-43)(36"x24") sign on S.R. 36 approximately 40 feet south of Regency Drive.

 Install one (1) STOP Line (2"x24") thermoplastic pavement marking, remove and replace one (1) Adopt A Highway (TN-43)(36"x24") sign and one (1) Kingsport City Limit (TN-3) sign on S.R. 36 approximately 40 feet south of Regency Drive.

 Remove and replace one (1) Curve Warning (W1-LL)(36"x36") sign on S.R. 36 approximately 40 feet south of Regency Drive.

 Install one (1) STOP Line (2"x24") thermoplastic pavement marking, remove and replace one (1) STOP Line (2"x27") thermoplastic pavement marking, remove and replace one (1) STOP Line (2"x27") thermoplastic pavement marking, remove and replace one (1) STOP Line (2"x27") thermoplastic pavement marking, remove and replace one (1) Stop

- * All warning signs shall be on fluorescent yellow sheeting material.

GUIDANDRAFT

1. Restripe existing pavement markings with 4" (60 mil) spray thermoplastic centerline, channelization, and edgeline pavement markings from L.M. 2.50 to L.M. 2.76. Restripe side roads fifty (50) feet with 4" (60 mil) spray thermoplastic from the edge of pavement on S.R. 36.

2. Remove and replace one (1) School Bus Stop Ahead (S3-1)(36"x36") sign on S.R. 36 approximately 635 feet south of Lakeside Lane.

3. Relense existing bi-directional one (1)-color yellow snowplowable reflective pavement markers along the lane lines on S.R. 34 from L.M. 2.50 to L.M. 2.76.

4. Remove and replace one (1) Curve Warning (W1-2R)(36"x36") sign on S.R. 36 approximately 414 feet south of Lakeside Lane.

5. Remove and replace one (1) Speed Limit 35 MPH (R2-1)(30"x36") sign on S.R. 36 approximately 176 feet south of Lakeside Lane.

6. Remove and replace one (1) Divided Highway (W6-1)(36"x36") sign on S.R. 36 approximately 176 feet south of Lakeside Lane.

7. Remove and replace one (1) Two Way Traffic (W6-3)(36"x36") sign on S.R. 36 approximately 176 feet south of Lakeside Lane.

8. Install one (1) STOP Line (2'x20') thermoplastic pavement marking, remove and replace one (1) STOP (R1-1)(36"x36") sign and reset existing street name sign on Lakeside Lane, and install 2" min. width red reflective strip on sign post.

9. Remove and replace one (1) Interstate Route (M1-1)(24"x24") sign and one (1) Junction (M2-1)(21"x15") sign on S.R. 36 approximately 142 feet north of Lakeside Lane.

* All warning signs shall be on fluorescent yellow sheeting material.
* All school bus warning signs shall be on fluorescent yellow-green sheeting material.



AUDIT ROAD REVIEW SAFETY

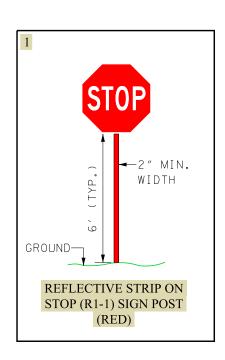
S.R. 36 L.M. 0.00 TO L.M. 2.76 SULLIVAN COUNTY

RSAR 2014

SULLIVAN

FIGURE 6 L.M. 2.50 TO L.M. 2.76

7 RSAR 2014 SULLIVAN



ROAD SAFETY AUDIT REVIEW

> STATE ROUTE 36 L.M. 0.00 TO L.M. 2.76 SULLIVAN COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE 7 SIGN DETAILS SHEET