

Road Safety Audit 2011

OTT – SR-53
0.00 to 5.37



ODOT District 2
Office of Planning & Programs
June 29, 2011

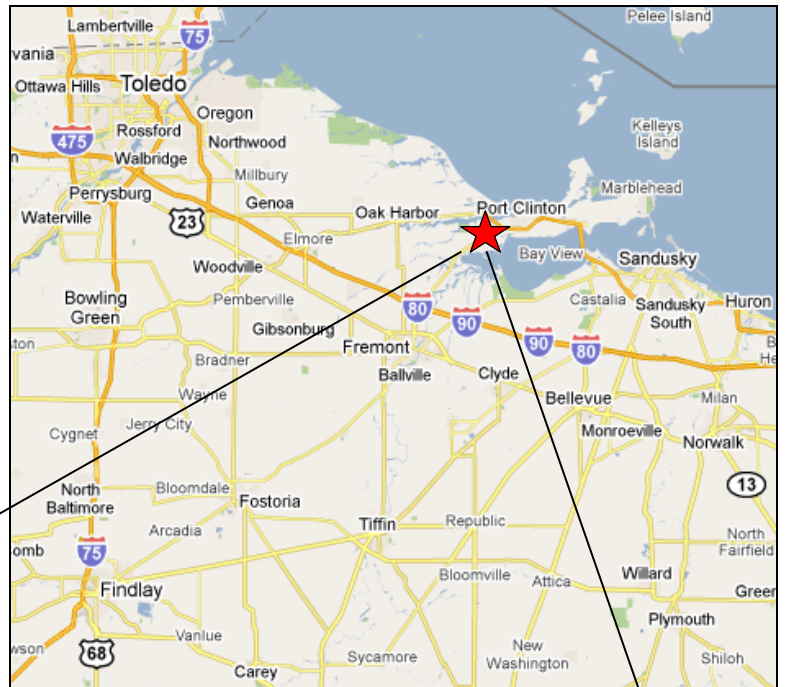


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Audit Overview

Between April 29, 2011 and June 29, 2011 a Road Safety Audit (RSA) was performed on OTT-53-0.00 to 5.37 by the Audit team. The members of the RSA audit team can be found in **Appendix A**.

The Audit team held the Opening Meeting on April 29, 2011 at the Ottawa County offices in Port Clinton and discussed the RSA format, timeframe for completion of the RSA, and team members. Subsequent meetings have been held on May 25th (included day and night field visits), June 1st (review of the field visits and recommend potential countermeasures), and June 22nd (review draft RSA report).

Relevant roadway data, traffic volumes, traffic speed, location maps, aerial images, crash data and collision diagrams were collected and generated prior to the RSA meeting and on sight investigations.

Purpose and Need

The purpose of the RSA and this study was to evaluate the existing safety conditions, crash patterns and to identify potential countermeasures along the corridor in order to improve roadway safety. This section was selected for study due to local concerns regarding the safety of the corridor.

Existing conditions

SR-53 begins in the City of Kenton, runs north through the Cities of Upper Sandusky, Tiffin, Fremont, then through the study area, overlaps with SR-2 running east around the City of Port Clinton before turning north and ending at the northern terminus of Catawba Island.

The land use along the RSA section is residential and agricultural with a few businesses. The study area consists of a 5.37 mile section of SR-53 including approximately (75) seventy five residential homes, (10) ten businesses, and (12) twelve intersections, see **Appendix B** for aerial images and **Appendix C** for section photographs.

SR-53 is a two-lane road with 12' lanes and 4' paved shoulder. The roadway is flat except at the interchange with SR-2 as SR-53 goes over SR-2. The roadway is straight except for a long sweeping curve just north of Paulsen Road. The curve was built in 1962 and is approximately 2500' in length.

There are several intersections within the RSA section that have unique geometry. Little Portage East Road, Oak Harbor Southeast Road, and Darr-Hopfinger Road all have a slip lane for motorists traveling south on SR-53 to utilize when making a right-turn movement. See figure below.



