APPENDIX A TO PART 1340

STATE SEAT BELT USE SURVEY REPORTING FORM

PART A: To be completed by the Governor's Highway Safety Representative (GR), or if applicable, the Coordinator of the State Highway Safety Office.

State:MICHIGANCalendar Year of Survey:2024

Statewide Seat Belt Use Rate: <u>92.0%</u>

I hereby certify that:

- <u>Katie Bower</u> has been designated by the Governor as the State's Highway Safety
 Representative (GR), and if applicable, the GR has delegated the authority to sign the certification in writing to <u>Katie Bower</u>, the Coordinator of the State Highway Safety
 Office.
- The reported statewide seat belt use rate is based on a survey design that was approved by NHTSA, in writing, as conforming to the Uniform Criteria for State Observational Surveys of Seat Belt Use, 23 CFR Part 1340.
- The survey design has remained unchanged since the survey was approved by NHTSA.
- <u>Peter Savolainen</u>, a qualified survey statistician, has reviewed the seat belt use rate reported above and information reported in Part B and has determined that they meet the Uniform Criteria for State Observational Surveys of Seat Belt Use, 23 CFR Part 1340.

September 18, 2024 Date

Signature

Katie Bower, Director, OHSP

Printed name of signing official

PART B

Data Collected at Observation Sites

Site ID	Site Type ¹	Date Observed	Sample Weight	Number of Drivers	Number of Front Passengers	Number of Occupants ² Belted	Number of Occupants Unbelted	Number of Occupants With Unknown Belt Use
1-1	Original	05-JUN-24	71682.45	126	19	133	11	1
1-2	Original	05-JUN-24	180376.19	130	25	146	8	1
1-3	Original	05-JUN-24	60803.82	126	27	143	10	0
1-4	Original	05-JUN-24	42883.59	125	29	139	15	0
2-1	Original	03-JUN-24	101569.65	127	3	123	7	0
2-2	Original	03-JUN-24	71391.06	120	19	131	8	0
2-3	Original	03-JUN-24	2633168.98	5	1	6	0	0
2-4	Original	03-JUN-24	289526.14	127	11	131	7	0
3-1	Original	29-MAY-24	94012.77	83	15	91	6	1
3-2	Original	29-MAY-24	178728.27	126	22	138	10	0
3-3	Original	29-MAY-24	128873.47	120	29	134	15	0
3-4	Original	29-MAY-24	46721.50	20	10	25	5	0
4-1	Original	29-MAY-24	59186.06	61	10	60	8	3
4-2	Original	29-MAY-24	63051.27	98	32	111	19	0
4-3	Original	29-MAY-24	128094.78	120	24	130	14	0
4-4	Original	29-MAY-24	54835.50	110	33	126	17	0
5-1	Original	14-JUN-24	46737.89	73	17	88	2	0
5-2	Original	14-JUN-24	143329.52	120	14	129	5	0
5-3	Original	14-JUN-24	2356379.21	9	1	8	2	0
5-4	Original	14-JUN-24	88728.89	120	25	140	5	0
5-5	Original	14-JUN-24	51094.81	118	33	143	8	0
6-1	Original	08-JUN-24	60278.19	48	7	50	5	0
6-2	Original	08-JUN-24	55530.45	68	19	83	3	1
6-3	Original	08-JUN-24	27858.35	130	45	162	13	0
6-4	Original	08-JUN-24	1665597.50	28	8	31	5	0
6-5	Original	08-JUN-24	67721.74	84	32	98	18	0
7-1	Original	02-JUN-24	89160.19	120	35	145	10	0
7-2	Original	02-JUN-24	15156.71	120	29	140	9	0
7-3	Original	02-JUN-24	55084.95	120	25	129	16	0
7-4	Original	02-JUN-24	56553.88	120	42	152	10	0
8-1	Original	30-MAY-24	40123.42	130	20	129	21	0

¹Identify if the observation site is an original observation site or an alternate observation site.

² Occupants refer to both drivers and passengers.

8-2	Original	30-MAY-24	1504410.64	10	1	8	3	0
8-3	Original	30-MAY-24	135223.93	130	18	130	18	0
8-4	Original	30-MAY-24	122280.89	130	18	142	6	0
8-5	Original	30-MAY-24	66410.11	130	17	142	5	0
9-1	Original	06-JUN-24	1504410.64	7	2	9	0	0
9-2	Original	06-JUN-24	82827.74	120	17	114	23	0
9-3	Original	06-JUN-24	99954.15	120	19	114	25	0
9-4	Original	06-JUN-24	78921.71	120	17	126	11	0
9-5	Original	06-JUN-24	45019.53	120	24	131	13	0
10-1	Original	13-JUN-24	97584.80	127	11	131	7	0
10-2	Original	13-JUN-24	83517.97	112	13	117	8	0
10-3	Original	13-JUN-24	28975.26	124	26	141	9	0
10-4	Original	13-JUN-24	18169.52	127	31	146	12	0
10-5	Original	13-JUN-24	1778460.24	20	7	21	6	0
10-6	Original	13-JUN-24	12855326.7 5	127	24	140	11	0
11-1	Original	28-MAY-24	117244.02	130	17	133	14	0
11-2	Original	28-MAY-24	74336.52	130	17	136	11	0
11-3	Original	28-MAY-24	120354.37	140	12	145	7	0
11-4	Original	28-MAY-24	96573.94	130	22	147	5	0
11-5	Original	28-MAY-24	1778460.24	50	7	48	9	0
12-1	Original	03-JUN-24	50073.91	120	23	132	11	0
12-2	Original	03-JUN-24	62291.25	120	7	117	10	0
12-3	Original	03-JUN-24	70586.66	120	15	128	7	0
12-4	Original	03-JUN-24	26946.15	102	24	118	8	0
12-5	Original	03-JUN-24	129727.76	120	19	130	9	0
13-1	Original	31-MAY-24	2996364.70	29	4	26	7	0
13-2	Original	31-MAY-24	121943.11	100	18	109	9	0
13-3	Original	31-MAY-24	78817.14	115	33	134	14	0
13-4	Original	31-MAY-24	57623.18	120	38	139	19	0
13-5	Original	31-MAY-24	100061.88	120	25	127	18	0
14-1	Original	30-MAY-24	5419939.49	120	27	131	16	0
14-2	Original	30-MAY-24	109330.31	120	22	131	11	0
14-3	Original	30-MAY-24	75062.60	120	30	135	15	0
14-4	Original	30-MAY-24	81762.62	120	27	136	11	0
14-5	Original	30-MAY-24	60737.95	120	35	143	12	0
15-1	Original	02-JUN-24	49039.88	38	11	45	4	0
15-2	Original	02-JUN-24	92569.70	107	32	128	11	0
15-3	Original	02-JUN-24	106609.97	110	43	145	8	0
15-4	Original	02-JUN-24	69374.35	66	33	86	13	0
16-1	Original	09-JUN-24	66726.25	125	42	155	12	0
16-2	Original	09-JUN-24	65792.49	124	52	167	9	0
16-3	Original	09-JUN-24	59227.34	125	28	138	15	0

16-4	Original	09-ILIN-24	86245.01	125	22	137	10	0
16-5	Original	09-IUN-24	23390.91	123	37	146	15	0
16-6	Original	09-JUN-24	9785.00	113	40	137	16	0
17-1	Original	07-JUN-24	2715455.51	32	10	25	17	0
17-2	Original	07-JUN-24	205558.83	120	20	128	12	0
17-3	Original	07-JUN-24	397522.09	120	26	127	19	0
17-4	Original	07-JUN-24	58709.72	71	11	77	5	0
17-5	Original	07-JUN-24	69420.09	77	24	95	6	0
18-1	Original	08-JUN-24	37792.39	125	32	152	5	0
18-2	Original	08-JUN-24	129624.61	128	49	173	4	0
18-3	Original	08-JUN-24	88038.01	128	31	153	2	0
18-4	Original	08-IUN-24	145439 50	124	42	147	19	0
19-1	Original	31-MAY-24	57088.04	132	14	130	16	0
19-2	Original	31-MAY-24	54332.30	131	33	143	20	1
19-3	Original	31-MAY-24	87134.38	128	22	133	17	0
19-4	Original	31-MAY-24	85475 10	134	26	144	16	0
19-5	Original	31-MAY-24	49918 25	126	23	133	16	0
20-1	Original	14-IUN-24	28121.69	98	12	97	13	0
20-2	Original	14-JUN-24	35680.20	111	24	127	8	0
20-3	Original	14-IUN-24	42513 33	134	32	142	24	0
20-3	Original	14-IUN-24	50016 53	132	29	139	22	0
20-5	Original	14-IUN-24	143830.05	132	23	137	20	0
20 3	Original	29-MAY-24	22269 77	109	5	106	8	0
21-2	Original	29-MAY-24	45273.07	124	6	123	6	1
21-3	Original	29-MAY-24	74803.36	121	9	119	15	0
21-4	Original	29-MAY-24	55324.99	121	11	117	15	0
21-5	Original	29-MAY-24	58040.73	123	11	118	16	0
21-6	Original	29-MAY-24	1504410.64	35	11	38	8	0
22-1	Original	01-JUN-24	28758.64	112	16	99	29	0
22-2	Original	01-JUN-24	12091.37	110	15	95	30	0
22-3	Original	01-JUN-24	40767.54	92	23	101	14	0
22-4	Original	01-JUN-24	27138.63	93	27	94	26	0
23-1	Original	12-JUN-24	74537.07	140	9	139	9	1
23-2	Original	12-JUN-24	44869.20	80	7	75	12	0
23-3	Original	12-JUN-24	1504410.64	24	7	23	8	0
23-4	Original	12-JUN-24	71091.22	124	15	123	16	0
24-1	Original	03-JUN-24	51417.25	93	12	98	7	0
24-2	Original	03-JUN-24	41275.70	130	14	134	10	0
24-3	Original	03-JUN-24	76233.70	130	15	137	8	0
24-4	Original	03-JUN-24	72429.81	127	15	125	15	2
24-5	Original	03-JUN-24	140674.34	130	14	122	22	0
25-1	Original	11-JUN-24	2356379.21	19	1	16	4	0
25-2	Original	11-JUN-24	49178.43	109	28	134	3	0

25-3	Original	11-JUN-24	55687.70	94	34	121	7	0
25-4	Original	11-JUN-24	32240.55	124	23	140	7	0
26-1	Original	29-MAY-24	84245.85	127	15	128	14	0
26-2	Original	29-MAY-24	83532.38	99	24	121	2	0
26-3	Original	29-MAY-24	72677.67	130	18	136	12	0
26-4	Original	29-MAY-24	19228.23	109	19	117	11	0
27-1	Original	10-JUN-24	56753.15	14	0	14	0	0
27-2	Original	10-JUN-24	42925.41	117	22	133	6	0
27-3	Original	10-JUN-24	15658.85	60	13	67	5	1
27-4	Original	10-JUN-24	14798.47	120	25	128	17	0
27-5	Original	10-JUN-24	12045.27	30	5	33	2	0
27-6	Original	10-JUN-24	11854.07	27	5	29	3	0
28-1	Original	03-JUN-24	69359.75	97	20	99	18	0
28-2	Original	03-JUN-24	11640.39	102	18	109	11	0
28-3	Original	03-JUN-24	41064.65	115	27	136	6	0
28-4	Original	03-JUN-24	97798.45	128	26	144	10	0
29-1	Original	06-JUN-24	49039.88	19	9	28	0	0
29-2	Original	06-JUN-24	49039.88	57	19	72	4	0
29-3	Original	06-JUN-24	131265.16	126	28	141	13	0
29-4	Original	06-JUN-24	47110.84	120	36	124	32	0
29-5	Original	06-JUN-24	51420.46	103	29	119	13	0
30-1	Original	04-JUN-24	74178.46	128	8	131	5	0
30-2	Original	04-JUN-24	53240.32	130	19	149	0	0
30-3	Original	04-JUN-24	29037.70	112	27	134	5	0
30-4	Original	04-JUN-24	1778460.24	34	5	33	6	0
30-5	Original	04-JUN-24	28082.69	125	24	139	10	0
31-1	Original	01-JUN-24	26459.41	130	33	151	10	2
31-2	Original	01-JUN-24	79572.17	130	40	166	4	0
31-3	Original	01-JUN-24	3597961.86	130	48	172	6	0
31-4	Original	01-JUN-24	62466.07	130	50	168	12	0
31-5	Original	01-JUN-24	48207.55	130	37	155	11	1
32-1	Original	02-JUN-24	102898.74	124	56	174	6	0
32-2	Original	02-JUN-24	36514.77	122	63	179	6	0
32-3	Original	02-JUN-24	47246.46	89	50	124	15	0
32-4	Original	02-JUN-24	113676.72	127	48	169	6	0
33-1	Original	08-JUN-24	138607.11	120	53	144	29	0
33-2	Original	08-JUN-24	95389.73	120	48	154	14	0
33-3	Original	08-JUN-24	2633168.98	4	3	7	0	0
33-4	Original	08-JUN-24	67838.50	60	30	88	2	0
33-5	Original	08-JUN-24	101349.08	60	17	72	5	0
34-1	Original	05-JUN-24	120088.85	129	13	135	6	1
34-2	Original	05-JUN-24	45040.70	120	10	118	12	0
34-3	Original	05-JUN-24	29859.39	139	15	147	7	0

		1				1	1	1
34-4	Original	05-JUN-24	73906.33	120	14	128	6	0
34-5	Original	05-JUN-24	55666.35	120	15	123	12	0
35-1	Original	30-MAY-24	118006.69	123	15	127	11	0
35-2	Original	30-MAY-24	182482.52	123	12	131	4	0
35-3	Original	30-MAY-24	200096.58	128	7	129	6	0
35-4	Original	30-MAY-24	2356379.21	11	1	11	1	0
36-1	Original	09-JUN-24	17293.57	120	41	154	7	0
36-2	Original	09-JUN-24	49557.68	120	33	145	8	0
36-3	Original	09-JUN-24	41566.21	107	30	130	7	0
36-4	Original	09-JUN-24	30262.39	110	33	134	9	0
37-1	Original	10-JUN-24	2356379.21	10	2	9	3	0
37-2	Original	10-JUN-24	6597861.78	120	12	120	12	0
37-3	Original	10-JUN-24	46737.89	45	8	51	2	0
37-4	Original	10-JUN-24	46604.09	125	32	147	10	0
37-5	Original	10-JUN-24	44540.00	122	19	137	4	0
38-1	Original	28-MAY-24	41693.76	118	25	133	10	0
38-2	Original	28-MAY-24	74195.71	128	12	134	6	0
38-3	Original	28-MAY-24	46737.89	9	2	10	1	0
38-4	Original	28-MAY-24	44013.57	109	17	117	9	0
38-5	Original	28-MAY-24	81238.11	116	17	130	3	0
39-1	Original	06-JUN-24	59686.07	130	31	153	8	0
39-2	Original	06-JUN-24	29806.59	124	31	146	9	0
39-3	Original	06-JUN-24	49961.19	29	9	33	5	0
39-4	Original	06-JUN-24	95273.39	130	22	144	8	0
39-5	Original	06-JUN-24	63640.03	130	22	146	6	0
40-1	Original	30-MAY-24	77151.30	125	21	139	7	0
40-2	Original	30-MAY-24	18236.76	107	12	111	8	0
40-3	Original	30-MAY-24	19369.89	114	15	118	10	1
40-4	Original	30-MAY-24	20754.39	98	25	114	9	0
40-5	Original	30-MAY-24	14101.78	82	21	98	5	0
40-6	Original	30-MAY-24	38612.01	123	19	132	10	0
41-1	Original	06-JUN-24	64025.76	81	17	91	7	0
41-2	Original	06-JUN-24	59242.02	124	19	137	6	0
41-3	Original	06-JUN-24	25475.54	123	13	125	11	0
41-4	Original	06-JUN-24	37063.20	120	33	149	4	0
41-5	Original	06-JUN-24	90075.12	125	22	138	9	0
42-1	Original	01-JUN-24	97857.63	127	27	143	11	0
42-2	Original	01-JUN-24	46737.89	28	12	36	4	0
42-3	Original	01-JUN-24	48112.53	68	44	107	5	0
42-4	Original	01-JUN-24	53336.18	85	49	129	5	0
42-5	Original	13-JUN-24	107116.89	101	14	113	2	0
			Total	20,659	4,359	23,023	1,977	18

Standard Error of Statewide Belt Use Rate³: 0.4%

Nonresponse Rate, as provided in § 1340.9(f)

Nonresponse rate for the survey variable seat belt use: 0.07%

³ The standard error may not exceed 2.5 percent.

