2013 Texas Litter Survey

A Survey of Litter at
253 Sites throughout
The State of Texas

Conducted for

Sherry Matthews Advocacy Marketing
Don't mess with Texas

by

Environmental Resources Planning, LLC
Gaithersburg, MD

Final Report

August 23, 2013

Sherry Matthews
Advocacy Marketing

2013 Texas Litter Survey

Table of Contents

Appendices

List of Tables

List of Figures

Acknowledgements

ER Planning would like to acknowledge Brenda Flores Dollar, TxDOT and Sherry Matthews Advocacy Marketing for providing the necessary guidance and support to successfully conduct the 2013 Texas Litter Survey.

Thanks to the Science and Operations staff at NOAA's National Weather Office in Lubbock, TX for providing valuable data regarding wind and other weather-related factors critical to understanding how weather affects littering rates in Texas.

Thanks also to all of the field crews and staff at Environmental Resources Planning, LLC for their hard work and dedication to this project.

2013 Texas Litter Survey

Executive Summary

Environmental Resources Planning, LLC (ER Planning), in cooperation with Sherry Matthews Advocacy Marketing and the Texas Department of Transportation (TxDOT), conducted a Visible Litter Study (VLS) to estimate the projected number of pieces and types of litter on Texas roadways in 2013. For this study, two separate litter surveys were conducted in which litter was tallied on 253 sites across Texas, each consisting of a one-tenth mile stretch of TxDOT-maintained roadway. In addition to the 163 original sites sampled in 2009, 90 new sites were also sampled in areas less represented by previous surveys. Data from the *Original Sites* were compared with the same areas surveyed in 2009. Data for the 90 *New Sites* were analyzed separately. This will provide TxDOT with the opportunity to compare changes in litter on *Original Sites* and *New Sites* in future surveys.

The increase in the number of sites in 2013 was designed to provide broader coverage of the state, since areas within sites tend to be more homogeneous than areas of different sites. The Executive Summary includes an overview of the methodology and results of the 2013 VLS. The full report provides an analysis of data from two full litter surveys in addition to the accumulated litter calculated as part of this study with a statistical analysis of the resultant data.

Study Highlights

Highlights from the 2013 VLS are shown below. Comprehensive data can be found in the full report and appendices.

➢ The results of the 2013 VLS indicate that 434,509,848 items of *Visible Litter* accumulate annually on the TxDOT-maintained roadway system, a reduction of 34% since 2009.

➢ This decrease in *Visible Litter* occurred despite the rise in both adult population in Texas (5.8%) and an increase in traffic levels statewide (1.5 billion additional miles traveled annually in Texas) between the years in which the 2009 and 2013 VLS studies were conducted.

➢ Most *Total Litter* (71%) was comprised of *Micro Litter*, items that are not normally visible while driving. *Micro Litter* can result from mowing without prior removal of litter.

➢ *Cigarette Butts* continued to comprise the largest portion of *Total Litter* in 2013 (31%), similar to 2009 (36%) and 2005 (28%).

➢ *Automotive Litter (Tire Debris* and *Vehicle Debris*) comprised 24 % of *Total Litter*.

➢ *Tire Debris* was the second largest component of litter (24%) and was pervasive across all areas of Texas.

- High wind gusts significantly affect how litter accumulation rates are measured in Texas.

- *Total Litter* on new sites, which focused more on roads with lower vehicle traffic, was significantly higher than on original sites.

- Given the portion of *Total Litter* attributable to vehicle debris and the effect of winds, population and traffic, the *Don't mess with Texas* program is likely more effective than is realized.

- Statistical tests show only a mild correlation between litter and the proximity to fast food establishments, convenience stores and schools. This suggests that litter cleanups are becoming culturally ingrained even in the face of continuing littering.

- Littered beverage containers (especially beer cans, water bottles and soda cans) were a larger component of *Visible Litter* (items larger than two square inches) than normally found in statewide litter surveys, but were reduced substantially since 2009.

- The number of adult Texans (16 years or older) as part of the population grew by more than 1 million (6%) since the previous survey. This population growth has generated higher traffic levels, which tends to correlate with higher rates of littering.

2013 Texas Litter Survey

Introduction

Environmental Resources Planning, LLC (ER Planning) conducted two statewide litter surveys throughout the State of Texas in 2013 to gauge the rate, extent and composition of litter along roadways maintained by TxDOT. TxDOT has sponsored such statewide litter surveys since 1985. The methodology used for conducting these litter surveys has consisted of quantifying and characterizing *Visible Litter* (items two square inches and larger) and *Micro Litter* (items smaller than two square inches).

Cost of Litter

The cost to deal with roadside litter in Texas, as shown in Figure 1, is substantial: $47 million to TxDOT alone in 2012. This figure continues to grow. Research conducted by ER Planning staff shows that cities, counties, institutions and businesses in Texas likely expend an amount greater than this for their part in dealing with litter.

Figure 1 – TxDOT Litter-Related Costs
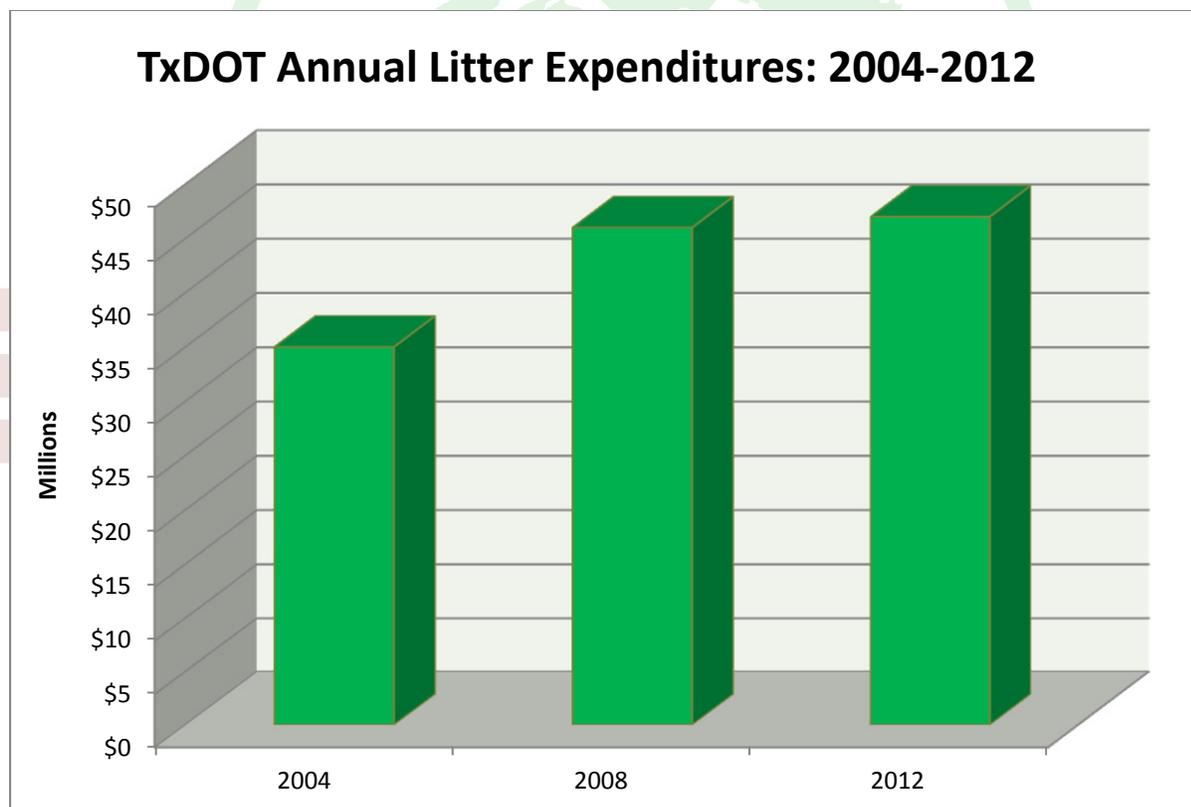
Source: TxDOT (2013)

The State of Texas has a significant infrastructure of litter cleanups and educational efforts through TxDOT, Keep Texas Beautiful and its local affiliates and the Adopt-A-Highway program, which covers approximately 10% of Texas roadways.

No other state in the U.S. has consistently monitored roadside litter and provided high-profile litter abatement programs as Texas has done and continues to do. Yet, as in other areas, roadside litter continues to provide challenges.

Traffic Data

The adult driving population in Texas increase 5.8% from 17.9 million in 2007 to 19 million in 2010 as shown in Figure 1. Population growth generates higher traffic levels, which tends to correlate with higher rates of littering. Studies conducted by the Institute for Applied Research have shown that litter rates follow traffic levels and population growth.