All intersections with SR-53 are T-type intersections with the motorists turning right or left with no through movements. The sight distance at the intersections is good with some locations needing some trimming of the vegetation.

In 2009, according to the ODOT Traffic Survey Report SR-53 between the Sandusky County Line and Darr-Hopfinger Road there were approximately 7,190 vehicles per day, of those approximately 440 or 6%, were classified as commercial B & C trucks. The section of SR-53 between Darr-Hopfinger and SR-2 had approximately 9,320 vehicles per day, of those approximately 480 or 5%, were classified as commercial B & C trucks. Traffic Data can be seen in Appendix D. SR-53 is functionally classified as a rural minor arterial with a posted legal speed limit of 55 mph.

All of the local roadways leading up to SR-53 are two lane roadways that have stop control. The two ramp intersections with SR-2 allow the SR-53 traffic to flow north and south with the ramp traffic either stopping to enter or merging into the SR-53 traffic.

The traffic signage and pavement markings for the section were inventoried for the RSA and the results can be found in **Appendix L**.

Traffic Counts

As part of the RSA manual traffic counts were taken at the following intersections:

- SR-53 / TR-112 (Little Portage East)
- SR-53 / CR-17 (Oak Harbor Southeast)
- SR-53 / CR-12 (Darr-Hopfinger)
- SR-53 / TR-281 (Wilcox)
- SR-53 / SR-2 EB ramps
- SR-53 / SR-2 WB ramps

The counts were taken from 7-11 am and 2-6 pm between May 3 and May 12, 2011.

Tube counts were taken between May 3 and May 16, 2011. The tube counts obtained data 24 hours a day for traffic volumes, vehicle classification, and speed information. The tube count location was approximately 0.25 miles south of Wilcox Road. The traffic volume, vehicle classification, and speed information can be found in **Appendix E**.

Entire Section Crash Data

Crash reports were obtained for the period between January 1st of 2006 and December 31st of 2010. The reports were checked for accuracy by cross-checking them with actual police reports. During this five-year period, on SR-53, a total of (68) sixty-eight crashes occurred within the study limits, of the (68) sixty-eight crashes, (27) twenty-seven were rear-end crashes, (16) sixteen were fixed object crashes, (8) eight were sideswipe passing crashes, and (6) six were angle crashes. (3) Three crashes were fatal and (34) thirty-four were injury crashes recorded in this section over the study period. The full section crash information is located in **Appendix F**.

Year			Light Condition		
2006	17	25%	Daylight	53	78%
2007	18	27%	Dark – No lights	8	12%
2008	16	24%	Dawn	2	3%
2009	7	10%	Dusk	2	3%
2010	10	14%	Dark-Lighted	2	3%
Total	68		Light Not Stated	1	1%
			Total	68	

Crash Severity		
Fatal	3	4%
Injury	34	50%
Property damage only	31	46%
Total	68	

Month		
Jan	5	7%
Feb	8	12%
Mar	3	5%
Apr	1	2%
May	5	7%
Jun	11	16%
Jul	7	10%
Aug	9	13%
Sep	8	12%
Oct	5	7%
Nov	4	6%
Dec	2	3%
Total	68	

Road Condition		
Dry	48	71%
Wet	13	19%
Ice/Snow	7	10%
Total	68	

Weather Condition		
Clear	52	77%
Rain	6	9%
Snow	6	9%
Other	4	5%
Total	68	

Hour of Day		
4	1	2%
5	2	3%
6	2	3%
8	4	6%
9	4	6%
10	7	10%
11	3	4%
12	2	3%
13	4	6%
14	3	4%
15	8	12%
16	8	12%
17	10	15%
18	3	4%
19	3	4%
22	2	3%
23	2	3%
Total	68	

Crash Type		
Rear End	27	40%
Fixed Object	16	24%
Sideswipe Passing	8	12%
Angle	6	9%
Sideswipe Meeting	4	6%
Left Turn	2	3%
Head On	2	3%
Pedestrian	1	2%
Parked Vehicle	1	2%
Other Non Collision	1	2%
Total	68	