2024 Statewide Weighted Driver <u>Handheld Mobile Device</u> Use Rate

Observational Wave	Total Observations (Driver Only)	Weighted Percent of Handheld Mobile Device Use	Standard Error
June 2024	20,647	5.5%	0.4%

2024 Unweighted Driver <u>Handheld Mobile Device</u> Use Rates by Stratum

Stratum	Total Observations (Driver Only)	Unweighted Percent of Handheld Mobile Device Use
1	5,535	4.3%
2	5,013	4.6%
3	4,559	4.5%
4	5,540	7.0%

2023 Statewide Weighted Driver <u>Handheld Mobile Device</u> Use Rate

Observational Wave	Total Observations (Driver Only)	Weighted Percent of Handheld Mobile Device Use	Standard Error
June 2023	21,791	6.7%	

2023 Unweighted Driver <u>Handheld Mobile Device</u> Use Rates by Stratum

Stratum	Total Observations (Driver Only)	Unweighted Percent of Handheld Mobile Device Use
1	5,915	5.5%
2	5,171	5.6%
3	4,791	6.0%
4	5,914	7.2%

Revised August 6, 2024

JUNE 2024 DIRECT SEAT BELT AND MOBILE DEVICE OBSERVATION SURVEY

Prepared for: Office of Highway Safety Planning Lansing, MI

Prepared by: Michigan State University East Lansing, MI

2024 Statewide Weighted Seat Belt Use Rate

	То	Total Observations			Otanaland
Observation Period	Driver	Passenger	Total	Seat Belt Use	Error
May 28 - June 17, 2024	20,647	4,353	25,000	92.0%	0.4%

2024 Unweighted Safety Belt Use Rates by Stratum

01	Tota	Unweighted		
Stratum	Driver	Passenger	Total	Percent of Seat Belt Use
1	5,535	1,019	6,554	93.9%
2	5,013	1,086	6,099	94.7%
3	4,559	1,224	5,783	90.5%
4	5,540	1,024	6,564	89.3%

2024 Statewide Weighted Driver <u>Handheld Mobile Device</u> Use Rate

Total ObservationsObservation Period(Driver Only)		Weighted Percent of Handheld Mobile Device Use	Standard Error
May 28 - June 17, 2024	20,647	5.5%	0.4%

2024 Unweighted Driver <u>Handheld Mobile Device</u> Use Rates by Stratum

Stratum	Total Observations (Driver Only)	Unweighted Percent of Handheld Mobile Device Use
1	5,535	4.3%
2	5,013	4.6%
3	4,559	4.5%
4	5,540	7.0%

2024 ANNUAL DIRECT OBSERVATION SURVEY OF SEAT BELT USE AND MOBILE DEVICE USE IN MICHIGAN



FINAL REPORT

Prepared for: Michigan Office of Highway Safety Planning Lansing, MI

> Prepared by: Michigan State University East Lansing, MI

Date: July 25, 2024



MICHIGAN STATE

2024 ANNUAL DIRECT OBSERVATION SURVEY OF SEAT BELT USE AND MOBILE DEVICE USE IN MICHIGAN

FINAL REPORT

Prepared for: Michigan Office of Highway Safety Planning Lansing, MI

Prepared by: Michigan State University East Lansing, MI

Date: July 25, 2025

The opinions, findings, and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Michigan Office of Highway Safety Planning, the U.S. Department of Transportation, or the National Highway Traffic Safety Administration. This report was prepared in cooperation with the Michigan Office of Highway Safety Planning and the U.S. Department of Transportation, and the National Highway Traffic Safety Administration.

1. Report No.	2. Government Ac	cession No.	3. Recipient's Catalo	g No.	
4. Title and Subtitle	5. Report Date:				
2024 Annual Direct Observation Sur Use in Michigan	July 25, 2024				
	6. Performing Organi	zation Code:			
7. Author(s) Timothy J. Gates, Peter T. Savolair Kay, and Sagar Keshari	nen, Brendan J. Ru	usso, Jonathan J.	8. Performing Organi	zation Report No.	
9. Performing Organization Name ar Michigan State University 428 S. Shaw Lane	nd Address:		10. Work Unit No. (TI	RAIS)	
East Lansing, MI 48824		11. Contract or Grant No.			
12. Sponsoring Agency Name and A Office of Highway Safety Plannir 7150 Harris Drive	13. Type of Report and Period Covered: Final Report				
Dimondale, MI 48821			14. Sponsoring Agency Code:		
15. Supplementary Notes:					
 16. Abstract: This report documents the methods a Mobile Device Use in the State of M total of 200 intersection/interchange In addition to belt use, data were co observed front-seat occupant, along 25,000 front-seat occupants along w the weighted seat belt use rate in Mid rate compared to the 2023 rate of 92 continue to exhibit lower seat belt use the weighted rate of handheld mobil statistically significant decrease from to the distracted driving law going into 17. Key Words: Seat belt, restraint, use rate, mobile hands-free, cell phone 	⁵ Seat Belt Use and was observed at a r and June of 2024. , and race for each sessed for a total of ased on these data, lower seat belt use se in pickup trucks, e.g., talking, typing), which represents a chigan in 2023 prior ang younger drivers.				
19. Security Classification (report): Unclassified	20. Security Class Unclassified	sification (Page):	21. No of Pages: 49	22. Price:	

Technical Report Documentation Page

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1.0 INTRODUCTION

The use of seat belts is the single most effective means of reducing fatal and non-fatal injuries in motor vehicle crashes. In 2023 alone, a statistical projection estimated 40,990 people were killed in motor vehicle crashes in the United States, representing a decrease of 3.6 percent compared to the 42,514 fatalities reported to have occurred in 2022 [1]. Considering passenger vehicle occupants involved in fatal traffic crashes in 2022, half of those killed were unrestrained, compared to only 15 percent of those who survived [2]. Restraint use was even less likely in passenger vehicle occupant fatalities if the occupant was in a pickup truck (61 percent unrestrained), between ages 25 and 34 (61 percent unrestrained), traveling at night (57 percent unrestrained), or male (54 percent unrestrained). NHTSA has estimated that the use of lap/shoulder seat belts by front-seat occupants reduces the risk of fatal injuries by approximately 45 percent for passenger cars and 60 percent for light trucks [2]. Moreover, the use of lap/shoulder seat belts by frontseat occupants reduces the risk of moderate to critical injury by 50 percent for passenger cars and 65 percent for light trucks [2]. A study conducted by the National Highway Traffic Safety Administration (NHTSA) on the economic and societal impacts of motor vehicle crashes estimated that from 1975 to 2019, seat belts have prevented over 403,000 fatalities and \$2.5 trillion in medical care, lost productivity, and other injury-related economic costs [3]. During the same period, over 390,000 additional fatalities could have been prevented by the use of seat belts [3]. In 2019 alone, seat belts prevented approximately 14,653 fatalities and could have saved an additional 2,400 people if they were properly belted [3].

In light of these facts, continuing efforts have been aimed at increasing the use of seat belts across the United States. According to the 2023 National Occupant Protection Use Survey (NOPUS), 91.9 percent of drivers and right-front passengers used seat belts, which is a 0.3 percentage point increase from the 91.6 percent observed in 2022 [4]. The Midwest region as a whole showed a 92.9 percent seat belt use rate in 2023, which was an increase from the 89.3 percent seat belt use rate observed in 2022 [4]. In Michigan, past studies indicate that the overall annual seat belt use rate among front-seat occupants has ranged between 92.4 percent and 94.5 percent between 2013 and 2023. In 2022, which is the most recent year that seat belt use data are available for individual states, Michigan was one of 26 states with a seat belt use rate exceeding 90 percent [5]. Michigan is currently one of the 34 "primary law" states, where a front-seat occupant motorist can be stopped and cited for the sole reason of not wearing a seat belt. The most recently available nationwide statistics (2023) indicate that states with primary seat belt laws had an average seat belt use rate of 92.0 percent, which is 0.7 percent higher than the 91.3 percent observed in states without primary seat belt laws [4].

As the non-use of seat belts is ultimately a behavioral issue, targeted programs aimed at changing belt use behavior of vehicular occupants who are most prone to low belt use rates represent an important tool towards increasing use rates. To that end, identification of demographic characteristics related to low belt use is a primary goal of state belt use surveys. Other uses of state seat belt use include:

1

- To fulfill reporting requirements to NHTSA;
- To allocate statewide safety funding to specific program areas;
- To provide targeted funding to areas where belt use is lower than the statewide average; and
- To provide targeted programs for certain segments of the population.

1.1 Study Purpose and Objectives

The purpose of the 2024 Annual Direct Observation Survey (referred to hereafter as the "Annual Survey") was to determine the percentage of Michigan drivers and front-seat passengers who were utilizing their seat belts along with the percentage of drivers using mobile devices. Additional objectives were as follows:

- Implement the methodology for estimating Michigan seat belt use in an economically feasible manner that is compliant with the Uniform Criteria for State Observational Surveys of Seat Belt Use published in the *Federal Register Vol. 76, No. 63* (April 1, 2011, Rules and Regulations, pp. 18042 18059);
- Provide training to all staff conducting the observation surveys and conduct quality assurance/quality control (QA/QC) of the data collection efforts;
- Conduct an observational survey of seat belt use for the three-week period immediately following the Memorial Day holiday;
- Summarize and cross-tabulate the observational data in a spreadsheet format indicating overall seat belt use, seat belt use by strata, seat belt use by time of day and day of week, and seat belt use by various demographic characteristics; and
- Continue to track annual changes in seat belt use and generate necessary comparative data analyses and visual aids depicting trends.

1.2 Study Area

The study area for the Annual Survey included those counties representing at least 85 percent of the passenger vehicle fatalities according to Fatality Analysis Reporting System (FARS) data averages for the years 2016 to 2020, which was the data analysis period required for site resampling prior to the 2023 survey. Michigan is comprised of 83 counties, 38 of which account for at least 85 percent of the passenger vehicle crash-related fatalities according to FARS data averages for the years 2016 to 2020. Therefore, observation locations from within these 38 counties were eligible to be selected for inclusion in the survey. As required by NHTSA, Michigan will update the sample of data collection sites every five years in order to have survey results that represent the geographic areas with at least 85 percent of crash-related fatalities.

2.0 SAMPLING METHOD

In 2011, the National Highway Traffic Safety Administration (NHTSA) issued new Uniform Criteria for State Observational Surveys of Seat Belt Use in *Federal Register Vol. 76, No. 63* (April 1, 2011, Rules and Regulations, pp. 18042 – 18059). The current methodological approach was prepared for the State of

Michigan as a part of the 2013 direct observation seat belt survey and was subsequently approved by NHTSA. The methodology was employed during the sampling of locations used in the surveys performed during the five-year period of 2013-2017. However, the federal criteria also requires that states re-sample the observation locations using the approved methodology at least every five years. Thus, the 200 primary and 200 alternative observation sites were re-sampled for the 2023-2027 Michigan seat belt surveys. It should be noted that observation sites had most recently been resampled in 2018 for the five-year period between 2018-2022. This re-sampling task was performed by Michigan State University based on the aforementioned NHTSA-approved methodology for the state of Michigan (developed in 2013), using updated FARS and vehicle miles traveled (VMT) data. The methodology and lists of 200 primary and 200 alternative sites for the 2023-2027 surveys were approved by NHTSA in early 2023. Please refer to Appendix II for the resumes of the principal investigators, Dr. Timothy Gates and Dr. Peter Savolainen, who in addition to leading the re-sampling effort for the 2023-2027 surveys, also led development of the methodological approach for the state of Michigan as a part of the FY 2013 seat belt survey. The following sections provide details of the sampling process.

2.1 General Approach

The study approach includes a stratified systematic probability proportional to size (PPS) sample of data collection sites as described here:

- All 83 counties in Michigan were listed in descending order of the average number of motor vehicle crash-related fatalities for the period from 2016 to 2020. FARS data were used to determine the average number of crash-related fatalities per county. It was determined 38 counties accounted for at least 85 percent of Michigan's total crash-related fatalities during this period as shown in Table 1 along with vehicle miles of travel (VMT). These 38 counties comprise the sample frame from which the survey observation locations would be selected, which is displayed in Figure 1.
- The counties were stratified according to historical seat belt use rates into four strata. These strata
 were constructed such that the annual VMT were approximately balanced within each of the four
 groups. This represents the first stage of sample selection.
- 3. At the second stage, the MAF/TIGER Feature Class Code (MTFCC, see Section 2.2) was used to classify all road segments into three explicit classifications: 1.) Primary Roads, 2.) Secondary Roads, and 3.) Local Roads. This resulted in a total of 12 strata (4 belt use strata, each with 3 MTFCC classes). The number of sites within each MTFCC class was determined proportionately based upon historical VMT, resulting in 30 percent primary roads, 60 percent secondary roads, and 10 percent local roads.

- 4. Road segments were then implicitly stratified by county and segment length. Specific segments were selected randomly with PPS from all segments within each stratum. A random, systematic sample of 50 road segments was selected PPS to road segment length within each belt use group. This process resulted in the selection of 200 road segments (4 belt use rate groups x 50 sites per belt use rate group, allocated proportionately among MTFCC classes). An additional 200 sites were also selected to use as alternates. Ultimately, the final set of observation sites included 35 counties out of the 38 initially identified within the sample frame, as no sites were selected in Hillsdale, Ionia, and Osceola counties
- 5. Based on past experience with the Michigan annual seat belt surveys, it was expected that each site would yield a sample size of 125 vehicles, thereby resulting in an expected 25,000 total vehicle observations. Based on this value, the standard error was expected to be less than 2.5 percent. In the event the calculated standard error should be greater than 2.5 percent, additional data would be collected from existing sites until this criterion was satisfied.
- Additional stages of selection were used to determine travel direction, lane, day of week, time of day, and vehicles to be observed, at random and with known probability, as appropriate under the Uniform Criteria, as described in Section 2.4.