Figure 2 – Texas Population Change: 2007 - 2010
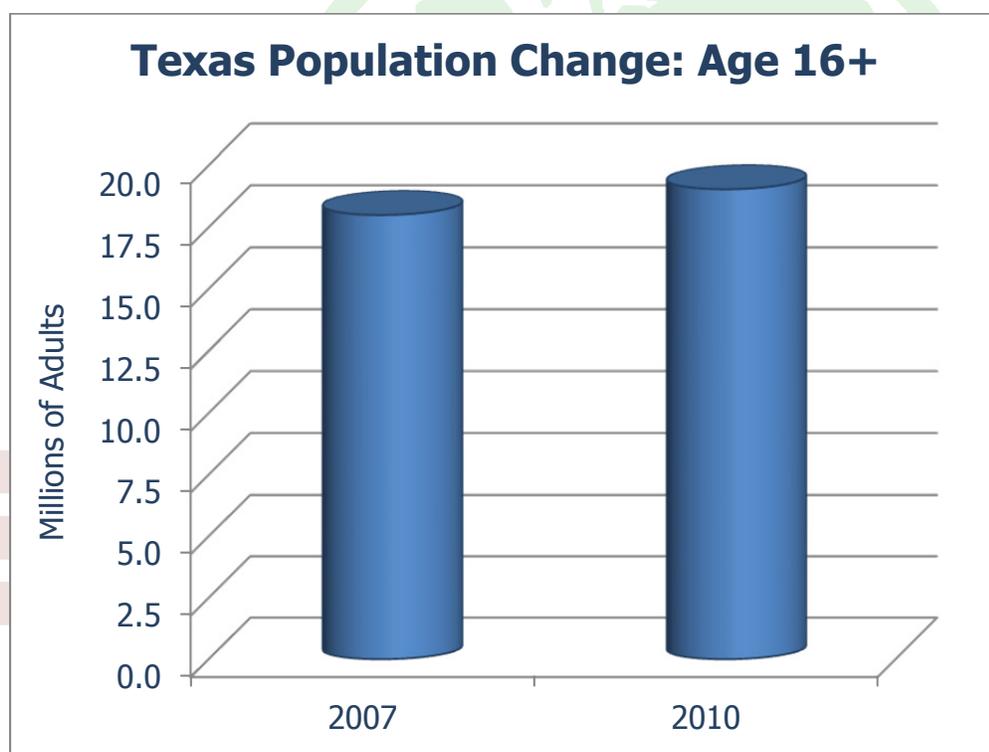
Source: TxDOT (2013)

Daily Vehicle Miles Traveled (DVMT) measures the average daily traffic on TxDOT-maintained roadways. Increases in DVMT tend to correlate with higher rates of littering. Traffic levels increased on FM Roads (1.4%) and Interstates (5.9%) between 2008 and 2012, but decreased on State Highways (-1.8%) and U.S. Highways (-3.4%). Overall, the traffic levels statewide increased by 4.1 million miles per day (0.9%) as shown in Table 1. This equates to an increase of 1.5 billion miles annually. This increase was lower than the increase in adult population, suggesting less travel on a per capita basis; however the traffic levels would be expected to rise if economic conditions continue to improve.

Table 1 – Daily Vehicle Miles Traveled

| System | Daily Vehicle Mileage | | Percent |
	2008	*2012*	*Change*
FM/RM Roads	68,509,267	69,407,935	1.3%
Interstates	162,209,757	171,808,165	5.9%
State Highways	116,169,088	114,133,600	-1.8%
U.S. Highways	127,970,392	123,634,294	-3.4%
Total:	**474,858,505**	**478,983,993**	**0.9%**

Source: TxDOT (2013)

Table 2 shows the change in Average Daily Traffic (ADT) counts for the roadway segments sampled on the 163 Original Sites. The overall ADT decreased by 7%, while Large Litter decreased 34% between 2009 and 2013. Although the ADT data sets are from 2007 and 2011, this may still suggest a relationship between traffic levels and the amount of Large Litter observed along Texas roadways (Table 9).

The changes in ADT by roadway type generally correlated with changes in Total Litter. FM Roadways showed the largest increase in daily traffic (+22%) and the largest increase in Total Litter (Table 13). Interstates and US Highways both showed reductions in ADT and Total Litter. State Highways were the only roadway type that did not show a correlation between ADT (which decreased) and Total Litter (which increased).

The reader should keep in mind that 2011 was the most recent ADT data available, while the survey data reflects 2013 conditions. This is consistent with previous Texas litter surveys and was followed in 2013 to be comparable with data from these previous surveys.

Table 2 – ADT for Sampled Roadway Segments by Roadway Type

| Roadway Type | Avg. Daily Traffic | | |
	2007	*2011*	*Percent Change*
FM Roadways	160,480	195,150	22%
Interstates	3,838,911	3,757,700	-2%
State Highway	732,419	574,990	-21%
U.S. Highway	1,101,587	891,000	-19%
Total:	**5,833,397**	**5,418,840**	**-7%**

Source: TxDOT (2013)

2013 Texas Litter Survey

Methodology

The 2013 Texas Litter Survey was conducted by surveying 253 sites including the 163 *Original Sites* surveyed in the previous 2009 litter study along with 90 *New Sites*, which focused on areas less represented in previous surveys. These sites were added to provide more data for certain target areas.

Each site was surveyed twice for *Visible Litter* to help ensure accuracy. Taking into account both surveys conducted, field crews surveyed about 4.8 million square feet along Texas roadways. *Micro Litter* was surveyed on three 3' x 18' transects and then extrapolated to the length of the site. Details regarding the methodology are included in the Appendix.

In order to be comparable to previous litter surveys conducted in Texas, the first litter survey was conducted between February 26, 2013 and March 9, 2013, while the second litter survey was conducted between April 9, 2013 and April 18, 2013.

The following approach was used for conducting the two litter surveys in 2013:

1. Quantifying and characterizing litter in an initial survey,
2. Quantifying and characterizing litter in a follow-up survey conducted an average of 42 days later;
3. Analyzing data from each survey separately; and
4. Analyzing the change in litter between surveys.

Litter was classified as either *Visible Litter* (two square inches or more) or *Micro Litter* (less than two square inches.) All sites were one-tenth mile in length and a maximum width of 18 feet.

Micro Litter was sampled on three transects of each site. Each of the three transects comprised a 3' x 18' area. The area of the three transects totaled 162 square feet. The data from these transects were extrapolated to the size of the entire site.

Litter was characterized using 106 categories (89 for *Visible Litter* and 17 for *Micro Litter*). These categories were consistent with those used in previous Texas litter surveys and other recent litter surveys. Brand names of items were recorded when visible.

Once the two litter surveys were conducted, the net accumulated litter (*Total Litter*) was calculated. The resultant data is shown in the sections below. The data sets for each of the two surveys were examined separately and compared. All percentages are rounded in the report.

Two sites were removed from the survey. Major road construction had begun on one of the *New Sites* between the first and second surveys. Data for a second site (one of the *Original Sites*) was removed as it was deemed an extreme outlier. Thus, this report is based on data from 162 *Original Sites* and 89 *New Sites*. Section 1 reports the findings for *Visible Litter*, those items visible while driving along roadways. Section 2 reports the findings for *Total Litter*: *Micro Litter* and *Visible Litter*. The map in Figure 3 shows the color-coded locations of the *Original Sites* and *New Sites*.