Day of Week		
Sunday	7	10%
Monday	9	13%
Tuesday	13	19%
Wednesday	6	9%
Thursday	10	15%
Friday	16	24%
Saturday	7	10%
Total	68	

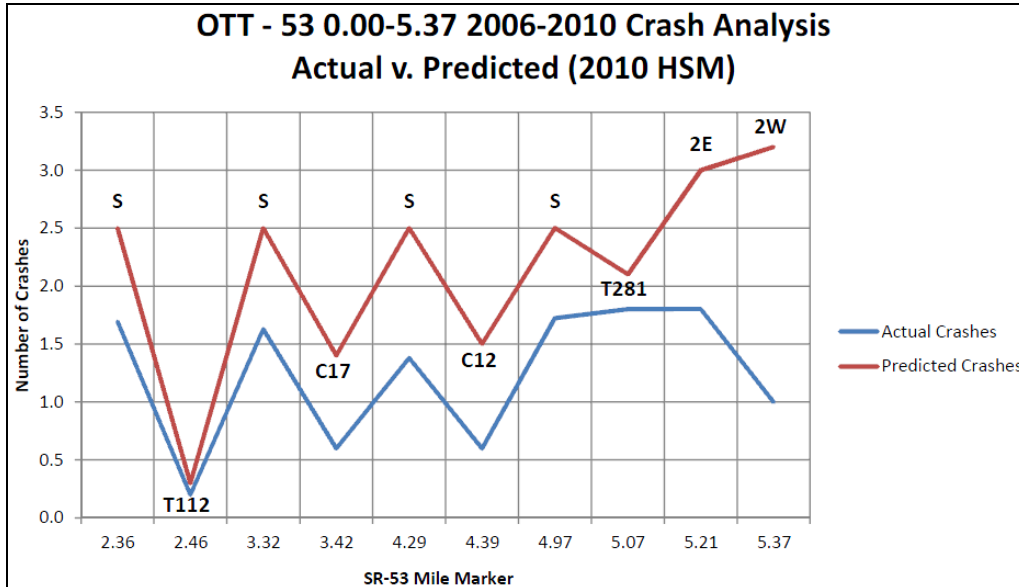
Entire Section Crash Analysis

The crash history indicates that rear end, fixed object, sideswipe passing, and angle crashes comprise (84) eighty four percent of the total. (15) fifteen percent of the crashes occurred at night, (19) nineteen percent of the crashes occurred on wet pavement, and (24) twenty four percent occurred on Friday. Section and intersection collision diagrams are located in **Appendix G**.

Crash Rate Analysis

Crash rates for all the intersections within the RSA section were calculated and compared to the predicted rates per the *2010 Roadway Safety Manual*. For all intersections and roadway segments of the RSA the actual crash rate between 2006 and 2010 were lower than the predicted crash rate. See below for the graph and **Appendix H** for all the details.

Code	Location	Segment	Actual*	Actual Per year	Actual Per Location	Predicted	Reference	
S	Section	0	2.36	20	4	1.7	2.5	Figure 10-3
T112	Little Portage East	2.36	2.46	1	0.2	0.2	0.3	Figure 10-4
S	Section	2.46	3.32	7	1.4	1.6	2.5	Figure 10-3
C17	Oak Harbor SE	3.32	3.42	3	0.6	0.6	1.4	Figure 10-4
S	Section	3.42	4.29	6	1.2	1.4	2.5	Figure 10-3
C12	Darr-Hopfinger	4.29	4.39	3	0.6	0.6	1.5	Figure 10-4
S	Section	4.39	4.97	5	1	1.7	2.5	Figure 10-3
T281	Wilcox	4.97	5.07	9	1.8	1.8	2.1	Figure 10-4
2 E	SR-2 East	5.06	5.21	9	1.8	1.8	3	Figure 10-4
2 W	SR-2 West	5.21	5.37	5	1	1.0	3.2	Figure 10-4
*2006-2010 crashes			Total	68				



Individual Intersection Crash Data

The (6) six major intersections along SR-53 in the study area were analyzed to determine crash pattern and possible causes. Each intersection data is outlined below and the full data is in **Appendix I**.