Figure 1. 38-County Sample Frame for the Annual Direct Observation Seat Belt Survey

	Fatalities (2016-2020)		Vehicle Miles Traveled (Billions)						
County	Mean	Percent	Cumulative	2016	2017	2018	2019	2020	VMT
Wayne	106.0	16.2%	16.2%	15.52	15.80	15.94	15.80	12.73	15.16
Kent	39.0	5. 9%	22.2%	5.97	6.13	6.17	6.11	5.20	5.92
Oakland	36.0	5.5%	27.6%	12.94	13.08	13.05	13.08	10.63	12.56
Genesee	28.2	4.3%	31.9%	4.07	4.15	4.14	4.14	3.53	4.01
Macomb	25.2	3.8%	35.8%	6.46	6.37	6.64	6.78	5.77	6.40
Kalamazoo	20.2	3.1%	38.9%	2.51	2.66	2.64	2.62	2.17	2.52
Washtenaw	17.4	2.7%	41.5%	3.66	3.83	4.04	3.95	3.18	3.73
Ottawa	15.8	2.4%	43.9%	2.42	2.48	2.51	2.53	2.20	2.43
Monroe	14.4	2.2%	46.1%	2.03	2.05	2.05	2.04	1.67	1.97
Berrien	14.0	2.1%	48,2%	1.99	2.05	2.07	2.10	1.87	2.02
Calhoun	13.8	2.1%	50. <mark>4%</mark>	1.72	1.84	1.82	1.76	1.42	1.71
Muskegon	13.8	2.1%	52.5%	1.54	1.57	1.56	1.54	1.32	1.51
Saginaw	13.6	2.1%	54.5%	2.19	2.20	2.17	2.15	1.86	2.12
Livingston	13.0	2.0%	56.5%	2.35	2.40	2.43	2.43	2.05	2.33
St. Clair	12.6	1.9%	58.4 <mark>%</mark>	1.56	1.65	1.54	1.52	1.36	1.53
Ingham	12.2	1.9%	60.3%	2.35	2.41	2.39	2.35	1.93	2.29
Van Buren	12.2	1.9%	62.1%	1.05	1.09	1.10	1.09	0.95	1.05
Allegan	11.0	1.7%	63.8%	1.44	1.53	1.52	1.50	1.38	1.47
Jackson	10.4	1.6%	65.4%	1.71	1.77	1.75	1.74	1.44	1.68
St. Joseph	10.4	1.6%	67.0%	0.56	0.56	0.51	0.50	0.46	0.52
Montcalm	10.0	1.5%	68.5%	0.60	0.63	0.63	0.65	0.59	0.62
Eaton	9.8	1.5%	70.0%	1.25	1.29	1.29	1.30	1.08	1.24
Isabella	8.2	1.2%	71.3%	0.70	0.71	0.71	0.74	0.65	0.70
Clinton	7.6	1.2%	72.4%	1.15	1.18	1.18	1.17	0.98	1.13
Lenawee	7.6	1.2%	73.6%	0.92	0.93	0.93	0.87	0.75	0.88
Lapeer	7.4	1.1%	74.7%	0.94	0.97	0.98	1.00	0.88	0.95
Shiawassee	7.4	1.1%	75.8%	0.79	0.86	0.86	0.85	0.69	0.81
Cass	7.2	1.1%	76.9%	0.47	0.49	0.49	0.49	0.42	0.47
Newaygo	7.2	1.1%	78.0%	0.41	0.40	0.40	0.38	0.35	0.39
Tuscola	6.6	1.0%	79.0%	0.53	0.54	0.53	0.53	0.45	0.51
Midland	6.4	1.0%	80.0%	0.89	0.92	0.94	0.92	0.80	0.89
Grand Traverse	6.2	0.9%	81.0%	0.95	0.93	1.00	1.03	0.91	0.96
Barry	5.8	0.9%	81.8%	0.44	0.45	0.44	0.42	0.37	0.42
Bay	5.6	0.9%	82.7%	1.23	1.24	1.26	1.28	1.12	1.23
Ionia	5.6	0.9%	83.5%	0.82	0.85	0.83	0.82	0.69	0.80
Osceola	4.6	0.7%	84.2%	0.38	0.40	0.40	0.41	0.37	0.39
Hillsdale	4.4	0.7%	84.9%	0.39	0.41	0.41	0.41	0.37	0.40
Clare	4.2	0.6%	85.6%	0.37	0.41	0.39	0.39	0.37	0.39

Table 1. Michigan Average Motor Vehicle Crash-Related Fatalities by County (2016-2020)

2.2 Road Segment Stratification

Using 2021 Topologically Integrated Geographic Encoding and Referencing (TIGER) data developed by the U.S. Census Bureau, a comprehensive list of road segments from within these 38 counties was created. Each of these road segments has been classified by the U.S. Census Bureau using the MAF/TIGER Feature Class Code (MTFCC). There are primarily three classifications: 1) Primary Roads, 2) Secondary Roads, and 3) Local Roads (See Table 2 for detailed definitions). In addition, the listings include segment length as determined by TIGER. This descriptive information allowed for stratification of road segments. A systematic probability proportional to size (PPS) sample was employed to select the road segments to be used as observation sites.

Code	Name	Definition
S1100	Primary Road	Primary roads are limited-access highways that connect to other roads only at interchanges and not at at-grade intersections. This category includes Interstate highways, as well as all other highways with limited access (some of which are toll roads). Limited-access highways with only one lane in each direction, as well as those that are undivided are also included under S1100
S1200	Secondary Road	Secondary roads are main arteries that are not limited-access, usually in the U.S. highway, state highway, or county highway systems. These roads have one or more lanes of traffic in each direction, may or may not be divided, and usually have at grade intersections with many other roads and driveways. Secondary roads often have both a local name and a route number.
S1400	Local Neighborhood Road, Rural Road, City Street	A paved (privately or publicly maintained) non-arterial street, road, or byway that usually has a single lane of traffic in each direction. Scenic park roads would be included in this feature class, as would (depending on the region of the country) some unpaved roads.

Table 2. Michigan MAF/TIGER Feature Class Codes Included in the Road Segment File

2.3 Selection of Road Segments

Within each of the four belt use strata, a total of 50 road segments were selected. Michigan employed the Census TIGER EDGES data set for the selection of road segments. Michigan exercised the available exclusion option and removed rural local roads in counties not within metropolitan statistical areas (MSAs), and other non-public roads, unnamed roads, unpaved roads, vehicular trails, access ramps, cul-de-sacs, traffic circles, and service drives from the dataset. The number of road segments selected within each MTFCC class was determined proportionately based upon total annual VMT within the three classes (Primary, Secondary, and Local). Thus, the segments selected ultimately included 15 primary roads (20 percent of sample), 30 secondary roads (60 percent of sample), and 5 local roads (10 percent of sample).

Prior to selecting the specific observation locations, all road segments were explicitly stratified by MTFCC (primary, secondary and local) within each of the four belt use rate groups and implicitly stratified by county and by segment length to obtain an ordered list. Implicit stratification by county was done to ensure adequate geographic coverage was obtained as a part of the selection process. Similarly, the implicit

stratification by length ensured representative coverage within each MTFCC class since higher-class roads tended to be longer than lower-class roads. Specific road segments were then selected with PPS using segment length as the measure of selection (MOS). As such, the inclusion probability for a specific road segment is:

$$\pi_{h|gc} = n_{gc} l_h / \sum_{\forall h} l_h,$$

where n_{gc} is the road segment sample size for MTFCC *c* in stratum *g* that was allocated, l_h is the length of road segment h, and

$$\sum_{\forall h} l_h$$

is the total length of all segments in stratum g and MTCFF c.

A random start (RS) was selected between 0 and the calculated *I*, which determined the first road segment selected. Subsequent road segments selected were determined by adding multiples of *I* to the RS until the desired number of road segments were selected and/or the end of the sorted list was reached.

Table 3 presents summary statistics detailing the total length (miles) of segments in the sample frame, and the number of road segments selected within each of the MTFCC classes by belt use group and county. Ultimately, the final set of observation sites included 35 counties out of the 38 initially identified within the sample frame, as no sites were selected in Hillsdale, Ionia, and Osceola counties. Appendix III presents the complete list of the final observation sites including belt use stratum, county, and road classification.

In the event an original road segment was permanently unavailable, a reserve road segment was to be used. The reserve road segment sample consisted of one additional road segment per original road segment selected, resulting in a reserve sample of an additional 200 road segments. These reserve segments were identified and selected as the road segments immediately following the original road segment selected. Thus, these segments were also explicitly stratified by seat belt use and MTFCC group, as well as implicitly stratified by segment length and county. Each reserve segment corresponded to an original road segment selected. Thus, these are considered selected with PPS using road segment length as MOS by the same approach as described previously. As such, for the purposes of data weighting, the reserve road segment inherited all probabilities of selection and weighting components up to and including the road segment stage of selection (e.g., the sampling of vehicles) would be determined by the reserve road segment itself.

Country	Stuatum	Mean	Mean	Length of Roads in Sample Frame (<i>Miles</i>)			Count of Selected Sites		
County	Stratum	Fatalities	VMT	Primary Secondary Local			Duiman	Secondary	Local
Wormo	4	106.0	15.16	218.2	218.0	7.507.8		1 secondary	
Wayne	4	20.0	5.02	108.4	155.1	2 860 6	2	10	1
Oaldand	1	35.0	12.56	204.1	102.5	67467	2	-	2
Canasaa	2	28.2	12.50	162.5	195.5	2 804 0	1	9	1
Maaamh	3	26.2	4.01	105.5	102.0	2,094.0	1	12	1
Valamazaa	4	25.2	0.40	09.2	74.0	3,005.0	1	7	2
Washtonaw	1	17.4	2.52	90.0	74.9	2 575 7	7	1	2
Ottowo	2	17.4	2.75	80.2	124.0	2,373.7	1	4	2
Monroo	2	13.0	1.45	110.1	82.2	1,664.7	1	1	1
Porrion	2	14.4	2.02	119.1	122 7	2,010.2	2	1	0
Calhour	2	12.8	1.71	120.1	101.2	2,010.5	1	1	1
Muskegon	2	13.0	1.71	65.1	68.7	1,020.2	0	4	1
Sacinaw	2	13.0	2.12	61.2	166.2	2 260 8	0	2	1
Livingston	2	13.0	2.12	105.2	60.1	2,300.0	0		0
St Clair	2	12.6	1.52	105.5	104.1	2,010.0	2	1	0
Jucham	1	12.0	2.20	107.0	112.8	1,971.0	1	10	0
Von Duron	2	12.2	1.05	74.0	84.2	1,924.0	1	2	0
Allegan	2	11.0	1.05	112.5	83.0	0.0	1	2	0
Jackson	2	10.4	1.47	08.5	110.6	1 030 2	1	2	0
St Joseph	2	10.4	0.52	0.0	130 /	1,930.2	0	1	0
Montcalm	3	10.4	0.52	26.2	105.9	1 827 9	0	3	0
Faton	2	9.8	1.24	77.7	105.9	1,027.9	1	3	1
Isabella	3	8.2	0.70	67.2	36.1	0.0	1	2	0
Clinton	3	7.6	1 13	107.8	45.7	1 356 9	1	1	1
Lenawee	3	7.6	0.88	0.0	152.1	0.0	0	2	0
Laneer	3	7.4	0.95	49.5	79.8	1 582 3	2	1	1
Shiawassee	3	7.4	0.81	51.2	63.6	1,287.9	1	0	0
Cass	3	7.2	0.47	0.0	126.2	1 181 0	0	1	Ő
Newaygo	3	7.2	0.39	0.0	104.0	0.0	0	2	0
Tuscola	3	6.6	0.51	0.0	141.4	0.0	0	5	0
Midland	2	6.4	0.89	52.1	45.2	1.249.1	2	0	0
Grand Traverse	2	6.2	0.96	0.0	104.9	0.0	0	4	0
Barry	3	5.8	0.42	0.0	107.3	0.0	0	1	0
Bav	2	5.6	1.23	79.2	97.0	1,340.0	1	3	1
Ionia	3	5.6	0.80	51.0	77.7	1,310.6	0	1	0
Osceola	3	4.6	0.39	50.3	73.6	0.0	0	0	0
Hillsdale	3	4.4	0.40	0.0	108.0	0.0	0	0	0
Clare	3	4.2	0.39	68.4	65.6	0.0	3	1	0
Total			86.11	3,103.0	3,997.1	61,550.7	60	120	20

Table 3. Length of Roads in Sample Frame and Count of Selected Sites by County

2.4 Selection and Scheduling of Survey Locations

Road segments were mapped according to the latitude and longitude of their midpoints. The selected road segment was identified by an intersection or interchange that occurred within or just beyond the segment. Data collection sites were deterministically selected such that traffic would be moving during the observation period. Therefore, to capture vehicles moving at a low rate of speed to facilitate accurate data collection, the observation locations along each subject segment were selected to be within 50 to 150 feet upstream of a controlled intersection. For limited-access roadways, data collection locations were selected along the exit ramps. The observed direction of travel was randomly assigned for each road segment.

All belt use observations were conducted during weekdays and weekends between 7 AM and 7 PM to include rush hour (before 9:30 AM and after 3:30 PM) and non-rush hour observations. Site assignment schedules, which were provided to the data collectors and quality control monitors, indicated the observed road name, nearest crossroad, GPS coordinates where the observer should stand, assigned date, assigned time, and assigned observation direction. Sites within relatively close geographic proximity were assigned as data collection clusters. In accordance with the uniform seat belt survey criteria, the first site within each cluster was assigned a random day and time for completion. All other sites within a cluster were assigned to the same day and by geographic proximity to minimize travel within the cluster. Approximately five sites were scheduled each day for each data collector. Start times and days were staggered to ensure all days of the week and hours of the day (daylight) were represented in the sample.

2.5 Data Collection Process

Seat belt surveys were performed for exactly 60 minutes at each of the 200 observation locations. The data collected at the 200 observation sites provided a representative sample for each day of the week and each hour of the day between 7 AM and 7 PM of the statewide seat belt use characteristics. All passenger vehicles, including commercial vehicles weighing less than 10,000 pounds, were eligible for observation. Heavy truck, buses, and other vehicles weighing over 10,000 pounds were not observed. Only one direction of traffic was observed at any given site. The data collectors were instructed to observe as many lanes of traffic as they could while obtaining data on 99 percent of eligible vehicles. This direction of observations were appropriately weighted, as explained in the Data Analysis Section of this report (Section 5.0).

The observers carried a cover sheet and numerous seat belt observation data collection paper forms to each site. These forms are shown in Appendix I. The observation form was used to record seat belt use by drivers and front-seat passengers, including children in booster seats. The only front-seat occupants excluded from this study were children seated in child seats with harness straps. Table 4 lists the three clearly defined categories of seat belt use that were observed by the data collectors, which included 'belted correctly', 'not belted correctly', and 'unknown belt use' as previously described. An occupant was recorded

as 'belted correctly' only if they were observed to be properly using the shoulder belt (i.e., shoulder belt was across chest; not under arm or behind back). The 'unknown belt use' category was marked if an observer was unable to determine the position of an occupant's seat belt, and these observations were not included in the final sample, but a record was kept calculating the non-response rate which is discussed in the data analysis section of this report.

Code	Definition
Belted	The shoulder belt is in front of the person's shoulder and used correctly.
Not belted	The shoulder belt is not in front of the person's shoulder or not used at all.
Unknown	It cannot reasonably be determined whether the driver or right front passenger is belted.

Table 4. Seat Belt Use Codes and Definitions

Additional data collected for each observed front-seat occupant included occupant age (estimated), gender, and race, as well as vehicle type and use (e.g., commercial or non-commercial) information. The driver age categories included 16-29, 30-59, 60 and over, and unknown, while the passenger age also included a 0-15 category. The driver and passenger race categories included white, black, other, or unknown. Each observed vehicle was categorized into one of four groups: passenger cars, sport utility vehicles, vans or minivans, and pickup trucks. The vehicles were also identified as commercial or non-commercial vehicles. Furthermore, each driver was observed for any indication of mobile device use classified as follows: 'handheld (talking)', 'handheld (typing)', 'hands-free (earpiece)', and hands-free (no earpiece)'.

The cover sheet was used to document site information, including date, site location, site number, alternate site data, assigned traffic flow, number of lanes available and observed, start and end times for observations, and weather conditions. This cover sheet was completed by the data collector at each site before any observations took place.

Observations were manually recorded in the field on survey forms and returned back to the office within 24 hours of the data collection, or as soon as possible after multiple day trips to outstate locations. The data collected in the field were entered into a spreadsheet by the observer at the conclusion of the data collection activities for each day and verified for accuracy by office staff.

Data collectors also used a handheld tally device to simultaneously count every passenger vehicle that passed through the observed lanes during the 60-minute observation period, regardless of whether a seat belt observation was performed. This volume count was then utilized during the belt use weighting process.

2.6 Rescheduling and Alternate Sites

If a site was temporarily unavailable due to a crash, short-term road work or maintenance, inclement weather, or any event that may hinder exact results, data collection was rescheduled for a similar time of day and type of day of the week. In the event the site was permanently unavailable, such as being closed for long-term construction, then an alternate site selected as part of the reserve sample was to be used as a permanent replacement.

2.7 Sample Size and Precision

A standard error of less than 2.5 percent for the seat belt use estimates is required by the Final Rule. Since 1999, the annual seat belt surveys in Michigan have historically obtained standard errors below this threshold (e.g., 0.6 percent in 2023) with observed sample sizes often exceeding 25,000 vehicles. Since the proposed design for the 2024 Annual Survey was similar to the one utilized in 2023, it was expected that the vehicle sample size for the 2024 Annual Survey would be similar to the 2023 Annual Survey and the precision objective was expected to be achieved. In the event that the precision objective was not met, additional observations would be taken starting with those sites having the fewest observations. New data would be added to existing data until the desired precision was achieved. However, this was determined to not be necessary as the 2024 standard error was well below 2.5 percent.