2013 Texas Litter Survey

Figure 3 – Sites Distribution Map

Legend

▲ Previously Sampled Sites

● Newly Sampled Sites
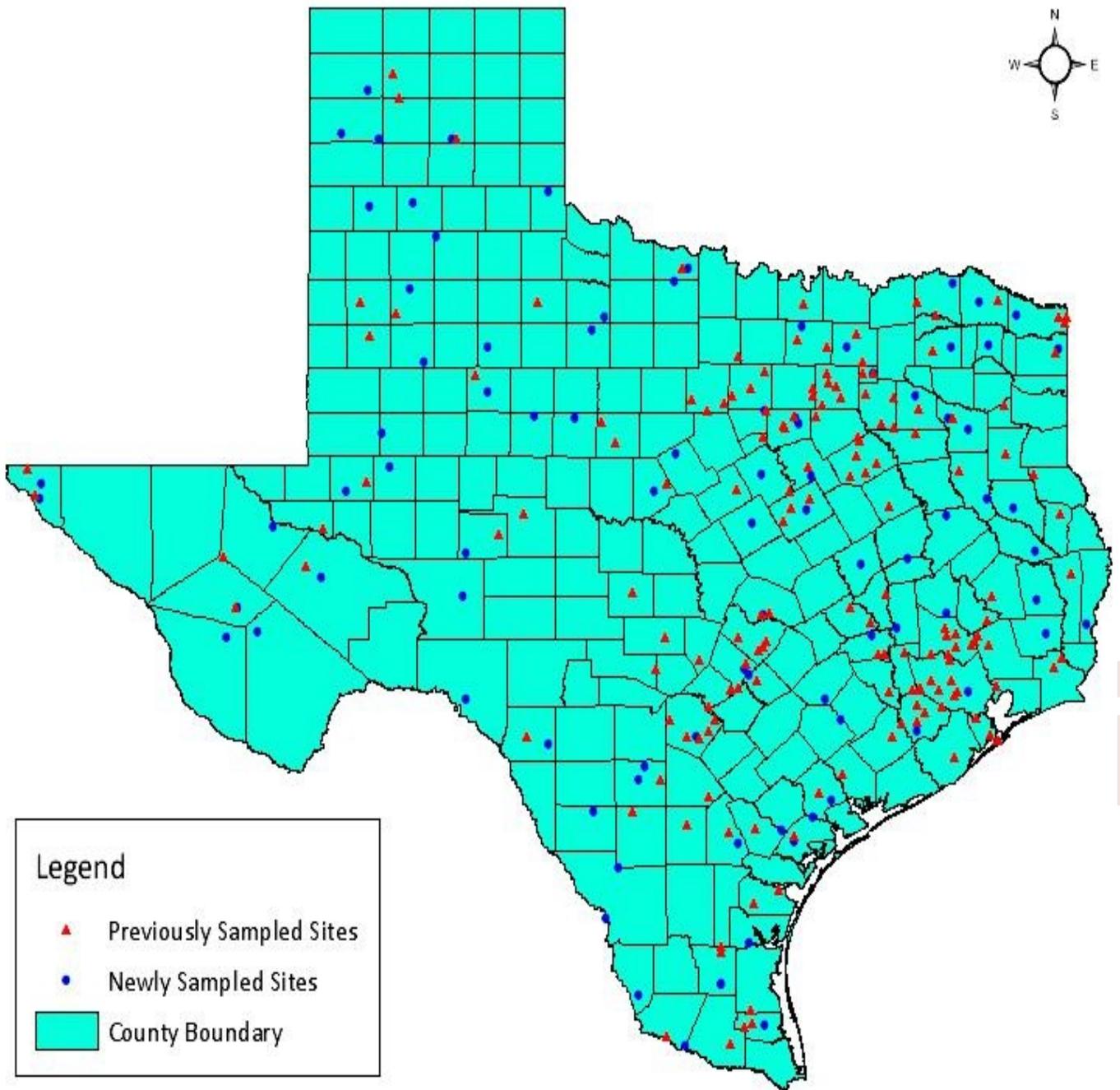
☐ County Boundary

Section 1: Analysis of Visible Litter Only

First Survey

The largest component of *Visible Litter* on both the *Original Sites* and *New Sites* during the first survey was *Tire & Rubber Debris*, as shown in Table 3. *Tire & Rubber Debris* was slightly higher at the *New Sites*. This was followed by *Misc. Paper* and *Misc. Plastic*, two categories representing weathered items not otherwise classifiable. The top 10 components of *Visible Litter* were similar portion on the *Original Sites* and *New Sites*.

The top 10 of the 89 components of litter comprised 64% of *Visible Litter* on the *Original Sites* and 62% of *Visible Litter* on the *New Sites*. The remaining 79 components comprised 36% of *Visible Litter* on the *Original Sites* and 38% of *Visible Litter* on the *New Sites*. All other components not listed comprised less than 3% of *Visible Litter*.

Table 3 – First Litter Survey: Top 10 Components

Visible Litter Items	Original Sites	Rank	New Sites	Rank
Tire & Rubber Debris	16%	1	18%	1
Misc. Paper	13%	2	12%	2
Misc. Plastic	8%	3	9%	3
Beer Cans	5%	4	4%	6
Vehicle & Metal Road Debris	4%	5	5%	4
Plastic Packaging - Film	4%	6	3%	7
Construction Debris	4%	7	3%	8
Water Bottles (Plastic)	4%	8	4%	5
Cup Lids, Pieces Lids, Straws *	3%	9	-	-
Tobacco Packaging	3%	10	3%	10
Foil Materials and Pieces *	-	-	3%	9
Subtotal - Top 10 Items	**64%**		**62%**	

* Percentages are not shown for items that were not part of the top 10 ranking.

Second Survey

The largest components of *Visible Litter* found on both the *Original Sites* and *New Sites* in the second survey were *Tire & Rubber Debris,* followed by Misc. Paper and Misc. Plastic, as was true in the first survey. The other major components of *Visible Litter* were also similar on both the *Original Sites* and the *New Sites* as shown in Table 4. Significantly more *Tire & Rubber Debris* was observed on *New Sites* in the second survey, although most other components comprised a similar percentage of *Visible Litter*. The top 10 components of *Visible Litter* were exactly the same at *Original Sites* and *New Sites*.

The top 10 components comprised 59% of *Visible Litter* on the *Original Sites* and 64% on the *New Sites*. The remaining 79 components comprised 41% of *Visible Litter* on the *Original Sites* and 36% on the *New Sites*. All other components not listed in Table 4 comprised less than 3% of *Visible Litter*.

2013 Texas Litter Survey

Table 4 – Second Litter Survey: Top 10 Components

Visible Litter Items	Original Sites	Rank	New Sites	Rank
Tire & Rubber Debris	18%	1	27%	1
Misc. Paper	7%	2	7%	3
Misc. Plastic	7%	3	7%	2
Vehicle & Metal Road Debris	6%	4	6%	4
Beer Cans	5%	5	4%	5
Construction Debris	4%	6	3%	10
Water Bottles (Plastic)	4%	7	3%	6
Cup Lids, Pieces Lids, Straws	3%	8	3%	7
Tobacco Packaging	3%	9	3%	8
Soft Drink Cans	3%	10	3%	9
Subtotal - Top 10 Items	*59%*		*64%*	

Accumulated Litter

The largest component of *Accumulated Litter* was *Tire & Rubber Debris* on both the *Original Sites* (18%) and the *New Sites* (27%) as shown in Table 5.

Table 5 – Accumulated Litter: Top 10 Components

Visible Litter Items	Original Sites	Rank	New Sites	Rank
Tire & Rubber Debris	13%	1	29%	1
Vehicle & Metal Road Debris	7%	2	5%	2
Construction Debris	5%	3	3%	5
Misc. Plastic	4%	4	5%	3
Misc. Paper	4%	5	3%	6
Beer Cans	3%	6	4%	4
Non-Brand Napkins *	3%	7	-	-
Snack Food Packaging *	3%	8	-	-
Tobacco Packaging	2%	9	2%	9
Soft Drink Cans	2%	10	2%	7
Cup Lids, Pieces Lids, Straws *	-	-	2%	8
Water Bottles (Plastic) *	-	-	2%	10
Subtotal - Top 10 Items	**46%**		**59%**	

* Percentages are not shown for items that were not part of the top 10 ranking.

2013 Texas Litter Survey

The top 10 components of *Accumulated Litter* continued to be similar on both the *Original Sites (46%)* and the *New Sites (59%)*, although *Tire & Rubber Debris* was significantly higher on *New Sites (29%)*. A list detailing all components of *Visible Litter* is included in the Appendix.

Since Farm to Market (FM) Roads comprise 56% of the TxDOT roadway system mileage (Table 6), it is not surprising that 58% of the *Visible Litter* accumulates on FM Roads.

Table 6 - Litter Accumulation Rates by Roadway

Road Type	Visible Litter	Percent of Visible Litter
FM Roads	251,831,329	58%
Interstates	32,900,711	8%
State Highways	114,966,303	26%
U.S. Highways	34,811,505	8%
Total	**434,509,848**	**100%**

The physical composition of littered items is shown in Table 7. *Other* includes items made from multiple materials. The composition of items was generally similar, except that *Rubber*, which includes *Tire Debris*, was a higher component of *Visible Litter* on *New Sites*.

Table 7 – Visible Litter Composition

Physical Composition	Percent of Total		
	Original Sites	New Sites	All Sites
Paper & Paperboard	22%	16%	20%
Plastic	24%	20%	22%
Metal	8%	9%	8%
Rubber/Leather	13%	29%	20%
Glass	3%	4%	3%
Textiles	4%	3%	3%
Wood	<1%	<1%	<1%
Other	26%	19%	23%
Total	**100%**	**100%**	**100%**

Table 8 compares the most littered items in 2013 by roadway, showing that *Rubber* was much higher on Interstates than on any other roadway in 2013 causing the percentage of *Paper and Paperboard* items to be lower. The higher incidence of *Rubber* is likely due related to the large volume of eighteen-wheelers and the high speed of traffic on Interstates.

2013 Texas Litter Survey

Table 8 – Litter Composition by Roadway

Physical Composition	Percent of Total by Road Type - 2013				
	Interstates	US Highways	State Highways	FM Roads	All Roads
Paper & Paperboard	19%	25%	26%	25%	22%
Plastics	21%	23%	24%	30%	24%
Metals	6%	11%	7%	10%	8%
Rubber/Leather	24%	<1%	5%	4%	13%
Glass	2%	7%	2%	3%	3%
Textiles	4%	3%	3%	2%	4%
Wood	<1%	<1%	<1%	<1%	<1%
Other	23%	31%	32%	25%	26%
Total	**100%**	**100%**	**100%**	**100%**	**100%**

A comparison of changes in *Visible Litter* on the *Original Sites* between 2009 and 2013 (Table 9) indicates an overall reduction of 34% in Visible Litter. This is based on an examination of all litter components in 2009 compared with 2013 and deriving an assessment of the portion likely attributable to *Visible Litter*.