SR-53 at Little Portage East Road:

Year		
2006	0	0%
2007	0	0%
2008	1	100%
2009	0	0%
2010	0	0%
Total	1	

Light Condition		
Dark-Lighted	1	100%
Total	1	

Crash Type		
Angle	1	100%
Total	1	

Day of Week		
Sunday	0	0%
Monday	0	0%
Tuesday	0	0%
Wednesday	0	0%
Thursday	0	0%
Friday	1	100%
Saturday	0	0%
Total	1	

Crash Severity		
Fatal	0	0%
Injury	1	100%
Property damage only	0	0%
Total	1	

SR-53 at Oak Harbor Southeast Road:

Year		
2006	0	0%
2007	0	0%
2008	2	67%
2009	0	0%
2010	1	3%
Total	3	

Light Condition		
Daylight	3	100%
Total	3	

Crash Type		
Sideswipe Passing	2	67%
Left Turn	1	33%
Total	3	

Day of Week		
Sunday	1	33%
Monday	0	0%
Tuesday	0	0%
Wednesday	0	0%
Thursday	0	0%
Friday	0	0%
Saturday	2	67%
Total	3	

Crash Severity		
Fatal	0	0%
Injury	2	67%
Property damage only	1	33%
Total	3	

SR-53 at Darr-Hopfinger Road:

Year		
2006	0	0%
2007	1	33%
2008	1	33%
2009	0	0%
2010	1	33%
Total	3	

Light Condition		
Daylight	3	100%
Total	3	

Crash Type		
Angle	2	67%
Rear End	1	33%
Total	3	

Day of Week		
Sunday	0	0%
Monday	0	0%
Tuesday	0	0%
Wednesday	0	0%
Thursday	2	67%
Friday	0	0%
Saturday	1	33%
Total	3	

Crash Severity		
Fatal	0	0%
Injury	1	33%
Property damage only	2	67%
Total	3	

SR-53 at Wilcox Road:

Year		
2006	4	44%
2007	0	0%
2008	4	44%
2009	1	12%
2010	0	0%
Total	9	

Light Condition		
Daylight	7	78%
Dark-No Lights	1	11%
Dawn	1	11%
Total	9	

Crash Type		
Rear End	5	56%
Fixed Object	2	22%
Parked Vehicle	1	11%
Other	1	11%
Total	9	

Day of Week		
Sunday	0	0%
Monday	0	0%
Tuesday	1	11%
Wednesday	1	11%
Thursday	3	33%
Friday	4	44%
Saturday	0	0%
Total	9	

Crash Severity		
Fatal	0	0%
Injury	4	44%
Property damage only	5	56%
Total	9	

SR-53 at SR-2 EB Ramps:

Year		
2006	2	22%
2007	5	56%
2008	1	11%
2009	1	11%
2010	0	0%
Total	9	

Light Condition		
Daylight	7	78%
Dark-No Lights	2	22%
Total	9	

Crash Type		
Rear End	5	56%
Angle	2	22%
Fixed Object	1	11%
Sideswipe Passing	1	11%
Total	9	

Day of Week		
Sunday	1	11%
Monday	1	11%
Tuesday	3	33%
Wednesday	0	0%
Thursday	0	0%
Friday	3	33%
Saturday	1	11%
Total	9	

Crash Severity		
Fatal	0	0%
Injury	6	67%
Property damage only	3	33%
Total	9	

SR-53 at SR-2 WB Ramps:

Year		
2006	1	20%
2007	2	40%
2008	0	0%
2009	0	0%
2010	2	40%
Total	5	

Light Condition		
Daylight	4	80%
Not Stated	1	20%
Total	5	

Crash Type		
Rear End	2	40%
Fixed Object	1	20%
Head On	1	20%
Sideswipe Passing	1	20%
Total	5	

Day of Week		
Sunday	0	0%
Monday	1	20%
Tuesday	1	20%
Wednesday	1	20%
Thursday	2	40%
Friday	0	0%
Saturday	0	0%
Total	5	