3.0 OBSERVER TRAINING

The data collection team was comprised of MSU student staff. All data collectors were able to stand for long periods of time, work outdoors, and successfully complete the training program. The data collector training program included both a classroom and field portion. The classroom training program was conducted at MSU several weeks prior to the start of the survey and was led by the PI, Timothy Gates. All data collectors attended this classroom session, which was held in-person with appropriate pandemic-related safety precautions. Each data collector received a training manual composed of the information detailed during the training session and all necessary field supplies. The syllabus for the training program is shown as Figure 2.

At the conclusion of the classroom training, the data collectors conducted their first field practice at a location near the MSU campus. QC monitors with experience conducting seat belt surveys were available during this period to respond to questions and aid data collectors as needed. Reliability and repeatability field data collection practice continued during the weeks leading up to full-scale survey implementation at various intersections near the MSU campus for students living in the East Lansing area, and various locations across the state for students living outside of the area. These intersections represented various site characteristics that could be challenging for observational data collection. Initially, inexperienced observers were paired with experienced observers, who noted which individual vehicle the entire group was to evaluate. This allowed an analysis of the accuracy of the inexperienced data collectors in

comparison to those who have participated in the study previously. After gaining ample experience, observers were then assigned to collect seat belt observational data independently. The training data was then entered and compared among the observers in each group to determine the accuracy of their observations.

Day 1 - In-Class Training Program and Field Practice

Welcome, introductions, and distribution of materials					
Survey overview					
Scheduling and rescheduling Site Assignment Sheet Observation periods Temporary impediments such as weather Permanent impediments at data collection sites					
Site locations Locating assigned sites Alternate site selection Interstate ramps and surface streets Direction of travel/number of observed lanes					
Data collection techniques Definitions of belt/booster seat use, passenger vehicles Observation protocol: belt use, vehicle type/use, demographic characteristics Unobservable vehicles/occupants					
Data collection forms Cover sheet Recording alternate site information Recording observations					
Data entry procedures					
Travel reports, lodging, and auto reservations					
Field practice at ramps and surface streets					
Days 2-10 Continued Field Practice					
Field practice at ramps and surface streets					

Figure 2. Training Syllabus

4.0 QUALITY CONTROL

The policies and procedures utilized while conducting the direct observation surveys of seat belt use were based upon the *Uniform Criteria for State Observational Surveys of Seat Belt Use* from Title 23, Part 1240.12 of the Code of Federal Regulations. The study design for the 2024 Annual Survey was consistent with these criteria, which established observations should be conducted on specific dates and times and in particular directions of travel, all of which were determined randomly in advance of the studies. Further, the criteria state policies should be in place in the event observations cannot be made due to unanticipated events, such as road construction. In such situations, data collectors were instructed to observe at the preassigned alternate location. Policies were also established for cases where traffic flow is too heavy to observe all vehicles or traffic is moving too quickly for observation. In most instances, high traffic volumes prohibit data collectors from observing all vehicles. Consequently, data collectors were instructed to observe do observe as many vehicles as is feasible for observation under such conditions for the required period of 60 minutes, although all passenger vehicles traveling through the observed lanes during the data collection period were included in the volume count.

The principal investigators from MSU served as the QC monitors, conducting site audits of the data collectors. The QC monitor made unannounced covert visits to five percent of all data collection sites over the duration of the study, which amounted to 10 sites. The purpose of these visits was to ensure data collectors were following all survey protocol including performing observational surveys at the assigned location, in the assigned direction, during the assigned period, completing the cover sheet and observation forms correctly, making accurate observations of seat belt use within an appropriate number of lanes. The random checks were conducted at least once for each observer and no major violations of policies or procedure were observed as a part of these audits. The QC monitors also checked a 10 percent random sample of the entered data to ensure the observation data were being entered correctly from the data collection forms. After data entry, all forms were organized, boxed, and stored for 3-years.

5.0 DATA ANALYSIS

The data collected in the field as a part of the 35-county Annual Survey for 2024 were entered into a spreadsheet by the observer at the conclusion of the data collection activities for each day and verified for accuracy by office staff. Rates for seat belt and mobile device use were determined for each survey stratum, county, location, etc., as well as the statewide annual average. A 95-percent confidence interval for each use rate estimate was determined according to the NHTSA guidelines. The following sections outline the methods used to estimate the use rate and variance for seat belts. A similar procedure was utilized to estimate mobile device use rate and variance.

5.1 Imputation

No imputation was done on missing data.

5.2 Sampling Weights

The following is a summary of the notation used in this section.

- g Subscript for belt use group strata
- *h* Subscript for road segment strata
- *i* Subscript for road segment
- j Subscript for time segment
- k Subscript for road direction
- I Subscript for lane
- m Subscript for vehicle
- n Subscript for front-seat occupant

Under this stratified multistage sample design, the inclusion probability for each observed vehicle was the product of selection probabilities at all stages: π_g for belt use group (stratum-road class), $\pi_{hi|g}$ for road segment, $\pi_{j|ghi}$ for time segment, $\pi_{k|ghij}$ for direction, $\pi_{l|ghijk}$ for lane, and $\pi_{m|ghijkl}$ for vehicle. So the overall vehicle inclusion probability was:

$$\pi_{ghijklm} = \pi_g \pi_{hi|g} \pi_{j|ghi} \pi_{k|ghij} \pi_{l|ghijk} \pi_{m|ghijkl}$$

The sampling weight (design weight) for vehicle *m* is:

$$w_{gchijklm} = rac{1}{\pi_{gchijklm}}$$

5.3 Non-Responding Site Adjustment

There were no sites which required 'non-responding' adjustment in the 2024 Annual Survey due to zero eligible vehicles arriving during the observation period.

5.4 Estimators

Noting all front-seat occupants were observed, the driver/passenger seat belt use status was:

$$y_{ghijklmn} = \begin{cases} 1, if belt used \\ 0, otherwise \end{cases}$$

In order to estimate the weighted seat belt use rate most accurately for the entire state of Michigan, the estimator used in this analysis was weighted by segment length and stratum-level VMT to determine the overall annual belt use rate in Michigan. This estimation technique is detailed in *An Example of a Compliant*

State Seat Belt Use Survey Design [6]. Under this estimator, the use rates within each stratum were first calculated using the road segment length-based estimator:

$$p_{L_{gh}} = \frac{\sum_{all \, ijklmn \, in \, gh} w_{ijklm|gh} Length_{ghi} y_{ghijklmn}}{\sum_{all \, ijklmn \, in \, gh} w_{ijklm|gh} Length_{ghi}}$$

The twelve stratum-specific use rates were then weighted by the proportion of total statewide VMT (shown in Table 5) within each stratum, which resulted in the road class VMT-based estimator:

$$p_{VMT} = \frac{\sum_{g} w_{g} \sum_{h} VMT_{gh} p_{gh}}{\sum_{g} w_{g} \sum_{h} VMT_{gh}}$$

The use of the VMT-based estimator (p_{VMT}) reduced the weighting bias towards local road observation sites by accounting for their relatively short length and low VMT as compared to primary and secondary roads. VMT data were obtained from the Michigan Highway Performance Monitoring System (HPMS) for the year 2022 (most recent available), which are displayed by stratum in Table 5.

Belt Use				
Stratum	Primary	Secondary	Local	Total
1	6,833,370	10,949,961	2,265,048	20,048,380
2	7,978,793	11,759,783	1,849,067	21,587,643
3	6,264,366	12,661,555	2,133,233	21,059,153
4	6,968,986	11,286,222	2,442,641	20,697,849
Statewide	28,045,515	46,657,521	8,689,989	83,393,025

Table 5. Annual Vehicle Miles of Travel by Stratum, 2022 (in 1,000s)

5.5 Variance Estimation

The variance (and standard error) for each estimator was determined using the "Delete-1 Jackknife" variance estimation program in SUDAAN 11 software. Under this methodology, the variance was calculated by deleting one observation location and adjusting the weights of the remaining PSU's in the same stratum to account for the deleted PSU. The procedure was repeated, removing each location once. For the road class VMT based estimator (p_{VMT}), the "Delete-1 Jackknife" method was used to estimate the variances within each of the road class/belt use strata:

$$V(p_{gh}) = \left(\frac{n_{gh} - 1}{n_{gh}}\right) \sum_{i=1}^{n_{gh}} (p_{ghi} - p_{gh})(p_{ghi} - p_{gh})'$$

where:

 $V(p_{gh})$ = Estimated variance within each of the road class/belt use strata

p = Estimated belt use rate

 p_{ghi} = Estimated belt use rate at location i in road segment type h in belt use group g

 p_{ah} = Estimated belt use rate in road segment type h in belt use group g

 n_{gh} = Number of locations of road segment type h in belt use group g

The variance for the annual use rate was then determined using the following equation:

$$V(p) = \frac{\sum_{\forall g,\forall h} VMT_{gh}^2 V(p_{gh})}{\left(\sum_{\forall g,\forall h} VMT_{gh}\right)^2}$$

where:

V(p) = Estimated variance of statewide belt use rate

The standard error of the statewide use rate was found by simply taking the square root of the estimated variance. The 95 percent confidence interval of the statewide belt use was equal to the weighted seat belt use rate plus/minus 1.96 (for the Z-test at alpha = 0.05) multiplied by the standard error expressed as a percent.

5.6 Non-Response Rate

According to NHTSA's guidelines, the non-response rate for the 2024 Annual Survey cannot exceed 10 percent. A non-response occurs when the observer was not able to determine the seat belt use of a front-seat vehicle occupant. This can occur due to a variety of reasons such as tinted windows, sun glare, high speeds of the vehicle in question, etc. Observers in the field marked either 'vehicle not observable' or 'unknown belt use' to keep a record of the non-response rate. There were a total of 18 non-response observations in the 2024 Annual Survey which represents approximately 0.07 percent of the total number of observations. This non-response rate was well below the allowable maximum of 10 percent established by the NHTSA. It should be noted that 'non-response' observations are not included in the analyses or tables in Chapter 6.0.

6.0 RESULTS AND TRENDS

The 2024 Annual Survey was performed between Tuesday, May 28 and Monday, June 17, 2024. During this observation period, a total of 20,647 vehicles were observed resulting in 25,000 total observations of drivers and right-front passengers at the 200 observation sites randomly selected to represent statewide seat belt use according to the federal Uniform Criteria.

6.1 Seat Belt Survey Results

The overall 2024 weighted annual seat belt use rate for Michigan was found to be 92.0 percent and is shown in Table 6 along with the standard error and confidence interval. The overall weighted annual seat belt use rate was calculated based upon the procedure described in the Data Analysis section (Section 5.0) of this report. The overall annual seat belt use rate is representative of all front-seat occupants (drivers and right-front passengers), all daytime hours (7:00 AM - 7:00 PM), and all days of the week. Again, it is noted that "belted" occupants included all drivers and front-seat passengers who were belted correctly, while "not belted" occupants included drivers and front-seat passengers who were either not belted or were wearing the shoulder belt incorrectly (e.g., under their arm or behind their back). The results of the belt use surveys at each of the 200 observation locations are provided in Appendix III.

 Table 6. Weighted Seat Belt Use Rate for Drivers and Front-Seat Passengers

Observational Wave	Seat Belt Use Rate*	Standard Error	
Annual	$92.0\pm0.8\%$	0.4%	

* Weighted Seat Belt Usage ± 95% Confidence Band

The seat belt use rate has also been calculated by occupant type, stratum, county, vehicle type, and various demographic categories, as presented in Table 7 and Tables 9 through 15. It should be noted that the seat belt use rates presented in these subsequent tables represent the raw (i.e., unweighted) seat belt use. As these raw rates are not weighted, they will vary slightly from the weighted annual use rate presented in Table 6.

Table 7 displays the raw (unweighted) seat belt use rates separately for drivers and right-front passengers. Table 8 summarizes the descriptive statistics for the seat belt survey in terms of sampling statistics for day of week and time of day.

Belt Use	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
Drivers	20,647	18,953	91.8%
Passengers (Right-Front)	4,353	4,070	93.5%
Total	25,000	23,023	92.1%

Table 7. Seat Belt Use by Occupant Type

*Unweighted rate based on the raw observation data.

Table 8.	Sampling	g Summar	y by	y Day	/ of Week	and	Time	of	Day
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Day of Week	Number of Sites Observed	Percent of Sites Observed	Number of Occupants Observed	Percent of Occupants Observed
Sunday	22	11.0%	3,281	13.1%
Monday	29	14.5%	3,226	12.9%
Tuesday	19	9.5%	2,252	9.0%
Wednesday	31	15.5%	3,843	15.4%
Thursday	47	23.5%	5,837	23.3%
Friday	25	12.5%	3,140	12.6%
Saturday	27	13.5%	3,421	13.7%
Total	200	100%	25,000	100%
Time of Day	Number of Sites Observed	Percent of Sites Observed	Number of Occupants Observed	Percent of Occupants Observed
7 am – 8 am	11	5.5%	1,097	4.4%
8 am – 9 am	13	6.5%	1,588	6.4%
9 am – 10 am	17	8.5%	2,003	8.0%
10 am – 11 am	23	11.5%	2,700	10.8%
11 am – 12 pm	19	9.5%	2,582	10.3%
12 pm – 1 pm	22	11.0%	2,530	10.1%
1 pm – 2 pm	23	11.5%	3,229	12.9%
2 pm – 3 pm	19	9.5%	2,599	10.4%
3 pm – 4 pm	23	11.5%	2,868	11.5%
4 pm – 5 pm	10	5.0%	1,300	5.2%
5 pm – 6 pm	10	5.0%	1,225	4.9%
6 pm – 7 pm	10	5.0%	1,279	5.1%
Total	200	100%	25,000	100%

Table 9 summarizes the 2024 driver and front-seat passenger seat belt use rates by county and belt-use stratum. Because of the relatively low number of sites and/or observations in many counties, the seat belt use rates listed may not be fully representative of each county. Strata 1 and 2 displayed the highest seat belt use rate (at 93.9 percent and 94.7 percent, respectively), while Stratum 4 displayed the lowest seat belt use rate at 89.3 percent. Tables 10 through 14 summarize occupant seat belt use for drivers and front-seat passengers by vehicle type for each day of the week, time of the day, gender, age, and race.