Table 9 – Visible Litter Change Estimate

Visible Litter Change Estimate		
2009	2013	Change %
662,842,933	435,067,590	-34%

This decrease in *Visible Litter* occurred despite the rise in both adult population in Texas (5.8%) and an increase in traffic levels statewide (1.5 billion additional miles traveled annually in Texas) between the years in which the 2009 and 2013 VLS studies were conducted.
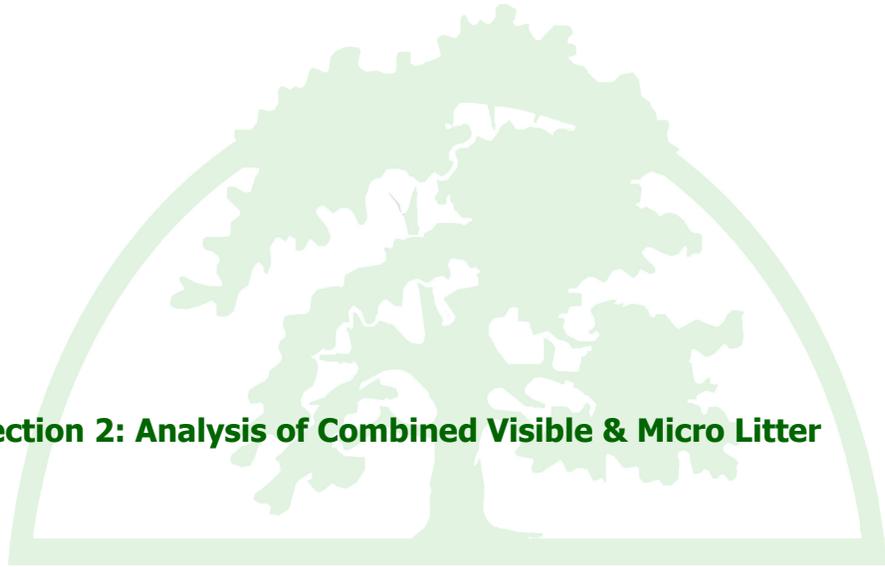
Section 2: Analysis of Combined Visible & Micro Litter

2013 Texas Litter Survey

For comparison of 2013 survey data with 2009 survey data, *Micro Litter* and *Visible Litter* were analyzed together in Section 2 as *Total Litter*.

First Survey

Table 10 shows that the largest components of *Total Litter* found on both the *Original Sites* and *New Sites* during that survey were *Cigarette Butts* and *Automotive Litter*. Other components were also a similar portion of *Total Litter* on both the *Original Sites* and *New Sites*. *Tire & Rubber Debris* was much higher at the *New Sites*, causing *Cigarette Butts* to comprise a lower percentage of *Total Litter*. All other components comprised 2% or less of *Total Litter*. The top 10 of the 106 components of litter comprised 68% of *Total Litter* on the *Original Sites* and 71% of *Total Litter* on the *New Sites*. The remaining 96 components comprised 32% of *Total Litter* on the *Original Sites* and 29% of *Total Litter* on the *New Sites*.

Table 10 – First Survey: Top 10 Components of Total Litter

Total Litter Items	Original Sites	Rank	New Sites	Rank
Cigarette Butts	26%	1	19%	2
Tire & Rubber Debris (Micro)	8%	2	19%	1
Tire & Rubber Debris (Visible)	8%	3	7%	4
Misc. Paper	6%	4	5%	5
Paper (Micro)	6%	5	8%	3
Misc. Plastic	4%	6	4%	7
Plastic Hard (Micro)	3%	7	2%	8
Glass (Micro)	3%	8	-	-
Beer Cans	2%	9	-	-
Vehicle & Metal Road Debris	2%	10	2%	9
Plastic Water Bottles	-	-	2%	10
Polystyrene Food Service (Micro)	-	-	4%	6
Subtotal - Top 10 Items	**68%**		**71%**	

Second Survey

The largest components of *Total Litter* on *Original Sites* and *New Sites* during the second survey were *Cigarette Butts* and *Automotive Litter*, similar to the first survey. The other major components of *Total Litter* were also similar on both *Original Sites* and *New Sites* (Table 11). More *Tire & Rubber Debris* was observed on *New Sites* in the second survey, causing *Cigarette Butts* to comprise a lower percentage of *Total Litter*. Otherwise, the major components of *Total Litter* were similar on *Original Sites* and *New Sites*.

All other components comprised 2% or less of *Total Litter*. The top 10 of the 106 components of litter comprised 78% of *Total Litter* on the *Original Sites* and 83% of

Total Litter on the *New Sites*. The remaining 96 components comprised 22% of *Total Litter* on the *Original Sites* and 17% of *Total Litter* on the *New Sites*.

Table 11 – Second Survey: Top 10 Components of Total Litter

Total Litter Items	Original Sites	Rank	New Sites	Rank
Cigarette Butts	34%	1	22%	2
Tire & Rubber Debris (Micro)	14%	2	31%	1
Paper (Micro)	7%	3	7%	3
Tire & Rubber Debris (Visible)	5%	4	6%	5
Glass Pieces	4%	5	7%	4
Plastic Hard (Micro)	4%	6	3%	7
Misc. Plastic	2%	10	2%	9
Polystyrene Food Service (Micro)	3%	7	3%	6
Plastic Film (Micro)	3%	8	2%	8
Misc. Paper	2%	9	2%	10
Subtotal - Top 10 Items	*78%*		*83%*	

Accumulated Litter

Table 12 lists the top 10 components of *Total Litter* for the *Original Sites*. Together they comprise 78% of this category. As was true in both surveys, tire-related debris, as a component of *Accumulated Litter*, was much higher on *New Sites* (39%) compared to the *Original Sites* (17%).

Table 12 – Accumulated Litter: Top 10 Components

Total Litter Items	Original Sites	Rank	New Sites	Rank
Cigarette Butts	31%	1	17%	2
Tire & Rubber Debris (Micro)	12%	2	31%	1
Tire & Rubber Debris (Visible)	5%	3	8%	4
Glass (Micro)	5%	4	8%	3
Paper (Micro)	4%	5	4%	5
Plastic Film (Micro)	3%	6	2%	8
Plastic Hard (Micro)	3%	7	3%	7
Vehicle and Metal Road Debris	2%	8	2%	9
Polystyrene Food Service (Micro)	2%	9	3%	6
Aluminum (Micro)	2%	10	-	-
Other Items (Wood)	-	-	1%	10
Subtotal - Top 10 Items	**69%**		**80%**	

2013 Texas Litter Survey

The highest portion of *Total Litter in 2013* was *Cigarette Butts* (31%), similar to 2009 (36%). *Total Tire Scraps* (pieces of blown tires) were significantly higher in 2013. *Micro Tire Scraps* were 12%, while *Tire & Rubber Debris comprised 57*% for a total of 17% compared with 5% in 2009. The remaining top 10 items were all components of *Micro Paper.*

Similar to previous litter surveys in Texas, *Cigarette Butts* were the predominant item found in litter. Table 13 clearly shows this impact – more than half a billion cigarette butts are littered on Texas roadways each year, a significant growth compared with 2009.

Table 13 - Littered Items by Roadway Type (with and without Cigarette Butts)

Roadway Type	Center line Miles	Including Cigarette Butt Litter			Excluding Cigarette Butt Litter		
		2009	**2013**	**% Change**	**2009**	**2013**	**% Change**
FM Roadways	40,965	528,823,879	954,821,303	81%	339,565,496	536,357,634	58%
Interstate Highway	3,233	94,121,255	77,614,712	-18%	52,839,405	57,582,066	9%
State Highway	16,331	260,656,708	291,159,745	12%	192,921,872	215,378,430	12%
U.S. Highway	12,104	218,168,944	157,019,311	-28%	154,866,269	101,245,795	-35%
Total:	72,633	1,101,770,786	1,480,615,070	34%	740,193,042	910,563,925	23%

As shown in Table 14, almost two-thirds of all litter is found on FM roads. This is due, in part, to the fact that FM Roads comprise 56% of the TxDOT roadway system mileage.

Table 14 - Litter Accumulation Rates

Road Type	Visible Litter	Micro Litter	Total Litter
FM Roads	251,831,329	702,989,974	954,821,303
Interstates	32,900,711	44,714,002	77,614,712
State Highways	114,966,303	176,193,442	291,159,745
U.S. Highways	34,811,505	122,207,805	157,019,311
Total	**434,509,848**	**1,046,105,223**	**1,480,615,070**

Just as importantly, Table 14 shows that *Micro Litter* items are consistently a high portion of *Total Litter* on all Texas roadways.

Comparisons to Previous Surveys

The physical composition of littered items is compared in Table 15. For consistency with previous surveys, cigarette butts were classified with paper items. *Paper and Paperboard* was a lower percentage of litter in 2013 mainly due to the higher percentage of *Scrap Tires*, a component of *Rubber*. The percentage of *Metal* and *Plastic* items in 2013 was very similar to 2009.

Table 15 – Litter by Composition

Physical Composition	Percent of Total		
	2005	2009	2013
Paper & Paperboard	61%	63%	43%
Plastic	25%	19%	17%
Metal	10%	7%	7%
Rubber/Leather	<1%	6%	17%
Glass	1%	2%	6%
Textiles	1%	1%	1%
Wood	<1%	<1%	2%
Other	1%	<1%	7%
Total	100%	100%	100%

When the composition of litter is broken out by roadway type, it is clear that *Tire Scraps* were much higher on Interstates than on any other roadway in 2013 causing the percentage of *Paper and Paperboard* items to be lower, as shown in Table 16.