Crash Severity		
Fatal	1	20%
Injury	1	20%
Property damage only	3	60%
Total	5	

Individual Intersection Crash Analysis

The individual intersections collision diagrams were analyzed to identify crash patterns and then determine if there were any appropriate countermeasures. Overall there were a low number of crashes at the intersections. There were a few locations where a crash pattern was identified and they are listed below:

1. SR-53 southbound at Wilcox Road – rear end crash pattern for southbound traffic waiting to turn left onto Wilcox Road
2. Eastbound SR-2 exit ramp at SR-53 – rear end crash pattern for vehicles stopped at stop sign
3. Westbound SR-2 exit ramp to southbound SR-53 – rear end crash pattern near the merge location

The intersection collision diagrams are in **Appendix G**.

Traffic Signal Warrant Analysis

The intersections where manual traffic counts were taken were reviewed to determine if a traffic signal was warranted per the *Ohio Manual of Uniform Traffic Control Devices*. The intersections were analyzed and none of the intersections meet the criteria to have a traffic signal installed. The traffic signal warrant analysis for each of the (6) six intersections analyzed can be found in **Appendix J**.

Turn Lane Analysis

The intersections where manual traffic counts were taken were reviewed for turn lane warrants to see if there was enough traffic to warrant a left or right turn lane per the ODOT *Location and Design Manual, Volume 1*. There was (1) one turn lane that was identified as being warranted and it was for southbound SR-53 at Wilcox Road. The turn lane analysis for each of the (6) six intersections analyzed can be found in **Appendix J**.

Possible Causes

The total number of crashes in the RSA section is relatively low for the type of facility and traffic volumes that utilize SR-53. However, the crashes that have occurred along SR-53 have been high speed crashes and more than half have involved an injury or fatality.

The section and intersections are not listed on the Ohio Department of Transportation's Safety Program for High Crash locations. ODOT has several types of safety programs that identifies sections and intersections based on total number of crashes, frequency of crashes, and severity of crashes.

The main concentration of crashes in the RSA section occurred between Wilcox Road and the westbound SR-2 interchange ramps. All (3) three intersections in this area have an identifiable rear end crash pattern for (1) of the roadway approaches and the RSA team has identified medium term countermeasures to address the crash pattern.

The unique geometry at Little Portage East Road, Oak Harbor Southeast Road, and Darr-Hopfinger Road does not appear to be causing crash problems although these are intersections that should be monitored. A short term countermeasure of installing double yellow pavement markings north and south of the intersection has been identified due to the split movements of the vehicles entering and exiting these intersections. No crash pattern was identified at these intersections but the RSA team believes these markings will enhance the safety of the intersections.

The parking near the Sunoco Gas Station at the south end of the RSA section was noted as a concern. There are two areas of concern. First, southbound motorists are parking on the west side of SR-53 along the shoulder and crossing the roadway to visit the convenience mart. The shoulder has some stone beyond that asphalt but the vehicles must have their right side tires on the paved 4' shoulder adjacent to traffic. This is dangerous for both the motorists travelling south on SR-53 as well as the patrons of the convenience store. Second, there are northbound motorists (generally larger vehicles with trailers or delivery trucks) parking parallel to SR-53 between the gas pumps and the northbound edge line. This create a serious sight distance problem for all motorists leaving the gas station as they cannot see either northbound or southbound SR-53 traffic. We are working with the business owner for a countermeasure on the east side of SR-53 and ODOT will establish a No Parking Zone on the west side of SR-53.

The overall speed of the motorists throughout the SR-53 corridor was noted as a major concern. The speed data collected by the tube counter shows the speed at the north end of the corridor is not significantly high but we acknowledge the speeds at the south end of the corridor are higher. The RSA team recommends keeping the Target Enforcement signs in place and working with the local law enforcement to place a speed trailer for added emphasis for the motorists.

It should be noted there were a total of 44 animal crashes in the section for the five year period. That is approximately 40% of the overall crashes in the RSA section. The main concentration of crashes occurred between MP 2.1 and 3.1 (0.25 miles south of Little Portage East Road to Lattimore Road).