STRATUM 1	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
Ingham County	1,288	1,202	93.3%
Kalamazoo County	1,463	1,373	93.8%
Oakland County	1,957	1,821	93.1%
Washtenaw County	1,846	1,755	95.1%
Total	6,554	6,151	93.9%
STRATUM 2	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
Allegan County	586	556	94.9%
Bay County	598	557	93.1%
Calhoun County	831	783	94.2%
Eaton County	506	478	94.5%
Grand Traverse County	605	561	92.7%
Jackson County	162	150	92.6%
Kent County	1,136	1,102	97.0%
Livingston County	139	130	93.5%
Midland County	224	217	96.9%
Monroe County	285	271	95.1%
Ottawa County	1,027	970	94.4%
Total	6,099	5,775	94.7%
STRATUM 3	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
Barry County	314	293	93.3%
Berrien County	258	241	93.4%
Cass County	156	124	79.5%
Clare County	485	427	88.0%
Clinton County	238	230	96.6%
Genesee County	355	297	83.7%
Isabella County	341	318	93.3%
Lapeer County	362	325	89.8%
Lenawee County	265	249	94.0%
Montcalm County	362	324	89.5%
Muskegon County	292	275	94.2%
Newaygo County	179	159	88.8%
Saginaw County	462	421	91.1%
Shiawassee County	77	72	93.5%
St. Clair County	412	376	91.3%
St. Joseph County	117	99	84.6%
Tuscola County	724	652	90.1%
Van Buren County	384	353	91.9%
Total	5,783	5,235	90.5%
STRATUM 4	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
Macomb County	1,997	1,803	90.3%
Wayne County	4,567	4,059	88.9%
Total	6,564	5,862	89.3%
Grand Total	25,000	23,023	92.1%

Table 9. Seat Belt Use by Stratum and County

Day of Week	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
Sunday	3,281	3,059	93.2%
Monday	3,226	2,988	92.6%
Tuesday	2,252	2,130	94.6%
Wednesday	3,843	3,510	91.3%
Thursday	5,837	5,386	92.3%
Friday	3,140	2,820	89.8%
Saturday	3,421	3,130	91.5%
Total	25,000	23,023	92.1%
Time of Day	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
7 am – 8 am	1,097	1,006	91.7%
8 am – 9 am	1,588	1,488	93.7%
9 am – 10 am	2,003	1,837	91.7%
10 am – 11 am	2,700	2,519	93.3%
11 am – 12 pm	2,582	2,364	91.6%
12 pm – 1 pm	2,530	2,295	90.7%
1 pm – 2 pm	3,229	2,947	91.3%
2 pm – 3 pm	2,599	2,386	91.8%
3 pm – 4 pm	2,868	2,642	92.1%
4 pm – 5 pm	1,300	1,214	93.4%
5 pm – 6 pm	1,225	1,130	92.2%
6 pm – 7 pm	1,279	1,195	93.4%
Total	25,000	23,023	92.1%
Vehicle Type	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
Passenger Cars	5,491	5,011	91.3%
Sport Utility Vehicles	12,531	11,838	94.5%
Vans/Minivans	2,004	1,833	91.5%
Pickup Trucks	4,974	4,341	87.3%
Total	25,000	23,023	92.1%
Gender	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
Male	13,720	12,361	90.1%
Female	11,268	10,650	94.5%
Unknown	12	12	100.0%
Total	25,000	23,023	92.1%
Age	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
0 - 15	357	340	95.2%
16 - 29	6,041	5,456	90.3%
30 - 59	14,759	13,602	92.2%
60+	3,820	3,605	94.4%
Unknown	23	20	87.0%
Total	25,000	23,023	92.1%
Race	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
White	21,197	19,718	93.0%
Black	2,569	2,191	85.3%
Other	1,213	1,095	90.3%
Unknown	21	19	90.5%
Total	25,000	23,023	92.1%

Table 10. Seat Belt Use by Day of Week, Time of Day, Vehicle Type, and Demographics

Seat Belt Use in Passenger Cars					
Day of Week	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
Sunday	678	628	92.6%		
Monday	710	659	92.8%		
Tuesday	515	477	92.6%		
Wednesday	833	769	92.3%		
Thursday	1,282	1,169	91.2%		
Friday	706	630	89.2%		
Saturday	767	679	88.5%		
Total	5,491	5,011	91.3%		
Time of Day	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
7 am – 8 am	248	223	89.9%		
8 am – 9 am	332	316	95.2%		
9 am – 10 am	420	383	91.2%		
10 am – 11 am	561	517	92.2%		
11 am – 12 pm	510	449	88.0%		
12 pm – 1 pm	644	575	89.3%		
1 pm – 2 pm	711	649	91.3%		
2 pm – 3 pm	628	561	89.3%		
3 pm – 4 pm	643	592	92.1%		
4 pm – 5 pm	233	217	93.1%		
5 pm – 6 pm	285	267	93.7%		
6 pm – 7 pm	276	262	94.9%		
Total	5,491	5,011	91.3%		
Gender	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
Male	3,055	2,752	90.1%		
Female	2,432	2,255	92.7%		
Unknown	4	4	100.0%		
Total	5,491	5,011	91.3%		
Age	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
0 - 15	50	44	88.0%		
16 - 29	2,120	1,902	89.7%		
30 - 59	2,560	2,350	91.8%		
60+	753	709	94.2%		
Unknown	8	6	75.0%		
Total	5,491	5,011	91.3%		
Race	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
White	4,259	3,965	93.1%		
Black	862	718	83.3%		
Other	360	319	88.6%		
Unknown	10	9	90.0%		
Total	5,491	5,011	91.3%		

Table 11.	Seat Belt	Use -	Passenger	Cars
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Seat Belt Use in Sport Utility Vehicles					
Day of Week	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
Sunday	1,699	1,620	95.4%		
Monday	1,531	1,458	95.2%		
Tuesday	1,147	1,099	95.8%		
Wednesday	1,960	1,843	94.0%		
Thursday	2,922	2,767	94.7%		
Friday	1,528	1,414	92.5%		
Saturday	1,744	1,637	93.9%		
Total	12,531	11,838	94.5%		
Time of Day	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
7 am – 8 am	543	510	93.9%		
8 am – 9 am	832	792	95.2%		
9 am – 10 am	1,014	949	93.6%		
10 am – 11 am	1,379	1,318	95.6%		
11 am – 12 pm	1,315	1,242	94.4%		
12 pm – 1 pm	1,267	1,173	92.6%		
1 pm – 2 pm	1,597	1,508	94.4%		
2 pm – 3 pm	1,292	1,220	94.4%		
3 pm – 4 pm	1,350	1,272	94.2%		
4 pm – 5 pm	686	662	96.5%		
5 pm – 6 pm	601	569	94.7%		
6 pm – 7 pm	655	623	95.1%		
Total	12,531	11,838	94.5%		
Gender	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
Male	5,510	5,134	93.2%		
Female	7,017	6,700	95.5%		
Unknown	4	4	100.0%		
Total	12,531	11,838	94.5%		
Age	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
0 - 15	199	191	96.0%		
16 - 29	2,829	2,631	93.0%		
30 - 59	7,434	7,022	94.5%		
60+	2,062	1,988	96.4%		
Unknown	7	6	85.7%		
Total	12,531	11,838	94.5%		
Race	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
White	10,507	10,049	95.6%		
Black	1,338	1,163	86.9%		
Other	679	620	91.3%		
Unknown	7	6	85.7%		
Total	12,531	11,838	94.5%		

Seat Belt Use in Vans and Minivans					
Day of Week	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
Sunday	192	179	93.2%		
Monday	287	255	88.9%		
Tuesday	215	205	95.3%		
Wednesday	282	251	89.0%		
Thursday	550	505	91.8%		
Friday	220	195	88.6%		
Saturday	258	243	94.2%		
Total	2,004	1,833	91.5%		
Time of Day	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
7 am – 8 am	94	87	92.6%		
8 am – 9 am	112	102	91.1%		
9 am – 10 am	177	161	91.0%		
10 am – 11 am	258	247	95.7%		
11 am – 12 pm	210	190	90.5%		
12 pm – 1 pm	203	188	92.6%		
1 pm – 2 pm	244	221	90.6%		
2 pm – 3 pm	199	178	89.4%		
3 pm – 4 pm	237	210	88.6%		
4 pm – 5 pm	103	95	92.2%		
5 pm – 6 pm	77	71	92.2%		
6 pm – 7 pm	90	83	92.2%		
Total	2,004	1,833	91.5%		
Gender	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
Male	1,173	1,052	89.7%		
Female	831	781	94.0%		
Unknown	0	0	Not applicable		
Total	2,004	1,833	91.5%		
Age	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
0 - 15	54	52	96.3%		
16 - 29	343	302	88.0%		
30 - 59	1,325	1,215	91.7%		
60+	281	263	93.6%		
Unknown	1	1	100.0%		
Total	2,004	1,833	91.5%		
Race	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*		
White	1,753	1,607	91.7%		
Black	169	147	87.0%		
Other	82	79	96.3%		
Unknown	0	0	Not applicable		
Total	2,004	1,833	91.5%		

Table 13. Seat Belt Use – Vans and Minivans

	Seat Belt Us	e in Pickup Trucks	
Day of Week	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
Sunday	712	632	88.8%
Monday	698	616	88.3%
Tuesday	375	349	93.1%
Wednesday	768	647	84.2%
Thursday	1,083	945	87.3%
Friday	686	581	84.7%
Saturday	652	571	87.6%
Total	4,974	4,341	87.3%
Time of the Day	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
7 am – 8 am	212	186	87.7%
8 am – 9 am	312	278	89.1%
9 am – 10 am	392	344	87.8%
10 am – 11 am	502	437	87.1%
11 am – 12 pm	547	483	88.3%
12 pm – 1 pm	416	359	86.3%
1 pm – 2 pm	677	569	84.0%
2 pm – 3 pm	480	427	89.0%
3 pm – 4 pm	638	568	89.0%
4 pm – 5 pm	278	240	86.3%
5 pm – 6 pm	262	223	85.1%
6 pm – 7 pm	258	227	88.0%
Total	4,974	4,341	87.3%
Gender	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
Male	3,982	3,423	86.0%
Female	988	914	92.5%
Unknown	4	4	100.0%
Total	4,974	4,341	87.3%
Age	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
0 - 15	54	53	98.1%
16 - 29	749	621	82.9%
30 - 59	3,440	3,015	87.6%
60+	724	645	89.1%
Unknown	7	7	100.0%
Total	4,974	4,341	87.3%
Race	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
White	4,678	4,097	87.6%
Black	200	163	81.5%
Other	92	77	83.7%
Unknown	4	4	100.0%
Total	4,974	4,341	87.3%

Table 14. Seat Belt Use - Pickup Trucks

Occupants of SUVs exhibited the highest seat belt use rate among vehicle types at 94.5 percent, followed by occupants of vans and minivans at 91.5 percent. Occupants of passenger cars exhibited a use rate of 91.3 percent, while occupants of pickup trucks exhibited the lowest use rate at 87.3 percent; consistent with historical trends. Considering days of the week, Fridays demonstrated the lowest seat belt usage rate with 89.8 percent. Seat belt use rates were highest on Tuesdays with a rate of 94.6 percent. The time 12:00 p.m. – 1:00 p.m. exhibited a lower usage rate (90.7 percent) than during all other times of the day, while the highest belt use rate (93.7 percent) was observed between 8:00 a.m. and 9:00 a.m.

Female occupants had higher use rates than male occupants by 4.4 percentage points (94.5 percent use rate for women vs. 90.1 percent use rate for men). The seat belt usage rate was highest among occupants age 60 and above (94.4 percent) and lowest for occupants between the ages of 16 to 29 (90.3 percent). Considering occupant race, the seat belt use rate was found to be lowest among black occupants (85.3 percent), while white occupants and other races were found to have a seat belt use rate of 93.0 percent and 90.3 percent, respectively.

Table 15 summarizes occupant seat belt use rates by gender, age, and race. Vehicle occupants whose gender could not be identified were excluded from this demographic comparison. Black men ages 16 to 29 exhibited the lowest belt use rate among all demographic categories (75.9 percent), which is consistent with prior belt use surveys. Also similar to previous findings, white women generally exhibited the highest seat belt use rates across the various age groups compared with other demographics.

Gender	Age	Race	Total Occupant Count	Belted Occupant Count	% Seat Belt Use*
		White	162	154	95.1%
		Black	18	15	83.3%
	0 - 15	Other	13	13	100.0%
		Unknown	0	0	Not applicable
		Total	193	182	94.3%
		White	2,078	1,844	88.7%
		Black	415	315	75.9%
	16 - 29	Other	246	214	87.0%
		Unknown	1	1	100.0%
		Total	2,740	2,374	86.6%
		White	7,559	6,889	91.1%
		Black	875	757	86.5%
Mala	30 - 59	Other	390	339	86.9%
wate		Unknown	3	2	66.7%
		Total	8,827	7,987	90.5%
		White	1,886	1,752	92.9%
		Black	44	41	93.2%
	60+	Other	19	16	84.2%
		Unknown	0	0	Not applicable
		Total	1,949	1,809	92.8%
	Unknown	White	5	4	80.0%
		Black	1	1	100.0%
		Other	0	0	Not applicable
		Unknown	5	4	80.0%
		Total	11	9	81.8%
	TO	TAL MALES	13,720	12,361	90.1%
		White	125	122	97.6%
		Black	20	17	85.0%
	0 - 15	Other	19	19	100.0%
		Unknown	0	0	Not applicable
		Total	164	158	96.3%
		White	2,595	2,468	95.1%
		Black	443	370	83.5%
	16 - 29	Other	263	244	92.8%
		Unknown	0	0	Not applicable
		Total	3,301	3,082	93.4%
		White	5,008	4,777	95.4%
		Black	681	606	89.0%
Female	30 - 59	Other	243	232	95.5%
1 onlaid		Unknown	0	0	Not applicable
		Total	5,932	5,615	94.7%
		White	1,774	1,703	96.0%
		Black	71	68	95.8%
	60+	Other	19	18	94.7%
		Unknown	2	2	100.0%
		Total	1,866	1,791	96.0%
		White	1	1	100.0%
		Black	0	0	Not applicable
	Unknown	Other	1	0	0.0%
		Unknown	3	3	100.0%
		Total	5	4	80.0%
	тот	AL FEMALES	11,268	10,650	94.5%

Table 15. Seat Belt Use by Gender, Age, and Race

6.2 Seat Belt Use Trends

Figure 3 displays the seat belt use trends from the Michigan annual seat belt surveys between 2014 and 2024 during which seat belt use ranged between 92.0 (2024) and 94.5 (2016). In comparison to 2023, the 2024 Annual Survey revealed a slight decrease in seat belt usage from 92.4 percent in 2023 to 92.0 percent in 2024. However, this decrease in belt use is not statistically significant based on the 95-percent confidence band. From a geographic standpoint, this decrease in the statewide use rate is largely driven by general declines in belt use within several counties in Stratum 3, which are generally rural counties, coupled with the declines in Ingham and Macomb counties. Wayne County, which accounted for the greatest number of observations within any single county, and greater than 18 percent of all observations, saw belt use rates increase from 87.7 percent in 2023 to 88.9 percent in 2024. Furthermore, as shown in this and previous annual surveys of seat belt use in Michigan, from a demographic standpoint, the lowest seat belt use rates were observed for young men, black men, and males in pickup trucks. Continued public awareness and enforcement efforts addressing at-risk vehicle occupants and geographic areas prone to low belt use rates are warranted to increase seat belt use.



Figure 3. Seat Belt Use by Front-Seat Occupants in Michigan, 2014 - 2024

6.3 Mobile Device Survey Results

Mobile device use among drivers was also collected as a part of the 2024 Annual Survey. Drivers who were observed utilizing a mobile device were categorized as follows:

- Talking Handheld
- Typing Handheld
- Talking Hands-free (Earpiece Observed)
- Talking Hands-free (Earpiece Not Observed)

Table 16 presents driver mobile device use in 2024 by the type of use.

Type of Use	Total Number of Driver Observations	Number of Drivers Using a Mobile Device	% Mobile Device Use by Drivers*
Talking – Handheld	20,647	406	2.0%
Typing – Handheld	20,647	657	3.2%
Talking – Hands-Free (Earpiece Observed)	20,647	39	0.2%
Talking – Hands-Free (Earpiece Not Observed)	20,647	354	1.7%
Overall Mobile Device Use	20,647	1,456	7.1%

 Table 16. Driver Mobile Device Use Rates by Type of Use

*Unweighted rate based on the raw observation data.

In prior years, Michigan's overall mobile device use calculation included all four of the above categories. However, due to the introduction of the Michigan's distracted driving law, which went into effect on June 30, 2023 thereby prohibiting drivers from manually using a cell phone or other mobile device while operating a vehicle, a handheld-only mobile device use rate was also calculated in addition to the overall (i.e., handheld plus hands-free) rate.

6.3.1 All Mobile Devices (Handheld and Hands-Free)

When all handheld and hands-free mobile device use categories were included, the overall weighted driver mobile device use rate for Michigan in 2024 was 7.5 percent, which is shown in Table 17 along with the confidence band and standard error. The weighting procedure was the same as that for the seat belt rate described in the "Data Analysis" section (Section 5.0) of the report and, therefore, the weighted rate will differ from the raw/unweighted values presented in subsequent tables.

Type of Use	Use Rate*	Standard Error
All Uses of Mobile Devices (Handheld and Hands-Free)	$7.5\pm1.0~\%$	0.5%

Table 17. Weighted Driver Mobile Device Use Rate (Handheld and Hands-Free)

* Weighted Driver Mobile Device Usage ± 95% Confidence Band

Table 18 summarizes the use of mobile devices (handheld and hands-free) by drivers in terms of stratum, day of the week, time of the day, vehicle type, gender, age, and race. Considering the four strata, by far the highest mobile device use by drivers was observed in Stratum 4 (9.7 percent). Women were found to be more likely to use a mobile device while driving than men (9.0 percent and 5.7 percent, respectively). The mobile device use rate was found to be highest between 12:00 p.m. and 2:00 p.m. (both hours at 8.6 percent), while the mobile device use rate was lowest between 6:00 p.m. and 7:00 p.m. (4.6 percent). Perhaps most notably, there is a clear decreasing trend between age and mobile device use. Mobile device use was highest (12.2 percent) for drivers under 30 years of age, compared to 6.2 percent for drivers aged 30 to 59 and 2.0 percent for drivers aged 60 and above. Black drivers tended to exhibit higher mobile device use rates (12.8 percent) compared to the other race categories. Turning to days of the week, mobile device use was highest on Fridays (9.3 percent), and lowest on Sundays (5.0 percent). Finally, mobile device use was highest among drivers of passenger cars (7.9 percent), and lowest among drivers of pickup trucks (5.8 percent).