Table 16 – Litter Composition by Roadway

Physical Composition	Percent of Total by Road Type								Percent of Total	
	Interstate Highway		US Highway		State Highway		FM Roadway			
	2009	2013	2009	2013	2009	2013	2009	2013	2009	2013
Paper & Paperboard	68%	37%	57%	46%	56%	39%	72%	55%	63%	43%
Plastics	19%	13%	19%	22%	22%	19%	14%	20%	19%	17%
Metals	5%	7%	9%	7%	9%	10%	5%	6%	7%	7%
Rubber/ Leather	5%	30%	9%	9%	7%	12%	4%	4%	6%	17%
Glass	2%	4%	3%	7%	2%	5%	3%	7%	2%	6%
Textiles	<1%	2%	2%	1%	2%	1%	<1%	1%	1%	1%
Wood	<1%	2%	<1%	3%	<1%	3%	<1%	2%	<1%	2%
Other	<1%	6%	1%	6%	<1%	10%	1%	6%	<1%	7%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 17 compares the most littered items in 2013 with the most littered items in the two most recent surveys (2005 and 2009). *Cigarette Butts* were the most littered item in each of these surveys. *Tire & Rubber Debris* was also significant in both 2009 and 2013. Pieces of paper and plastic were dominant in both 2009 and 2013, suggesting that some littered items are likely mowed and broken into multiple pieces.

Table 17 – Comparison of Most Littered Items: 2005-2013

Comparison of VLS Item Rank by Survey Year		
2005	2009	2013
Cigarette Butts (28%)	Cigarette Butts (36%)	Cigarette Butts (31%)
Wrap (7%)	Paper Pieces (7%)	Tire & Rubber Debris (Micro) (12%)
Tissues/Towels/Napkins (5%)	Tire Parts (5%)	Tire & Rubber Debris (Visible) (5%)
Beer Cans (5%)	Cigar Butts (4%)	Glass (Micro) (5%)
Beverage Cups (4%)	Paper (4%)	Paper (Micro) (4%)
Cigarette Packs (4%)	Plastic Pieces (4%)	Plastic Film (Micro) (3%)
Soda Cans (3%)	Beer Cans (3%)	Plastic Hard (Micro) (3%)
Cup Lids (3%)	Cup Pieces (2%)	Vehicle & Metal Road Debris (2%)
Drinking Straws (3%)	Food Wrap (3%)	Polystyrene Food Service (Micro) (2%)
Lottery Tickets (2%)	Soda Cans (2%)	Aluminum (Micro) (2%)

Table 18 compares the top components of *Total Litter* by product use found in *Total Litter*. As in 2009, *Tobacco* remains the most littered item. *Construction/Industrial* and *Automotive* litter have continued to grow between 2005 and 2013.

Table 18 - Comparison of Litter by Use: 2005-2013

Litter by Product Use	Percent of Total		
	2005	2009	2013
Tobacco	33%	43%	33%
Household/Personal	4%	9%	4%
Food	29%	7%	6%
Non-Alcoholic Beverages	11%	13%	8%
Alcoholic Beverages	6%	6%	2%
Construction/Industrial	8%	10%	15%
Printed	8%	4%	8%
Other	0%	1%	1%
Automotive	1%	7%	24%
Total	**100%**	**100%**	**100%**

The breakdown of product use by roadway shows a significant reduction of *Tobacco* litter on Interstates (from 50% to 27%) and a slight reduction on FM Roads. The reduction of *Beverage-related* litter was likely influenced, in part, by the higher percentage of *Automotive* litter, as shown in Table 19.

2013 Texas Litter Survey

Table 19 - Comparison of Litter Use by Roadway: 2009-2013

Use	Percent of Total by Road Type								Percent of Total	
	Interstate Highway		US Highway		State Highway		FM Roadway			
	2009	2013	2009	2013	2009	2013	2009	2013	2009	2013
Tobacco	50%	27%	34%	37%	31%	28%	55%	45%	43%	33%
Household/ Personal	8%	6%	11%	4%	10%	6%	8%	4%	9%	4%
Food	6%	4%	8%	6%	9%	9%	5%	4%	7%	6%
Non-Alcoholic Beverages	14%	7%	14%	13%	13%	9%	9%	7%	13%	8%
Alcoholic Beverages	5%	2%	7%	2%	7%	2%	6%	2%	6%	2%
Construction/ Industrial	9%	10%	9%	17%	15%	18%	7%	17%	10%	15%
Printed	3%	7%	5%	7%	4%	8%	5%	8%	4%	8%
Other	<1%	1%	2%	0%	2%	1%	<1%	<1%	1%	1%
Automotive	6%	37%	10%	16%	9%	19%	5%	12%	8%	24%
Total:	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

The ranking of littered items by use, in Table 20, shows similarities in *Tobacco* and *Construction/Industrial* litter. Both categories were significant portions of litter in all three surveys. Viewing litter through this ranking sheds light on the types of litter found without regard to size.

Table 20 - Comparison of Litter Rank by Use: 2005-2013

Comparison of VLS Use Rank by Survey Year		
2005	2009	2013
Tobacco (33%)	Tobacco (43%)	Tobacco (33%)
Food (29%)	Non-Alcoholic Beverages (13%)	Automotive (24%)
Non-Alcoholic Beverages (11%)	Construction/Industrial (10%)	Construction/Industrial (15%)
Construction/Industrial (8%)	Household/Personal (9%)	Printed (8%)
Printed (8%)	Food (7%)	Non-Alcoholic Beverages (6%)
Alcoholic Beverages (6%)	Automotive (7%)	Household/Personal (7%)
Household/Personal (4%)	Alcoholic Beverages (6%)	Food (6%)
Automotive (1%)	Printed (4%)	Alcoholic Beverages (2%)
Other (0%)	Other (<1%)	Other (<1%)
Agricultural/Garden (0%)	Agricultural/Garden (<1%)	Agricultural/Garden (<1%)

Comparing the monthly projections of litter by roadway type, in Table 21, littering on FM Roads has grown significantly, while littering on State Highways has grown at a lower rate. Littering on Interstates and U.S. Highways dropped closer to 2005 levels.

Table 21 – Monthly Litter Projection by Roadway: 2005-2013

Roadway Type	Monthly Litter Projections			% Change
	2005	2009	2013	2009-2013
FM Roads	876	1,076	1,942	81%
Interstates	1,881	2,426	2,001	-18%
State Highways	877	1,330	1,486	12%
U.S. Highways	1,054	1,502	1,081	-28%

The annualized litter projection changes over the past nine years (Table 22) show the impact of these monthly littering rate projections, particularly on FM Roads. Although *Total Litter* grew 34 % since 2009, two-thirds of *Total Litter* is *Micro Litter*, items that are less than two inches in size. These items are typically more difficult to clean up compared with *Visible Litter*.

Table 22 – Estimated Littered Items by Roadway: 2005-2013

Roadway Type	Centerline Miles	Number of Littered Items			% Change
		2005	2009	2013	2009-2013
FM Roads	40,965	430,709,842	528,823,879	954,821,303	81%
Interstates	3,233	72,971,697	94,121,255	77,614,712	-18%
State Highways	16,331	170,488,104	260,656,708	291,159,745	12%
U.S. Highways	12,104	153,035,881	218,168,944	157,019,311	-28%
Total:	**72,633**	**827,205,524**	**1,101,770,786**	**1,480,615,070**	**34%**

Branded Litter

Prior visible litter studies performed in Texas have recorded both the brand name as well as the quantity of items within that brand name to provide a better understanding of which brands contribute most to litter. In 2001, 2005 and again in 2009, field crews noted the brand name of each item of litter collected where recognizable. In the 2013 study, field crews also made note of both small and large items of litter.