Overall Section and Intersection Recommendations

Low Cost, Short Term (0-12 months; <\$50,000)

1. New Sign Installation
 - a. Intersection Warning Signs (W2-1, W2-2)
 - i. Paulsen Rd.
 - ii. Little Portage East Rd.
 - iii. Oak Harbor SE. Rd.
 - iv. Darr-Hopfinger Rd.
 - v. Streeter Rd.



- b. Deer Warning Signs (W11-3)
 - i. MM 2.1-3.1 (0.25 mi. south of Little Portage to Lattimore)



- c. Guide signs and route markers
 - i. SR-2 interchange-upgrade old sheeting with new retro-reflective signs
 - 1. flat sheet signs to be completed by D-2 forces
 - 2. large extrusheet signs will be installed by ODOT Contract in 2012

- 2. Sign Relocation
 - i. Little Portage East Rd- Fire station signs approaching need to be appropriate warning sign distance

- 3. Pavement Markings
 - i. Centerline
 - 1. Install Double Yellow on sweeping curve north of Paulsen Road
 - 2. Install Double Yellow at the three (3) intersections with unique geometry
 - a. Little Portage East Road (300' north and south of intersection)
 - b. Oak Harbor Southeast Road (300' north and south of intersection)
 - c. Darr-Hopfinger Road (300' north and south of intersection)

 - 3. Install Stop Lines
 - a. Little Portage East Road
 - b. Oak Harbor Southeast Road
 - c. Darr-Hopfinger Road
 - d. Wilcox Road
 - e. SR-2 at EB ramps
 - f. SR-2 at WB ramps

- 4. Vegetation Mitigation
 - a. Paulsen Rd., north of intersection
 - b. Darr-Hopfinger Rd., north of intersection
 - c. Hyde Rd., south of intersection
 - d. East side of curve

- 5. Establish No Parking Zone along Southbound SR-53 across from Sunoco Gas Station

- 6. Add additional Target Enforcement sign for Northbound and Southbound SR-53 north of Little Portage East Road

- 7. Work with Port Clinton Schools to develop a handout to give to students with educational information regarding driving on SR-53

8. Work with Port Clinton Schools and law enforcement to develop an assembly for driving age students
9. Install Speed Trailer on SR-53 to inform motorists of their speed and the speed limit

The estimated cost for the short term countermeasures is \$50,000.

Medium Cost, Medium Term (1-5 years; <\$5 Million)

1. Relocate Guard Rail
 - a. South of SR-2 bridge on the west side of SR-53 for traffic looking north
2. Install turn lane
 - a. Left turn lane on SR-53 southbound at Wilcox Rd. (additional pavement required)
 - b. Left turn lane on SR-53 southbound at the SR-2 eastbound ramps (no additional pavement required)
 - c. Left turn lane on SR-53 northbound at the SR-2 westbound ramps (no additional pavement required)
 - d. Right turn lane on SR-53 southbound at SR-2 westbound ramps (no additional pavement required)

See **Appendix K** for graphic showing the turn lane installations

3. Resurface Roadway
 - a. SR-53 at SR-2 ramps – resurface section to eliminate confusing markings
 - b. SR-53 entire section between Sandusky County Line and SR-2 interchange
 - i. Currently not on D-2 Work Plan to be resurfaced before 2014
4. Install Interchange Lights at the SR-53 and SR-2 Interchange

5. Access Management
 - a. Sunoco Gas Station – modify ingress and egress locations
 - i. Currently working with property owner to determine plan
 - b. OK Rental and Sales Station – modify ingress and egress locations
 - i. Currently working with property owner to determine plan

The estimated cost for the medium term countermeasures is \$2,000,000.

High Cost, long Term (5+ Years)

1. Evaluate/Install Modern Roundabout
 - a. SR-53 at SR-2 eastbound ramps
 - b. SR-53 at SR-2 westbound ramps

The estimated cost for the long term countermeasures is \$1,000,000.