Stratum	Total Number of Driver Observations	Number of Drivers Using a Mobile Device	Percent of Drivers Using a Mobile Device*
1	5535	354	6.4%
2	5013	307	6.1%
3	4559	258	5.7%
4	5540	537	9.7%
Total	20,647	1,456	7.1%
Day of Week	Total Number of Driver Observations	Number of Drivers Using a Mobile Device	Percent of Drivers Using a Mobile Device*
Sunday	2,456	124	5.0%
Monday	2,803	198	7.1%
Tuesday	1,935	126	6.5%
Wednesday	3,334	258	7.7%
Thursday	4,929	364	7.4%
Friday	2,603	241	9.3%
Saturday	2,587	145	5.6%
Total	20,647	1,456	7.1%

Table 18. Driver Mobile Device Use by Stratum, Day of Week, Time of Day, Vehicle Type, and
Demographics (Handheld and Hands-Free)

Time of Day	Total Number of Driver Observations	Number of Drivers Using a Mobile Device	Percent of Drivers Using a Mobile Device*		
7 am – 8 am	991	73	7.4%		
8 am – 9 am	1,378	81	5.9%		
9 am – 10 am	1,722	107	6.2%		
10 am – 11 am	2,203	137	6.2%		
11 am – 12 pm	2,081	153	7.4%		
12 pm – 1 pm	2,107	182	8.6%		
1 pm – 2 pm	2,676	230	8.6%		
2 pm – 3 pm	2,080	136	6.5%		
3 pm – 4 pm	2,374	187	7.9%		
4 pm – 5 pm	1,064	66	6.2%		
5 pm – 6 pm	966	58	6.0%		
6 pm – 7 pm	1,005	46	4.6%		
Total	20,647	1,456	7.1%		
Vehicle Type	Total Number of Driver Observations	Number of Drivers Using a Mobile Device	Percent of Drivers Using a Mobile Device*		
Passenger Cars	4,704	370	7.9%		
Sport Utility Vehicles	10,269	753	7.3%		
Vans/Minivans	1,584	97	6.1%		
Pickup Trucks	4,090	236	5.8%		
Total	20,647	1,456	7.1%		
Gender	Total Number of Driver Observations	Number of Drivers Using a Mobile Device	Percent of Drivers Using a Mobile Device*		
Male	12,184	694	5.7%		
Female	8,456	762	9.0%		
Female Unknown	8,456 7	762 0	9.0% 0.0%		
Female Unknown Total	8,456 7 20,647	762 0 1,456	9.0% 0.0% 7.1%		
Female Unknown Total Age	8,456 7 20,647 Total Number of Driver Observations	762 0 1,456 Number of Drivers Using a Mobile Device	9.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device*		
Female Unknown Total Age 16 - 29	8,456 7 20,647 Total Number of Driver Observations 5,018	762 0 1,456 Number of Drivers Using a Mobile Device 612	9.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 12.2%		
Female Unknown Total Age 16 - 29 30 - 59	8,456 7 20,647 Total Number of Driver Observations 5,018 12,653	762 0 1,456 Number of Drivers Using a Mobile Device 612 786	9.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 12.2% 6.2%		
Female Unknown Total Age 16 - 29 30 - 59 60+	8,456 7 20,647 Total Number of Driver Observations 5,018 12,653 2,960	762 0 1,456 Number of Drivers Using a Mobile Device 612 786 58	9.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 12.2% 6.2% 2.0%		
Female Unknown Total Age 16 - 29 30 - 59 60+ Unknown	8,456 7 20,647 Total Number of Driver Observations 5,018 12,653 2,960 16	762 0 1,456 Number of Drivers Using a Mobile Device 612 786 58 0	9.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 12.2% 6.2% 2.0% 0.0%		
Female Unknown Total Age 16 - 29 30 - 59 60+ Unknown Total	8,456 7 20,647 Total Number of Driver Observations 5,018 12,653 2,960 16 20,647	762 0 1,456 Number of Drivers Using a Mobile Device 612 786 58 0 1,456	9.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 12.2% 6.2% 2.0% 0.0% 7.1%		
Female Unknown Total Age 16 - 29 30 - 59 60+ Unknown Total Race	8,456 7 20,647 Total Number of Driver Observations 5,018 12,653 2,960 16 20,647 Total Number of Driver Observations	762 0 1,456 Number of Drivers Using a Mobile Device 612 612 786 58 0 0 1,456 Number of Drivers Using a Mobile Device	9.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 12.2% 6.2% 2.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device*		
Female Unknown Total Age 16 - 29 30 - 59 60+ Unknown Total Race White	8,456 7 20,647 Total Number of Driver Observations 5,018 12,653 2,960 16 20,647 Total Number of Driver Observations 17,458	762 0 1,456 Number of Drivers Using a Mobile Device 612 786 58 0 1,456 Number of Drivers Using a Mobile Device 1,074	9.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 12.2% 6.2% 2.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 6.2%		
Female Unknown Total Age 16 - 29 30 - 59 60+ Unknown Total Race White Black	8,456 7 20,647 Total Number of Driver Observations 5,018 12,653 2,960 16 20,647 Total Number of Driver Observations 17,458 2,177	762 0 1,456 Number of Drivers Using a Mobile Device 612 786 58 0 1,456 Number of Drivers Using a Mobile Device 1,456 Number of Drivers Using a Mobile Device 1,074 279	9.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 12.2% 6.2% 2.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 6.2% 12.8%		
Female Unknown Total Age 16 - 29 30 - 59 60+ Unknown Total Race White Black Other	8,456 7 20,647 Total Number of Driver Observations 5,018 12,653 2,960 16 20,647 Total Number of Driver Observations 17,458 2,177 999	762 0 1,456 Number of Drivers Using a Mobile Device 612 786 58 0 1,456 Number of Drivers Using a Mobile Device 1,456 1,456 Number of Drivers Using a Mobile Device 1,074 279 102	9.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 12.2% 6.2% 2.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 6.2% 12.8% 10.2%		
Female Unknown Total Age 16 - 29 30 - 59 60+ Unknown Total Race White Black Other Unknown	8,456 7 20,647 Total Number of Driver Observations 5,018 12,653 2,960 16 20,647 Total Number of Driver Observations 17,458 2,177 999 13	762 0 1,456 Number of Drivers Using a Mobile Device 612 786 58 0 1,456 Number of Drivers Using a Mobile Device 1,456 Number of Drivers Using a Mobile Device 1,074 279 102 1	9.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 12.2% 6.2% 2.0% 0.0% 7.1% Percent of Drivers Using a Mobile Device* 6.2% 12.8% 10.2% 7.7%		

Table 18. Driver Mobile Device Use by Stratum, Day of Week, Time of Day, Vehicle Type, and
Demographics (Handheld and Hands-Free) (Continued)

6.3.2 Handheld Mobile Devices

Considering only handheld uses of a mobile device (i.e., talking or typing), the overall weighted driver handheld device use rate for Michigan in 2024 was 5.5 percent, which is shown in Table 19 along with the confidence band and standard error. The weighting procedure was the same as that for the seat belt rate described in the "Data Analysis" section (Section 5.0) of the report and, therefore, the weighted rate will differ from the raw/unweighted values presented in subsequent tables.

Type of Use	Use Rate*	Standard Error
Handheld Uses of Mobile Devices	5.5 ± 0.8%	0.4%

Table 19. Weighted Driver Handheld Mobile Device Use Rate

* Weighted Driver Handheld Mobile Device Usage ± 95% Confidence Band

Table 20 summarizes handheld mobile device use for drivers in terms of stratum, day of the week, time of the day, vehicle type, gender, age, and race. Again, by far the highest rate of handheld device use by drivers was observed in Stratum 4 (7.0 percent). Women were found to be more likely to use a handheld device while driving than men (5.9 percent and 4.6 percent, respectively). The handheld device use rate was found to be highest between 12:00 p.m. and 1:00 p.m. (6.6 percent), while the use rate was lowest between 6:00 p.m. and 7:00 p.m. (2.9 percent). Handheld device use was highest (9.2 percent) for drivers under 30 years of age, compared to 4.4 percent for drivers aged 30 to 59 and 1.4 percent for drivers aged 60 and above. Black drivers exhibited higher handheld device use rates (9.5 percent) compared to other racial categories. Turning to days of the week, handheld device use was highest on Fridays (6.5 percent), and lowest on Sundays (3.6 percent). Finally, handheld device use was highest among drivers of passenger cars (6.1 percent), and lowest among drivers of pickup trucks (4.9 percent).

Stratum	Total Number of Driver Observations	Number of Drivers Using a Handheld Mobile Device	Percent of Drivers Using a Handheld Mobile Device*
1	5535	239	4.3%
2	5013	232	4.6%
3	4559	205	4.5%
4	5540	387	7.0%
Total	20,647	1,063	5.1%
Day of Week	Total Number of Driver Observations	Number of Drivers Using a Handheld Mobile Device	Percent of Drivers Using a Handheld Mobile Device*
Sunday	2,456	89	3.6%
Monday	2,803	139	5.0%
Tuesday	1,935	105	5.4%
Wednesday	3,334	194	5.8%
Thursday	4,929	254	5.2%
Friday	2,603	168	6.5%
Saturday	2,587	114	4.4%
Total	20,647	1,063	5.1%

Table 20. Driver Handheld Mobile Device Use by Stratum, Day of Week, Time of Day, Vehicle Type,and Demographics

Time of Day	Total Number of Driver Observations	Total Number ofNumber of Drivers Using aDriver ObservationsHandheld Mobile Device			
7 am – 8 am	991	56	5.7%		
8 am – 9 am	1,378	70	5.1%		
9 am – 10 am	1,722	78	4.5%		
10 am – 11 am	2,203	104	4.7%		
11 am – 12 pm	2,081	111	5.3%		
12 pm – 1 pm	2,107	140	6.6%		
1 pm – 2 pm	2,676	160	6.0%		
2 pm – 3 pm	2,080	94	4.5%		
3 pm – 4 pm	2,374	138	5.8%		
4 pm – 5 pm	1,064	45	4.2%		
5 pm – 6 pm	966	38	3.9%		
6 pm – 7 pm	1,005	29	2.9%		
Total	20,647	1,063	5.1%		
Vehicle Type	Total Number of Driver Observations	Number of Drivers Using a Handheld Mobile Device	Percent of Drivers Using a Handheld Mobile Device*		
Passenger Cars	4,704	285	6.1%		
Sport Utility Vehicles	10,269	498	4.8%		
Vans/Minivans	1,584	79	5.0%		
Pickup Trucks	4,090	201	4.9%		
Total	20,647	1,063	5.1%		
Gender	Total Number of Driver Observations	Number of Drivers Using a Handheld Mobile Device	Percent of Drivers Using a Handheld Mobile Device*		
Male	12,184	560	4.6%		
Female	8,456	503	5.9%		
Unknown	7	0	0.0%		
Total	20,647	1,063	5.1%		
Age	Total Number of Driver Observations	Number of Drivers Using a Handheld Mobile Device	Percent of Drivers Using a Handheld Mobile Device*		
16 - 29	5,018	463	9.2%		
30 - 59	12,653	560	4.4%		
60+	2,960	40	1.4%		
Unknown	16	0	0.0%		
Total	20,647	1,063	5.1%		
Race	Total Number of Driver Observations	Number of Drivers Using a Handheld Mobile Device	Percent of Drivers Using a Handheld Mobile Device*		
White	17,458	787	4.5%		
Black	2,177	206	9.5%		
Other	999	69	6.9%		
Unknown	13	1	7.7%		
Total	20,647	1,063	5.1%		

Table 20. Driver Handheld Mobile Device Use by Stratum, Day of Week, Time of Day, Vehicle Type,and Demographics (Continued)

6.4 Mobile Device Use Trends

In comparison to the 2023 mobile device surveys, which were performed prior to the new distracted driving law going into effect, the 2024 surveys revealed decreases both in the use of all mobile devices (handheld and hands-free) and handheld-only mobile devices by Michigan drivers. Considering all mobile devices, the 2024 weighted use rate of 7.5 percent represents a decrease from the 8.3 percent rate observed in Michigan in 2023, although this decrease is not statistically significant. Nationally, the overall mobile device use rate by drivers was found to be 5.6 percent in 2022 (the most recent national data available), which included handheld talking, hands-free talking (earpiece observed), and typing, although hands-free devices with no earpiece observed were not included [7]. For comparison purposes, the exclusion from the Michigan data of cases where no earpiece was observed drops the 2024 raw/unweighted mobile device use rate to 5.4 percent, which is slightly lower than the 2022 nationwide rate.

Considering only handheld uses of mobile devices (e.g., talking, typing), the 2024 weighted use rate of 5.5 percent represents a considerable decrease from the 6.7 percent handheld device use rate observed in Michigan in 2023. Notably, handheld device use declined across all strata between 2023 (prior to the law going into effect) and 2024, particularly in strata 1, 2, and 3, where declines of at least 1.0 percentage points were observed. Handheld use of mobile devices remains considerably higher than average in Stratum 4 (Macomb and Wayne counties), by drivers under the age of 30, and by black drivers. Thus, public awareness campaigns to promote the new distracted driving law should target geographic areas (e.g., Macomb and Wayne counties) and demographic groups (e.g., younger drivers and black drivers) exhibiting the highest handheld device use. Compared to the nationwide rate of handheld device use by drivers, Michigan's 2024 weighted handheld device use rate of 5.5 percent is marginally higher than (though not statistically significantly different from) the nationwide rate of 5.2 percent from 2022, which is the most recent year for which national data are available [7].