Figure 4 – Branded Litter

Top 20 Most Common Brands in Litter
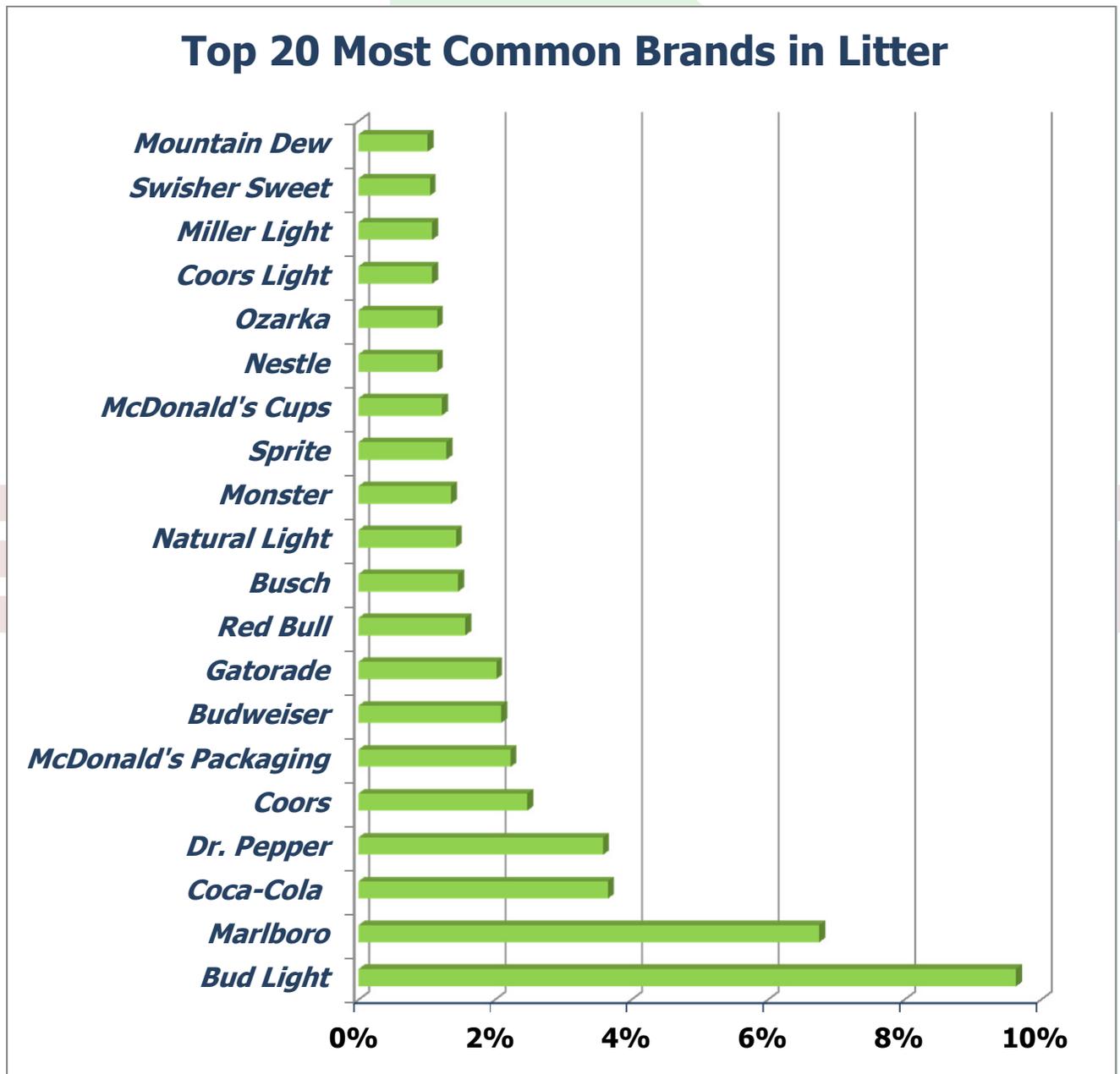
In the 2013 survey, brand names were recorded on over 450 unique brand types. The most pervasive brand name observed in litter, as shown in Figure 4, was Bud Light, which accounted for approximately 10% of all identified branded items. This is not surprising as Bud Light containers made up the majority of alcoholic beverages recorded in the 2009 study. Marlboro (including Marlboro Lights) was the second most identified brand, accounting for approximately 7% of all branded items.

This was followed by Coca-Cola (4%), and Dr. Pepper (4%) containers. In total, the top 20 most common brand names comprised 47% of all brand name items counted.

In 2009, tobacco products comprised 9 of the top 10 most commonly found branded items. Brand names of *Micro Litter* components such as *Cigarette Butts* were recorded when their brand names were readily identifiable. Table 23 displays the top ten brand name litter between the studies. As the table indicates, there was more of a relationship between the 2013 study and the 2005 study.

Table 23 – Branded Litter Comparisons

2005 VLS Brand Rank	2009 VLS Brand Rank	2013 VLS Brand Rank
Marlboro Light (18%)	Marlboro (7%)	Bud Light (10%)
Marlboro (13%)	Marlboro Light (5%)	Marlboro (7%)
Texas Lottery (3%)	Marlboro 100's (3%)	Coca-Cola (4%)
Doral (3%)	Doral (2%)	Dr. Pepper (4%)
McDonald's (3%)	Camel (2%)	Coors (2%)
Bud Light (2%)	Bud Light (2%)	McDonald's (2%)
Marlboro Menthol (2%)	Virginia Slims (2%)	Budweiser (2%)
Coca-Cola (2%)	Salem (2%)	Gatorade (2%)
Burger King (2%)	Newport (1%)	Red Bull (2%)
Dr. Pepper (2%)	Winston (1%)	Busch (2%)

2013 Texas Litter Survey

Statistical comparisons refer to the *Original Sites* surveyed for comparability to previous surveys unless otherwise noted. Findings based on surveying the *New Sites,* which were selected to provide data on special study areas, are reported separately.

Conclusions

➢ The results of the 2013 VLS indicate that 434,509,848 items of *Visible Litter* accumulate annually on the TxDOT-maintained roadway system, a reduction of 34% since 2009.

➢ This decrease in *Visible Litter* occurred despite the rise in both adult population in Texas (5.8%) and an increase in traffic levels statewide (1.5 billion additional miles traveled annually in Texas) between the years in which the 2009 and 2013 VLS studies were conducted.

➢ Most of *Total Litter* (71%) was *Micro Litter* (items smaller than two square inches).

➢ *Cigarette Butts* continued to comprise the largest portion of *Total Litter* in 2013 (31%), similar to 2009 (36%) and 2005 (28%).

➢ *Automotive Litter (Tire Debris* and *Vehicle Debris*) comprised 24 % of *Total Litter*.

➢ *Tire Debris* was the second largest component of litter (24%) and was pervasive across all areas of Texas.

➢ High wind gusts significantly affect how litter accumulation rates are measured in Texas.

➢ *Total Litter* on new sites, which focused more on roads with lower vehicle traffic, was significantly higher than on original sites.

➢ Given the portion of *Total Litter* attributable to vehicle debris and the effect of winds, population and traffic, the *Don't mess with Texas* program is likely more effective than is realized.

➢ Statistical tests show only a mild correlation between litter and the proximity to fast food establishments, convenience stores and schools. This suggests that litter cleanups are becoming culturally ingrained even in the face of continuing littering.

➢ Littered beverage containers (especially beer cans, water bottles and soda cans) were a significant component of *Visible Litter* (items larger than two square inches) in both surveys, similar to 2009 and 2005.

➢ The number of adult Texans (16 years or older) as part of the population grew by more than 1 million (6%) since the previous survey. This population growth has generated higher traffic levels, which tends to correlate with higher rates of littering.

Recommendations

➢ High wind gusts affect how litter accumulation rates along Texas roadways are measured. The way and extent to which these occur should be studied further as litter prevention efforts are based on these accumulation rates.

➢ Areas identified by new sites should be evaluated for focused litter reduction efforts.

➢ *Tire Debris*, although not an intentional form of litter, deface Texas roadways. Working with the appropriate gatekeepers and strategically placed signage showing the benefits of proper tire inflation can help reduce this form of litter.

➢ Programs focusing on reducing cigarette butts can reduce litter along Texas roadways significantly.

➢ Littered beverage containers, a large component of litter on certain sites, present an opportunity for focused litter prevention.

➢ Focusing on the progress made by the *Don't mess with Texas* program will help provide momentum for future efforts.
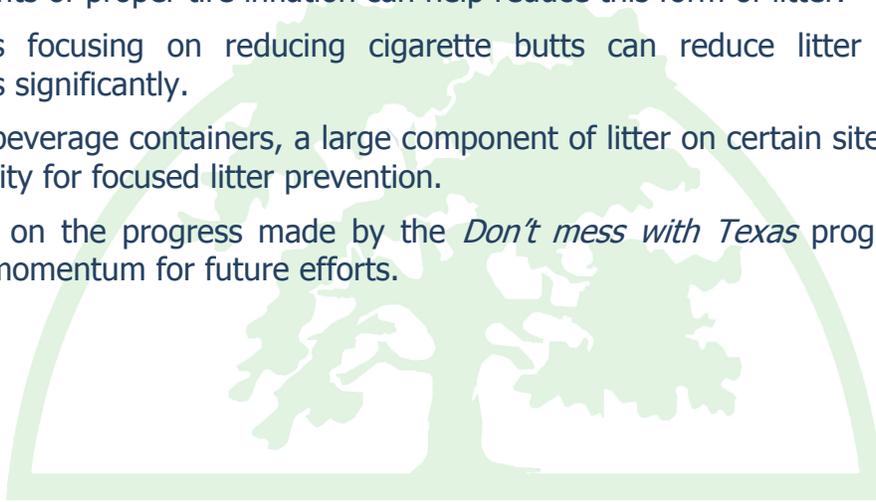
Appendices

Appendix A – Branded Litter

Appendix B – Methodology

Appendix C – Visible Litter Components

Appendix D – Micro Litter Components

Appendix E – Most Common Items within Use Categories

Appendix F – Statistical Analysis of Survey Data

Appendix G – Litter Categories and Descriptions

Appendix H – Sites List

Appendix A – Branded Litter

Table 24 contains a summary of the top classes of litter and the top brand name within that category as identified by brand type. As the table details, Marlboro cigarettes and packaging comprised 50% of all tobacco items found in the survey, while McDonalds packaging[1] contained the most identifiable brand name items found within food and food packaging. As indicated previously, Coca-Cola and Bud Light beverage containers were the most frequently found brand name items for non-alcoholic and alcoholic containers respectively. The most identifiable retail bag found in 2013 was from Wal-Mart stores.

Table 24 – Branded Litter by Use

Use	Brand Name	Percent within Litter Use
Tobacco	Marlboro	50%
	Swisher Sweet	8%
	Camel	6%
	Newport	4%
	Pall Mall	4%
	Copenhagen	3%
	Winston	3%
	Kool	2%
	Doral	2%
	Grizzly	2%
	All other brands	16%
Food & Food Packaging	McDonald's Packaging	12%
	Sonic	4%
	Jack in the Box	3%
	Whataburger	3%
	Doritos	3%
	Snickers	3%
	Lays	2%
	Taco Bell	2%
	Wrigley's	2%
	Frito Lay	2%

[1] Excludes fast-food cups, which were categorized under non-alcoholic beverages to be consistent with the 2009 study.