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APPENDIX I Michigan Seat Belt Survey Cover Sheet and Data Collection Form

DIRECT OBSERVATION SURVEY COVER SHEET

Date: 2024 Observer's Name:					
Site Identification:					
Site Location:					
Site Number:					
County:Stratum					
Alternate Site Information:					
Is this an alternate site? No Yes (Circle one)					
If yes, please provide a reason for using an alternate site from the reserve list:					
Site Description:					
Observation direction: Northbound Southbound Eastbound Westbound					
Number of <u>THROUGH</u> lanes observed for seat belt use: Number of <u>RIGHT TURN</u> lanes observed for seat belt use: Number of <u>LEFT TURN</u> lanes observed for seat belt use:					
Total number of lanes in this travel direction <u>PRIOR TO THE INTERSECTION</u> :					
Weather Conditions: Clear Light Fog Light Rain					
Site Start and End Time:					
Start time: End time:					
Sample Size					
60 Minute Volume Count (for lanes being observed for seat belt use):Vehicles					

	-	-	·······
Number of Seat Belt Obs	ervations Reco	orded in 60 min:	Vehicles

DATA COLLECTION FORM

Site # Page #	1	2	3	4	5	6	7	8	9	10			
Occupants Not Observable											Not Observable		
Commercial Use Vehicle											Commercial		
Vehicle Type											Vehicle Type		
Passenger Car	car	car	car	car	car ;	car	car	car	car	car	Passenger Car		
SUV	SUV	suv	suv	suv	suv	suv	suv	suv	suv	suv	SUV		
Van/Minivan	van	van	van	van	van	van	van	van	van	van	Van/Minivan		
Pickup Truck	PT	PT	PT	PT	PT 3	FT 8	PT	PT	PT	PT	Pickup Truck		
Driver Belt Use											Driver Belt Use		
Belted	Belt	Belt	Belt	Belt	Belt	Belt	Belt	Belt	Belt	Belt	Belted		
Not Belted	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	Not Belted		
Unknown	Un	Un	Un	Un	Un	Un	Un	Un	Un	Un	Unknown		
Driver Cell Phone Use											Driver Cell Phone Use		
Handheld (Talking)	talk	talk	talk	talk	talk	talk	talk	talk	talk	talk	Handheld (Talking)		
Handheld (Typing)	type	type	type	type	type	type	type	type	type	type	Handheld (Typing)		
Hands-free (E.P.)	EP	EP	EP	EP	EP -	EP	EP	EP	EP	EP	Hands-free (E.P.)		
Hands-free (No E.P.)	NEP	NEP	NEP	NEP	NEP	NEP	NEP	NEP	NEP	NEP	Hands-free (No E.P.)		
None	N	N	N	N	N '	N	N	N	N	N	None		
Driver Age											Driver Age		
16-29	16-29	16-29	1629	16-29	16-29	16-29	16-29	1629	1629	16-29	16-29		
30-59	30-69	3069	3069	30-69	30-69	30-69	30-69	3069	3069	3069	30-59		
60+	60+	60+	60+	60+	60+	60+	60+	60+	60+	60+	60+		
Unknown	Un	Un	Un	Un	Un 4	Un	Un	Un	Un	Un	Unknown		
Driver Gender						ŧ					Driver Gender		
Male	м	M	M	M	M	E M	м	M	M	M	Male		
Female	F	F	F	F	F	F	F	F	F	F	Female		
Unknown	Un	Un	Un	Un	Ung	e Un	Un	Un	Un	Un	Unknown		
Driver Race	144	144			147		147				Driver Race		
Plack	VV	W	W	W	W I		VV P	W	W D	W	Plask		
Other	0	0	0	0			0	0	0	0	Other		
Unknown	Un	Un	Un	110	10		Un	Un	Un	10	Unknown		
D D D D D D D	0II	011	0II	011	Un ·	0ii	UII	011	011	011	D		
Passenger Belt Use	Dalt	Dalt	Dalt	Dalt	Dalt	Rolt	Dalt	Delt	Dalt	Dalt	Passenger Belt Use		
Belted	Belt	Belt	Belt	Belt	Belt	Belt	Belt	Belt	Belt	Belt	Belted		
Not Belled	NB	NB	NB	NB	NB		NB	NB	NB	NB	Not Belted		
Diknown	Un	Un	Un	Un	Un ş	un 🧯	Un	Un	Un	Un	Discourses		
Passenger Age	<15	<1E	<1E	<15	<15	-15	<15	<1E	-15	-15	Passenger Age		
16-20	46:00	16:00	10	\$10	18:00	10	\$10	16:00	\$10	18:00	0-15		
30.59	30.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50	30.50	30-59		
60+	60+	60+	60+	60+	60+	60+	60+	60+	60+	60+	60+		
Unknown	Un	Un	Un	Un	Un	Un	Un	Un	Un	Un	Unknown		
Passenger Gender	0		0		1	8	0	0	0		Passenger Gender		
Male	м	м	м	м	M	Ŝм	м	м	м	м	Male		
Female	F	F	F	F	F	F	F	F	F	F	Female		
Unknown	Un	Un	Un	Un	Un	e Un	Un	Un	Un	Un	Unknown		
Passenger Race	Un	011	U.I.	-	0.1. 1		0	011	U.I.	0.1	Passenger Race		
White	w	w	w	w	w	w	w	w	w	w	White		
Black	В	B	B	B	В	в	В	B	B	В	Black		
Other	0	0	0	0	0	0	0	0	0	0	Other		
Unknown	Un	Un	Un	Un	Un	Un	Un	Un	Un	Un	Unknown		

Note: E.P. = Earpiece

APPENDIX II Resumes of Timothy J. Gates and Peter T. Savolainen

Dr. Timothy J. Gates

Summary

Dr. Timothy J. Gates is the current Principal Investigator of the Direct Observation Survey of Seat Belt Use. Dr. Gates is a Professor in the Michigan State University (MSU) Department of Civil and Environmental Engineering. He has more than 10 years of experience with direct observation surveys of safety restraint use. This includes a diverse range of experiences in sample design and selection, field data collection methods, observer training, statistical systems development, and optimization techniques. He also has expertise in the areas of survey research methodology, data processing, and statistical quality control.

Education

Ph.D., Civil Engineering, University of Wisconsin, 2007 M.S., Civil Engineering, Michigan State University, 2000 B.S., Civil Engineering, Michigan State University, 1999

Professional Associations

Institute of Transportation Engineers Transportation Research Board

Computer Skills

Operation Systems: Windows, iOS Software: SPSS, Microsoft PowerPoint, Excel, and Word

Relevant Project Experience (2007 to Present)

Direct Observation Surveys of Seat Belt Use –PI or co-PI on OHSP-sponsored Michigan seat belt use survey from FY2012 to present. Participated in proposal development, planning, survey implementation, data collection, quality control, data analysis, and report preparation. Led the resampling of Michigan's 200 seat belt observation sites in 2018 and 2023.

Direct Observation Surveys of Commercial Motor Vehicle Seat Belt Use – Co-PI on OHSP-sponsored Michigan seat belt use survey for commercial motor vehicle occupants during FY 2012 and 2015.

Direct Observation Surveys of Child Restraint Device Use and Misuse (including Booster Seat Use) – PI or co-PI on OHSP-sponsored child restraint device use/misuse survey, including booster seats in FY 2009, 2011, 2013, 2015, 2018, and 2022.

Direct Observation Surveys of Motorcycle Helmet Use – co-PI on OHSP-sponsored motorcycle helmet use survey in FY 2013 and 2017.

Dr. Peter T. Savolainen

Summary

Dr. Peter T. Savolainen is an MSU Foundation Professor in the Michigan State University Department of Civil and Environmental Engineering. Dr. Savolainen serves as the lead statistical advisor for this project. Prior to joining Michigan State University in 2018, he was an Associate Professor of Civil Engineering at Iowa State University (2014-2018) and Wayne State University (2006-2014). He has more than 11 years of experience with direct observation surveys of safety restraint use. This includes a diverse range of experiences in sample design and selection, data weighting, imputation, variance estimation, statistical systems development, and optimization techniques. He also has expertise in the areas of survey research methodology, data processing, and statistical quality control. Dr. Savolainen also teaches graduate level courses on civil engineering research methods and applications, as well as statistics and econometric methods of data analysis. He is a proficient user of various statistical analysis software packages, including LIMDEP, SAS, SPSS, and SUDAAN.

Education

Ph.D., Civil Engineering, Purdue University, 2006M.S., Civil Engineering, Purdue University, 2004B.S., Civil Engineering, Michigan Technological University, 2002

Professional Associations

American Society of Civil Engineers American Statistical Association Institute of Transportation Engineers

Computer Skills

Operation Systems: Windows, MacOS, iOS Software: LIMDEP, SAS, SPSS, SUDAAN, Microsoft PowerPoint, Excel, and Word

Relevant Project Experience (2006 to Present)

Direct Observation Surveys of Seat Belt Use –PI or co-PI on OHSP-sponsored Michigan seat belt use survey from FY 2008 to 2010 and FY 2012 to present. Participated in proposal development, planning, survey implementation, data collection, quality control, data analysis, and report preparation. Led development of the federally-approved seat belt observational survey methodology for the state of Michigan in 2012.

Direct Observation Surveys of Commercial Motor Vehicle Seat Belt Use – Co-PI on OHSP-sponsored Michigan seat belt use survey for commercial motor vehicle occupants during FY 2012.

Direct Observation Surveys of Child Restraint Device Use and Misuse (including Booster Seat Use) – PI or co-PI on OHSP-sponsored child restraint device use/misuse survey, including booster seats in FY 2009, 2011, 2013, 2015, 2018, and 2022.

Direct Observation Surveys of Motorcycle Helmet Use – co-PI on OHSP-sponsored motorcycle helmet use survey in FY 2013.

APPENDIX III

List of Annual Observation Locations by County, Stratum, and Road Classification Including Seat Belt Observation Data

Belt Use	County	Site Location	Site Type	Road Type	Actual Observations		Non- Response	Sample
Stratum	County		Site Type	Roud Type	Belted	Total	Obs.	Weight
1	Ingham	I-96 WB and M L King Blvd (Exit 101)	Original	Primary	130	137	0	41566.2
1	Kalamazoo	I-94 EB and S 9th Street (Exit 72)	Original	Primary	136	142	0	41064.7
1	Kalamazoo	US-131 NB and Stadium Drive EB (Exit 36 for BUS 94)	Original	Primary	144	154	0	97798.4
1	Kalamazoo	US-131 NB and W Main Street (Exit 38A for Kalamazoo)	Original	Primary	137	143	0	59242.0
1	Kalamazoo	US-131 and D Ave (Exit 44)	Original	Primary	149	153	0	37063.2
1	Oakland	I-75 SB and E Square Lake Road (Exit 74 for Adams Road)	Original	Primary	131	138	0	97584.8
1	Oakland	Northwestern Highway NWB (Lodge Srv. Drv.) and Lahser Road	Original	Primary	133	147	0	117244.0
1	Oakland	I-96 EB and Milford Road (Exit 155)	Original	Primary	128	135	0	70586.7
1	Washtenaw	US-23 SB and Six Mile Road (Exit 50)	Original	Primary	118	126	0	26946.1
1	Washtenaw	US-23 SB and Carpenter Road (Exit 27)	Original	Primary	140	147	0	32240.6
1	Washtenaw	I-94 WB and Jackson Road/Old US-12 (Exit 162)	Original	Primary	133	139	0	42925.4
1	Washtenaw	US-23 SB and US-12 (Exit 34 to Saline)	Original	Primary	131	136	0	74178.5
1	Washtenaw	I-94 EB and Michigan Ave (Exit 181)	Original	Primary	149	149	0	53240.3
1	Washtenaw	US-23 SB and Washtenaw Ave (Exit 37B to Ann Arbor)	Original	Primary	166	170	0	79572.2
1	Washtenaw	US-23 SB and Plymouth Road (Exit 41)	Original	Primary	168	180	0	62466.1
1	Ingham	E M-106/Morton Road and N Clinton Street/M-106	Original	Secondary	67	72	1	15658.9
1	Ingham	M-52/Main Street/Stockbridge Road and N Clinton Street/M-106	Original	Secondary	128	145	0	14798.5
1	Ingham	M-36/Topping Road and M-52 (Stockbridge Road)	Original	Secondary	33	35	0	12045.3
1	Ingham	M-36/Dansville Road and M-52	Original	Secondary	29	32	0	11854.1
1	Ingham	I-96 Bus Loop/S M-43 Hwy/E Oakland Ave and N Pennsylvania Ave	Original	Secondary	118	130	0	45040.7
1	Ingham	M-143/Michigan Ave and N Harrison Road	Original	Secondary	147	154	0	29859.4
1	Ingham	M-43/E. Grand River Ave and Northwind Drive	Original	Secondary	128	134	0	73906.3
1	Ingham	M-43/Grand River Avenue and Dobie Road/Central Park Drive	Original	Secondary	123	135	0	55666.4
1	Ingham	M-36 and S Jefferson Street	Original	Secondary	154	161	0	17293.6
1	Ingham	Cedar Street and College Road	Original	Secondary	145	153	0	49557.7
1	Kalamazoo	US-131 and Lyons Street	Original	Secondary	109	120	0	11640.4
1	Kalamazoo	M-96/Battle Creek Street and Burgess Drive	Original	Secondary	111	119	0	18236.8
1	Kalamazoo	M-96 (E. Michigan Ave) and S 35th Street	Original	Secondary	118	128	1	19369.9
1	Kalamazoo	BUS US-94/AmVets Mem Parkway and S Sprinkle Road	Original	Secondary	114	123	0	20754.4
1	Kalamazoo	M-96/King Highway and River Street	Original	Secondary	98	103	0	14101.8
1	Kalamazoo	Gull Road and N Sprinkle Road	Original	Secondary	132	142	0	38612.0
1	Kalamazoo	BUS US-94/AmVets Mem Parkway and N Park Street	Original	Secondary	125	136	0	25475.5

Belt Use	County Site Location	Site Type	Road Type	Actual Obs	servations	Non- Response	Sample	
Stratum			J J.		Belted	Total	Obs.	Weight
1	Oakland	US-24/Telegraph Road and Voorheis Street	Original	Secondary	117	125	0	83518.0
1	Oakland	M-59/E Huron Street and Woodward Ave (NB)	Original	Secondary	141	150	0	28975.3
1	Oakland	BUS US-24/N Cass Ave and N Johnson Street	Original	Secondary	146	158	0	18169.5
1	Oakland	M-1/Woodward Ave and Catalpa Drive	Original	Secondary	136	147	0	74336.5
1	Oakland	M-1/Woodward Ave and E Maple Road	Original	Secondary	145	152	0	120354.4
1	Oakland	M-1/Woodward Ave and W Big Beaver Road	Original	Secondary	147	152	0	96573.9
1	Oakland	M-59/Highland Road EB and N. Milford Road	Original	Secondary	132	143	0	50073.9
1	Oakland	M-59/Highland Road WB and Duck Lake Road	Original	Secondary	117	127	0	62291.3
1	Oakland	M-1/Woodward Ave and W Nine Mile Road	Original	Secondary	139	148	1	74537.1
1	Washtenaw	M-52/Ann Arbor Street and E Main Street	Original	Secondary	117	128	0	19228.2
1	Washtenaw	US-12/Michigan Avenue and Munger Road/Cloverlane Drive	Original	Secondary	134	139	0	29037.7
1	Washtenaw	N Huron Street and W Cross Street	Original	Secondary	139	149	0	28082.7
1	Washtenaw	M-153/Ford Road and N Prospect Road	Original	Secondary	155	166	1	48207.6
1	Oakland	Hollywood Ave and W Columbia Ave	Original	Local	21	27	0	1778460.2
1	Oakland	Brown Road EB and Joslyn Road	Original	Local	140	151	0	12855326.7
1	Oakland	Wellington Road and Franklin Road	Original	Local	48	57	0	1778460.2
1	Washtenaw	Ferris Street and S. Hamilton Street	Original	Local	33	39	0	1778460.2
1	Washtenaw	S 7th Street and W Liberty Street	Original	Local	172	178	0	3597961.9

Belt Use	County	County Site Location	Site Type Road Type	Road Type	Actual Observations		Non- Response	Sample
Stratum	county	Site Docuton	site type	Roud Type	Belted	Total	Obs.	Weight
2	Allegan	I-196 EB and M-40/Lincoln Road (Exit 49 to Allegan)	Original	Primary	33	38	0	49961.2
2	Allegan	I-196 NB and 109th Ave (Exit 26 to Pullman)	Original	Primary	36	40	0	46737.9
2	Allegan	I-196 NB and M-89 (Exit 34 to Fennville - 124th Ave)	Original	Primary	107	112	0	48112.5
2	Allegan	I-196 NB and Blue Star Highway (Exit 41)	Original	Primary	129	134	0	53336.2
2	Bay	I-75 NB and Beaver Road (Exit 168)	Original	Primary	143	151	0	51094.8
2	Calhoun	I-94 WB and 26 Mile Road (Exit 119 for M-199)	Original	Primary	10	11	0	46737.9
2	Eaton	I-69 SB and M-78/Butterfield Highway (Exit 48 to Bellevue)	Original	Primary	51	53	0	46737.9
2	Jackson	I-94 WB and Race Road	Original	Primary	14	14	0	56753.1
2	Kent	US-131 NB and M-57/14 Mile Road NE (Exit 101 to Sparta/Greenville)	Original	Primary	173	177	0	129624.6
2	Kent	I-96 EB and M-50/Alden Nash Ave SE (Exit 52 to Lowell/Charlotte)	Original	Primary	174	180	0	102898.7
2	Kent	I-196 EB and Fuller Ave NE (Exit 79)	Original	Primary	129	135	0	200096.6
2	Midland	US-10 WB and N W River Road	Original	Primary	88	90	0	46737.9
2	Midland	US-10 WB and Eastman Ave (Exit 122)	Original	Primary	129	134	0	143329.5
2	Monroe	US-23 SB and M-50/Tecumseh Street (Exit 17 to Dundee/Monroe)	Original	Primary	121	128	0	55687.7
2	Ottawa	I-196 EB and 32nd Ave (Exit 62 to Hudsonville)	Original	Primary	144	152	0	95273.4
2	Allegan	M-43/Bridge Street and Sherwood Ave	Original	Secondary	138	147	0	90075.1
2	Allegan	M-40/Jenner Drive and Marshall Street/Cedar Street	Original	Secondary	113	115	0	107116.9
2	Bay	M-13/Huron Road and Linwood Road	Original	Secondary	140	145	0	88728.9
2	Bay	M-84/E Salzburg Road and M-13/Euclid Ave	Original	Secondary	131	142	0	109330.3
2	Bay	M-13/Broadway Street and Fremont Ave	Original	Secondary	135	150	0	75062.6
2	Calhoun	M-66/Capital Ave and Burr Oak Street	Original	Secondary	133	143	0	41693.8
2	Calhoun	Michigan Ave and Eagle Street	Original	Secondary	134	140	0	74195.7
2	Calhoun	M-99/Superior Street and Erie Street	Original	Secondary	117	126	0	44013.6
2	Calhoun	M-66 and B Drive S	Original	Secondary	139	146	0	77151.3
2	Eaton	Lansing Road and N Canal Road	Original	Secondary	134	143	0	30262.4
2	Eaton	M-79/Lawrence Ave and Lincoln Street	Original	Secondary	147	157	0	46604.1
2	Eaton	M-50/N Cochran Ave and Lawrence Ave	Original	Secondary	137	141	0	44540.0
2	Grand Traverse	US-31 and M-72/Shores Beach Lane	Original	Secondary	133	144	1	71682.5
2	Grand Traverse	US-31/M-72/Munson Ave and Holiday Road	Original	Secondary	146	154	1	180376.2
2	Grand Traverse	US-31/Beitner Road and US-31/M-37	Original	Secondary	143	153	0	60803.8
2	Grand Traverse	M-113/Main Street and Brownson Ave	Original	Secondary	139	154	0	42883.6
2	Jackson	M-50/Main Street and Constitution Streeet	Original	Secondary	136	148	0	72677.7
2	Jackson	Spring Arbor Road and Dearing Road	Original	Secondary	130	133	0	81238.1

Belt Use	County	Site Location	Site Type	Site Type Road Type		Actual Ob	servations	Non- Response	Sample
Stratum			~~~~~~, r ~		Belted	Total	Obs.	Weight	
2	Kent	M-37 and 12 Mile Road NW	Original	Secondary	152	157	0	37792.4	
2	Kent	M-57/14 Mile Road NE and Lincoln Lake Road NE	Original	Secondary	153	155	0	88038.0	
2	Kent	Alden Nashe Ave SE and 92nd Street SE	Original	Secondary	179	185	0	36514.8	
2	Kent	M-11/28th Street SW and Ivanreset Ave SW	Original	Secondary	131	135	0	182482.5	
2	Livingston	Grand River Ave and National Street	Original	Secondary	130	139	0	129727.8	
2	Monroe	M-50/Tecumseh Street and Helle Boulevard/Cabela Boulveard	Original	Secondary	134	137	0	49178.4	
2	Ottawa	US-31 NB and Hayes Street	Original	Secondary	123	130	0	101569.6	
2	Ottawa	US-31 SB and Ferris Street	Original	Secondary	131	139	0	71391.1	
2	Ottawa	M-45/Lake Michigan Drive and 48th Ave	Original	Secondary	127	138	0	118006.7	
2	Ottawa	US-31 SB and Port Sheldon Street	Original	Secondary	153	161	0	59686.1	
2	Ottawa	9th Street and Columbia Ave	Original	Secondary	146	155	0	29806.6	
2	Ottawa	Chicago Drive and 36th Ave	Original	Secondary	146	152	0	63640.0	
2	Bay	9 Mile Road and W Parish Road	Original	Local	8	10	0	2356379.2	
2	Calhoun	N 20th Street and Goguac Street	Original	Local	120	132	0	6597861.8	
2	Eaton	Curtis Road and Nashville Highway/Reed Street	Original	Local	9	12	0	2356379.2	
2	Kent	Portland Ave and Leonard Street	Original	Local	11	12	0	2356379.2	
2	Monroe	Sumpter Road and Stony Creek Road	Original	Local	16	20	0	2356379.2	

Belt Use	County	Site Location	Site Type Road Ty	Road Type	Actual Ob	servations	Non- Response	Sample
Stratum	•			~ 1	Belted	Total	Obs.	Weight
3	Berrien	I-196 NB and M-63/Hagar Shore Road (Exit 7)	Original	Primary	28	28	0	49039.9
3	Berrien	US-31 NB/St. Joseph Valley Parkway and M-139/Old 31 (Exit 15A to Be	Original	Primary	72	76	0	49039.9
3	Clare	US-127 NB and BUS US-127/Clare Ave (Exit 176 to Old 27)	Original	Primary	60	68	3	59186.1
3	Clare	US-127 NB and BUS US-127/Clare Ave (Exit 170 to Harrison/Gladwin)	Original	Primary	111	130	0	63051.3
3	Clare	US-10/127 SB and BUS US-127/Clare Ave (Exit 160 to Clare)	Original	Primary	126	143	0	54835.5
3	Clinton	US-127 SB and E Round Lake Road (Exit 86)	Original	Primary	88	90	0	67838.5
3	Genesee	I-69 EB and M-15/State Road (Exit 145 to Davison/Clarkston)	Original	Primary	128	140	0	205558.8
3	Isabella	US-127 SB and M-20/Pickard Street (Exit 143 for Midland/Big Rapids)	Original	Primary	45	49	0	49039.9
3	Lapeer	I-69 EB and Wilder Road (Exit 159)	Original	Primary	77	82	0	58709.7
3	Lapeer	I-69 EB and Lake Pleasant Road (Exit 163)	Original	Primary	95	101	0	69420.1
3	Shiawassee	I-69 EB and Woodbury Road (Exit 98 to Lainsburg)	Original	Primary	72	77	0	101349.1
3	St. Clair	I-94 WB and Range Road (Exit 269)	Original	Primary	50	55	0	60278.2
3	St. Clair	I-94 EB and Fred W Moore Highway (Exit 257 to St. Clair)	Original	Primary	83	86	1	55530.5
3	St. Clair	I-69 EB and M-19/Kinney Road (Exit 184 to Sandusky/Richmond)	Original	Primary	98	116	0	67721.7
3	Van Buren	I-94 WB and County Road 365 (Exit 52 to Lawrence)	Original	Primary	119	132	0	51420.5
3	Barry	M-66 and M-50	Original	Secondary	124	139	0	47246.5
3	Barry	M-43 and Green Street/Heath Road	Original	Secondary	169	175	0	113676.7
3	Berrien	M-139/Ferry Street and M-139/Old 31	Original	Secondary	141	154	0	131265.2
3	Cass	M-152 and M-51	Original	Secondary	124	156	0	47110.8
3	Clare	M-115/5th Street and McEwan Street	Original	Secondary	130	144	0	128094.8
3	Clinton	BUS I-96/Grand River Ave and Airport Road	Original	Secondary	135	141	1	120088.9
3	Genesee	M-54/Saginaw Road and M-57/Vienna Road	Original	Secondary	144	173	0	138607.1
3	Isabella	M-20/Remus Road and S Lincoln Road	Original	Secondary	128	139	0	92569.7
3	Isabella	M-20/Remus Road and S Winn Road	Original	Secondary	145	153	0	106610.0
3	Lapeer	M-24/Lapeer Road and W Dryden Road	Original	Secondary	127	146	0	397522.1
3	Lenawee	M-34 and Scott Street/Red River Drive	Original	Secondary	128	142	0	84245.9
3	Lenawee	US-12 and M-52	Original	Secondary	121	123	0	83532.4

Belt Use	County	Site Location	Site Type	Site Type Road Typ	Road Type	Actual Ob	servations	Non- Response	Sample
Stratum			J	J F	Belted	Total	Obs.	Weight	
3	Montcalm	M-46/Howard City Edmore and Federal Road	Original	Secondary	91	97	1	94012.8	
3	Montcalm	M-66 and M-46	Original	Secondary	86	99	0	69374.3	
3	Montcalm	M-57/Washington Street/Carson City Road and M-91/Lafayette Street	Original	Secondary	147	166	0	145439.5	
3	Muskegon	BUS US-31/Seaway Drive and Hoyt Street	Original	Secondary	131	138	0	289526.1	
3	Muskegon	M-37/Maple Street and State Road	Original	Secondary	138	148	0	178728.3	
3	Newaygo	M-82/Curve Street/Croton Drive and M-37/Evergreen Drive	Original	Secondary	134	149	0	128873.5	
3	Newaygo	Monroe Street and M-37/Evergreen Drive	Original	Secondary	25	30	0	46721.5	
3	Saginaw	M-15/Vassar Road and M-81/Washington Road	Original	Secondary	136	147	0	81762.6	
3	Saginaw	M-57/Brady Road and M-52/Oakley Road	Original	Secondary	154	168	0	95389.7	
3	St. Clair	M-29/Dixie Highway and Palms Road	Original	Secondary	145	155	0	89160.2	
3	St. Joseph	US-12/Chicago Road and US-131	Original	Secondary	99	117	0	69359.8	
3	Tuscola	M-81/State Street and Frank Street	Original	Secondary	109	118	0	121943.1	
3	Tuscola	M-24/Mertz Road and M-46/Sanilac Road	Original	Secondary	134	148	0	78817.1	
3	Tuscola	M-46/Sanilac Road and M-24/Mertz Road	Original	Secondary	139	158	0	57623.2	
3	Tuscola	M-81/Cass City Road and Seeger Street	Original	Secondary	127	145	0	100061.9	
3	Tuscola	M-153/Ford Road and M-46/Sanilac Road	Original	Secondary	143	155	0	60737.9	
3	Van Buren	M-43 and M-40	Original	Secondary	91	98	0	64025.8	
3	Van Buren	M-43 and Blue Star Highway	Original	Secondary	143	154	0	97857.6	
3	Clinton	Essex Center Road and M-21	Original	Local	7	7	0	2633169.0	
3	Genesee	Genesee Street and Flint Street	Original	Local	25	42	0	2715455.5	
3	Lapeer	Clear Lake Road and M-53/Van Dyke Road	Original	Local	26	33	0	2996364.7	
3	Muskegon	Hendrick Road and Henry Street	Original	Local	6	6	0	2633169.0	
3	Saginaw	Freeland Road and M-47/Main Street	Original	Local	131	147	0	5419939.5	

Belt Use	County	County Site Location	Site Type	Road Type	Actual Observations		Non- Response	Sample
Stratum			~~~~~jp~		Belted	Total	Obs.	Weight
4	Macomb	I-94 EB and Little Mack (Exit 232)	Original	Primary	131	144	0	45019.5
4	Wayne	I-75 SB and Eureka Road (Exit 36)	Original	Primary	155	167	0	66726.2
4	Wayne	I-75 SB and Northline Road (Exit 37)	Original	Primary	167	176	0	65792.5
4	Wayne	M-39 NB and Outer Drive (Exit 3)	Original	Primary	143	163	1	54332.3
4	Wayne	I-75 SB and Clark Ave (Exit 47A)	Original	Primary	97	110	0	28121.7
4	Wayne	I-75 NB and Springwell Street (Exit 45)	Original	Primary	127	135	0	35680.2
4	Wayne	M-39/Southfield Freeway and Rotuna Drive (Exit 5)	Original	Primary	137	157	0	143830.1
4	Wayne	I-94 EB and Haggerty Road (Exit 192)	Original	Primary	106	114	0	22269.8
4	Wayne	I-75 SB and Clay Street (Exit 54)	Original	Primary	101	115	0	40767.5
4	Wayne	M-10 NB and 7 Mile (Exit 12)	Original	Primary	123	139	0	71091.2
4	Wayne	M-14 EB and Beck Road (Exit 18)	Original	Primary	98	105	0	51417.3
4	Wayne	I-275 NB and Ann Arbor Road (Exit XX)	Original	Primary	134	144	0	41275.7
4	Wayne	I-275 SB and Six Mile Road (Exit 170)	Original	Primary	137	145	0	76233.7
4	Wayne	I-96 EB and Farmington Road (Exit 174)	Original	Primary	125	140	2	72429.8
4	Wayne	I-96 EB and Inkster Road (Exit 177)	Original	Primary	122	144	0	140674.3
4	Macomb	M-19/Main Street and Division Road	Original	Secondary	162	175	0	27858.3
4	Macomb	New Haven Road/Main Street and M-19/Gratiot Ave	Original	Secondary	140	149	0	15156.7
4	Macomb	M-3/Gratiot Ave and 23 Mile Road	Original	Secondary	129	145	0	55085.0
4	Macomb	M-53 SB and 32 Mile Road	Original	Secondary	152	162	0	56553.9
4	Macomb	M-53/Van Dyke Ave and 17 Mile Road	Original	Secondary	129	150	0	40123.4
4	Macomb	M-59/Hall Road and Van Dyke Ave	Original	Secondary	130	148	0	135223.9
4	Macomb	M-59/Hall Road and Garfield Road	Original	Secondary	142	148	0	122280.9
4	Macomb	M-59/Hall Road and Romeo Plank Road	Original	Secondary	142	147	0	66410.1
4	Macomb	M-3/Gratiot Ave and Martin Road	Original	Secondary	114	137	0	82827.7
4	Macomb	M-3/Gratiot Ave and 12 Mile Road	Original	Secondary	114	139	0	99954.2
4	Macomb	M-97/Groesbeck Highway and 15 Mile Road	Original	Secondary	126	137	0	78921.7
4	Macomb	M-39/Southfield Road and Lafayette Boulevard	Original	Secondary	144	160	0	85475.1

Belt Use	County	Site Location	Site Type	Road Type	Actual Ob	servations	Non- Response	Sample Weight
Stratum	county		Site Type		Belted	Total	Obs.	
4	Wayne	M-85/Fort Street and Ford Ave/Northline Road	Original	Secondary	138	153	0	59227.3
4	Wayne	M-85/Fort Street and Pennsylvania Road	Original	Secondary	137	147	0	86245.0
4	Wayne	M-85/Fort Street and Vreeland Road	Original	Secondary	146	161	0	23390.9
4	Wayne	M-85/Fort Street and Gibraltar Road	Original	Secondary	137	153	0	9785.0
4	Wayne	US-24/Telegraph Road and Van Born Road	Original	Secondary	130	146	0	57088.0
4	Wayne	M-39/Southfield Road and Toledo Road	Original	Secondary	133	150	0	87134.4
4	Wayne	M-85/Fort Street and Outer Drive	Original	Secondary	133	149	0	49918.3
4	Wayne	US-12/Michigan Ave and Schlaff Street	Original	Secondary	142	166	0	42513.3
4	Wayne	M-153/Ford Road and Chase Road	Original	Secondary	139	161	0	50016.5
4	Wayne	US-12/Michigan Ave and Haggerty Road	Original	Secondary	123	129	1	45273.1
4	Wayne	M-153/Ford Road and Silvery Lane	Original	Secondary	119	134	0	74803.4
4	Wayne	M-153/Ford Road and US-24/Telegraph Road	Original	Secondary	117	132	0	55325.0
4	Wayne	M-153/Ford Road and Outer Drive	Original	Secondary	118	134	0	58040.7
4	Wayne	M-102/8 Mile Road and M-3/Gratriot	Original	Secondary	99	128	0	28758.6
4	Wayne	M-53/Van Dyke Ave and Outer Drive	Original	Secondary	95	125	0	12091.4
4	Wayne	M-5/Grand River Ave and Livernois	Original	Secondary	94	120	0	27138.6
4	Wayne	M-1/Woodward Ave and 7 Mile Road	Original	Secondary	75	87	0	44869.2
4	Wayne	US-12/Michigan Ave and Denton Road	Original	Secondary	151	161	2	26459.4
4	Macomb	School Section Road and Memphis Ridge Road	Original	Local	31	36	0	1665597.5
4	Macomb	Rinaldi Drive and 18 Mile Road	Original	Local	8	11	0	1504410.6
4	Macomb	Vegas Drive and Masonic	Original	Local	9	9	0	1504410.6
4	Wayne	Belton Street and US-24/Telegraph Road	Original	Local	38	46	0	1504410.6
4	Wayne	Pembroke Ave and Livernois	Original	Local	23	31	0	1504410.6