2013 Texas Litter Survey

Use	Brand Name	Percent within Litter Use
	Little Debbie	2%
	All other brands	61%
Non Alcoholic Beverages	Coca-Cola	10%
	Dr. Pepper	10%
	Gatorade	6%
	Red Bull	4%
	Monster	4%
	Sprite	4%
	McDonald's Cups	3%
	Nestle	3%
	Ozarka	3%
	Mountain Dew	3%
	All other brands	50%
Alcoholic Beverages	Bud Light	38%
	Coors	10%
	Budweiser	8%
	Busch	6%
	Natural Light	6%
	Coors Light	4%
	Miller Light	4%
	Keystone	4%
	Miller	4%
	Dos Equis	2%
	All other brands	15%
Printed	my SA	7%
	Bud Light Label/Box	6%
	McDonalds	6%
	Sunkist	6%
	7-11	5%
	Other	5%
	HEB	4%
	Home Depot	4%
	Taco Bell	4%
	All other brands	55%
Construction/ Auto	NAPA	12%
	All other brands	88%

Use	Brand Name	Percent within Litter Use
Household/ Personal	Halls	9%
	Nike	9%
	Oakley	6%
	All other brands	76%
Agricultural/ Garden	Lyssy & Eckel Feed	33%
	Red Chain	33%
	Scotts	33%
Plastic/ Paper Bags	Wal-Mart	23%
	HEB	15%
	Reddy Ice	8%
	Ziploc	8%
	99-Cent Store	5%
	Valero	5%
	Unknown	5%
	All other brands	32%

Appendix B – Methodology

The methodology used for the 2013 Texas Litter Survey is based on statistically-based methodologies that have been used in litter surveys throughout North America.

Conducting the Litter Survey

Each survey team was comprised of two people. Upon arriving at a site, the team safely parked their vehicle. Large worker signs were posted and traffic cones or flags were used to define site parameters. Team members were required to wear fluorescent orange/yellow traffic vests to increase visibility. The optimal site size was one-tenth mile (528 feet) x 18 feet. Conditions limiting access to a site's optimal width (e.g. walls or fences) were so noted.

Paint provided by TxDOT was used to mark the beginning, midpoint and end of each site. This helped identify sites that should not be cleaned and helped the survey teams return to the same survey points for the second survey.

The width of each site was measured from 1.5 feet inside the curb or the start of the pavement, towards the outer edge of the site, up to a maximum width of 18 feet and marked to indicate the boundary. This rule was set to include 1.5 feet into the street since curbs are normal catchment structures, for which DOTs typically ensure litter cleanup.

Litter Classification

For the 2013 Texas Litter Survey, litter was classified as *Visible Litter* (>= two square inches) and *Micro Litter* (< two square inches). This breakdown helps define and clarify the extent to which litter item size is a factor in the evaluation of resultant data.

The litter tallies were recorded into 89 categories of *Visible Litter* and 17 categories of *Micro Litter*. Utilizing these categories will allow comparison to litter in other areas and will for future litter surveys in Texas. A detailed description of each litter category is included in the Appendix.

Micro Litter was examined in three segments of each site: at the beginning, middle and end of each site. Each of these segments comprised a 3' x 18' area. The resultant data was extrapolated to the total site area.

Survey Count

At each site, the ambient site information was recorded on the appropriate form, describing the site number, size and proximity to conditions (e.g. traffic signal, fast food or convenience stores, etc.) and providing a subjective visual rating.

Appendix C – Visible Litter Components

All components of *Visible Litter* are shown in Table 25. This represents the data for the *Original Sites*, which are statistically comparable to data in the 2009 and 2005 surveys. Almost 25% of all *Visible Litter* is debris related to vehicle and construction. These items were also a significant portion of litter observed at the *New Sites* as well.

Table 25 – Visible Litter Components

Visible Litter Item	Percent
Tire & Rubber Debris	13.4%
Vehicle & Metal Road Debris	7.0%
Construction Debris	4.5%
Misc. Plastic	4.2%
Misc. Paper	3.8%
Beer Cans	3.1%
Non-Brand Napkins	2.8%
Snack Food Packaging	2.5%
Tobacco Packaging	2.4%
Soft Drink Cans	2.4%
Composite Materials - Other	2.3%
Cup Lids, Pieces Lids, Straws	2.3%
Other Cloth	2.2%
Printed Material (Newspapers, Etc.)	2.2%
Plastic Packaging - Film	2.0%
Polystyrene Cups (Foam)	2.0%
Water Bottles (Plastic)	2.0%
Sweet Snack Packaging	1.8%
Polystyrene Block Pieces	1.5%
Home Articles	1.5%
Misc. Cardboard	1.4%
Condiment Package (Salt, Etc.)	1.4%
Soft Drink (Plastic)	1.4%
Clothing Or Clothing Pieces	1.3%
Plastic Drink Cups	1.3%
Receipts (Business, Transfers, Etc.)	1.3%
Plastic Retail Bags - No Brand Name	1.3%
Paper Cups (Cold)	1.3%
Broken Glass Container	1.1%
Paper/Foil Wraps (Burger Wrappers)	0.8%

2013 Texas Litter Survey

Visible Litter Item	Percent
Container Lids	1.1%
Paper Packaging - Other	1.1%
Sport/Energy Drink (Plastic)	1.0%
Misc. Paperboard	0.9%
Foil Materials/Foil Pieces	0.8%
Gum Wrappers	0.8%
Plastic Jars/Bottles/Lids (Non Beverage)	0.7%
Paperboard (Cereal Type)	0.7%
Corrugated Boxes/Box Material	0.7%
Beer Bottles (Glass)	0.7%
Misc. Glass	0.7%
Plastic Retail Bags - Branded	0.7%
Paper Food Wrap (Meat Wrap)	0.7%
Paper Bags - Fast Food	0.6%
Polystyrene Clamshells/Pieces	0.5%
Other Plastic Shells/Boxes	0.5%
Milk/Juice (Plastic)	0.5%
Sport/Energy Drink (Cans)	0.5%
Zipper Bags/ Sandwich	0.5%
Lottery Ticket Debris	0.5%
Paper Cups (Hot)	0.4%
Paper Retail Bags - No Brand Name	0.4%
Paper Beverage Cases	0.4%
Plastic Wrap	0.4%
Plastic Bags - Not Retail (Leaf, Trash)	0.4%
Cigarettes/Butts	0.3%
Food Items	0.3%
Utensils (Plastic or Otherwise)	0.3%
Cans - Aluminum (Non Beverage)	0.3%
Name Brand FF Towels/Napkins	0.3%
Polystyrene Fast Food Plates	0.3%
Foil Containers	0.2%
Foil Pouches	0.2%
Wine/ Liquor (Plastic)	0.2%
Milk/Juice (Gable Top)	0.2%
Paper Clamshells	0.2%
Six Pack Plastic Rings	0.2%
Paper Retail Bags - Branded	0.1%
Cans - Steel	0.1%
Paper Trays	0.1%

Visible Litter Item	Percent
Wine/ Liquor (Glass)	0.1%
Soft Drink (Glass)	0.1%
Other Paper Cups	0.1%
Paper Fast Food Plates	0.1%
Other Plastic Fast Food Plates	0.1%
Milk/Juice (Glass)	0.1%
Aerosol Cans (Paint, Oils, Etc.)	0.1%
Aseptic (Box)	0.0%
Other Material Trays	0.0%
Cigar Butts/Tips	0.0%
Tea (Glass)	0.0%
Paper Bags - Not Retail	0.0%
Plates - Other Materials	0.0%
Polystyrene Trays	0.0%
Water (Glass)	0.0%
Glass Jars/ Bottles Misc.	0.0%
Tea/Coffee (Can)	0.0%
Tea (Plastic)	0.0%
Total Visible Litter	**100.0%**

Appendix D – Micro Litter: All Components

All components of *Micro Litter* are shown in Table 26. This represents the data for the *Original Sites*, which are statistically comparable to data in the 2009 and 2005 surveys. Two-thirds of all Micro Litter in Texas is either *Cigarette Butts* (almost half of all *Micro Litter*) or *Tire and Rubber* (scraps from blown tires). Other components showed evidence of having been mowed, which creates multiple items of litter from one piece.

Table 26 – Micro Litter Components

Micro Litter Item	Percent
Cigarette Butts	48.0%
Tire & Rubber Debris	18.6%
Glass	6.9%
Paper	6.2%
Plastic - Film	4.9%
Plastic - Hard	4.9%
Polystyrene – Food Service	3.5%
Aluminum	2.4%
Metal	1.1%
Other	1.0%
Bottle Caps	0.7%
Candy Wraps	0.5%
Polystyrene - Packaging	0.4%
Straws	0.2%
Tobacco Packaging	0.2%
Cigar Butts	0.2%
Food	0.1%
Total	**100.0%**

Appendix E – Most Common Items within Use Categories

For comparability to the litter surveys conducted in 2009 and 2005, Table 27 shows each component of *Total Litter* as a percentage of its *Litter Use* category. Under Construction/Industrial, small pieces of both hard and film plastic yielded the same total.

Cigarette Butts (96.6%) were a higher percentage of Tobacco Litter compared to 2009 (84%). Tire Debris (71%) was similar to 2009 (68%). Although some category details differed slightly, there were a number of similar findings compared to 2009. Non-Alcoholic beverage containers (34%) were similar to the results for Soda in 2009 (30%). Beer Cans (55%) were virtually the same as 2009 (56%). When added together, Beer Bottles and Broken Glass Containers, typically attributed to broken Beer Bottles, were also similar (30%) compared to 2009 (26%).

Table 27 – Components of Litter by Use Category

Use	Item Name	Percent of Use Category
Construction/ Industrial	Plastic Film Pieces (Micro)	20.8%
	Plastic Hard Pieces (Micro)	20.8%
	Aluminum Pieces	10.4%
	Construction Debris	10.4%
	Misc. Plastic	9.7%
	Metal Pieces (Micro)	5.2%
	Composite Materials - Other	5.2%
	Other Items (Wood)	4.5%
	Plastic Packaging - Film	4.5%
	Polystyrene Block Packaging	3.2%
	Polystyrene Packaging (Micro)	1.9%
	Foil Materials/Foil Pieces	1.9%
	Misc. Glass (Visible)	1.3%
	Aerosol Cans (Paint, Oils, Etc.)	0.0%
Tobacco	Cigarette Butt	96.6%
	Tobacco Packaging (Visible)	2.5%
	Tobacco Packaging (Micro)	0.6%
	Cigar Butts and Tips	0.3%

2013 Texas Litter Survey

Use	Item Name	Percent of Use Category
Automotive	Tire and Rubber Debris (Micro)	51.3%
	Tire and Rubber Debris (Visible)	19.7%
	Glass Pieces (Micro)	18.9%
	Vehicle and Metal Road Debris	10.1%
Printed	Paper - Micro	4.0%
	Misc. Paper	1.3%
	Receipts (Business, Transfers, Etc.)	0.5%
	Printed Material (Newspapers, Etc.)	0.8%
	Paper Packaging - Other	0.4%
	Stationary (School, Business Etc.)	0.4%
	Lottery Ticket Debris	0.2%
Non-Alcoholic Beverages	Polystyrene Food Service – (Micro)	27.3%
	Cup Lids, Pieces Lids, Straws	9.5%
	Soft Drink (Cans)	9.5%
	Water (Plastic)	8.3%
	Polystyrene Cups (Foam)	8.3%
	Soft Drink (Plastic)	5.9%
	Plastic Drink Cups	5.9%
	Bottle Caps	5.9%
	Paper Cups (Cold)	4.7%
	Sport/Energy Drink (Plastic)	4.1%
	Sport/Energy Drink (Cans)	2.4%
	Milk/Juice (Plastic)	2.4%
	Paper Cups (Hot)	2.4%
	Straw Pieces (Micro)	2.4%
	Milk/Juice (Gable Top)	1.2%
	Soft Drink (Glass)	0.0%
	Foil Pouches	0.0%
	Water (Glass)	0.0%
	Aseptic (Box)	0.0%
	Tea/Coffee (Can)	0.0%
	Milk/Juice (Glass)	0.0%
	Other Paper Cups	0.0%

2013 Texas Litter Survey

Use	Item Name	Percent of Use Category
	Tea (Plastic)	0.0%
	Tea (Glass)	0.0%
Household/ Personal	Misc. Cardboard	11.4%
	Clothing or Clothing Pieces	11.4%
	Home Articles	11.4%
	Plastic Retail Bags - No Brand Name	11.4%
	Container Lids	9.1%
	Misc. Paperboard	6.8%
	Paperboard (Cereal Type)	6.8%
	Plastic Jars / Bottles/ Lids (Non Beverage)	6.8%
	Corrugated Boxes/ Box Material	4.5%
	Zipper Bags/ Sandwich	4.5%
	Plastic Retail Bags - Branded	4.5%
	Cans-Aluminum (Non Beverage)	2.3%
	Paper Retail Bags - No Brand Name	2.3%
	Plastic Bags - Not Retail (Leaf, Trash)	2.3%
	Cans - Steel	2.3%
	Paper Retail Bags - Branded	2.3%
	Glass Jars/ Bottles Misc.	0.0%
	Paper Bags - Not Retail	0.0%
Food & Food-Related Items	Non-Brand Napkins	18.2%
	Snack Food Packaging	16.4%
	Sweet Snack Packaging	10.9%
	Condiment Package (Salt, Etc.)	9.1%
	Candy Wrapper Pieces	5.5%
	Paper/Foil Wraps (Burger Wrappers)	5.5%
	Gum Wrappers	5.5%
	Other Plastic Shells/Boxes	3.6%
	Polystyrene Clamshells	3.6%
	Food Items	3.6%
	Paper Bags - Fast Food	3.6%
	Paper Food Wrap (Meat Wrap)	3.6%
	Foil Containers	1.8%

Use	Item Name	Percent of Use Category
	Utensils (Plastic or Otherwise)	1.8%
	Paper Trays	1.8%
	Plastic Wrap	1.8%
	Polystyrene Fast Food Plates	1.8%
	Name Brand FF Towels/Napkins	1.8%
	Paper Clamshells	0.0%
	Paper Fast Food Plates	0.0%
	Other Material Trays	0.0%
	Polystyrene Trays	0.0%
	Other Plastic FF Plates	0.0%
	Plates - Other Materials	0.0%
Alcoholic Beverages	Beer Cans	55.0%
	Broken Glass Container	20.0%
	Beer Bottles (Glass)	10.0%
	Paper Beverage Cases	5.0%
	Six Pack Plastic Rings	5.0%
	Wine/ Liquor (Plastic)	5.0%
	Wine/ Liquor (Glass)	0.0%
Agricultural/ Garden	Other Cloth	100.0%

Appendix F – Statistical Analysis of Litter Audit Results

Confidence levels use statistical tests to show the probability that data in a survey represent actual conditions. The confidence levels for the 2013 litter survey were wider than 2009, as shown in Table 28, but narrower than in 2005.

Table 28 - Annual Litter and 90% Confidence Interval Estimate

Survey Year	Annual Litter Estimates (Millions of Items)	Annual Litter Estimates Minus 90% CI Estimate (Millions of Items)	Annual Litter Estimates Plus 90% CI Estimate (Millions of Items)
2005	827	578	1,076
2009	1,102	902	1,302
2013	1,481	1,057	1,905

Statistical tests were conducted to evaluate any potential correlations between litter and the following factors: beautification, convenience stores, fast food outlets, schools and traffic signals/signs. Separate tests were run for *Visible Litter* and *Micro Litter*.

Significance tests are typically conducted at the ".05 level" (95% likely to be true) or ".01 level" (99% likely to be true). Each of these tests was run for the first survey (S #1), the second survey (S #2) and the accumulated litter (Acc.).

As shown in Table 29, *Visible Litter* tended to be lower near any of these factors. This may be due to more frequent cleanups, as businesses and schools have become sensitized to the importance of keeping areas around their facilities clean.

Table 29 - Visible Litter Proximity Test

Factor	Beaut.	Conv. Stores	Fast Food	*School*	*Traffic Signs*
N=	19	42	28	*7*	*38*
S #1	0.04	-0.02	-0.01	-0.13	-0.13
S #2	-0.07	0.01	-0.05	-0.10	-0.16
Acc.	-0.13	0.03	-0.05	0.05	0.00

Colored cells are significant at the:

.05 level
.01 level

The results for Micro Litter (Table 30) were different. Virtually all of the factors showed a mild correlation to higher levels of litter, especially convenience stores and fast food outlets.

This is likely due to the fact that cleanups of *Micro Litter* are difficult and time consuming. Cleanup crews tend to focus on removal of *Visible Litter*, which is more visible than small items.

In addition, many of the positive results for the *Micro Litter* tests (Table 30) were at the .01 level, meaning a stronger likelihood (99%) that they are true than results at the .05 level (95%).

Table 30 – Micro Litter Proximity Test

Factor	Beaut.	Conv. Stores	Fast Food	*School*	*Traffic Signs*
N=	19	42	28	*7*	*38*
S #1	0.09	0.17	0.14	-0.03	0.14
S #2	0.08	0.25	0.27	0.04	0.11
Acc.	0.04	0.18	0.21	0.06	0.03

Colored cells are significant at the:

.05 level
.01 level

Correlations for Sites is a statistical test that analyzes the data and determines whether the amount of litter accumulated at each site was similar between surveys. The data in Table 31 shows that a noticeable similarity did exist at each site.

Table 31 - Correlations for Sites

Correlations for Sites Survey 1 vs. Survey 2	
Visible	0.67
Micro	0.47

Correlations between Surveys is a statistical test that analyzes the data and determines if the most and least littered items were similar between surveys. The data in Table 32 yielded a very strong correlation showing that the most and least littered items were very similar between the two surveys.

Table 32 - Correlations between Surveys

Correlations Between Surveys Survey 1 vs. Survey 2	
Visible	0.94
Micro	0.96

Another statistical test was run to analyze the data and determine if the litter accumulation patterns was similar for *Original Sites* and *New Sites*. There was a very strong correlation (Table 33) showing that litter across the State of Texas tends to be similar, as was true in previous surveys.

Table 33 - Correlations between Original and New Sites

Size	Survey 1	Survey 2
Visible	0.98	0.96
Micro	0.95	0.99

Impacts of High Wind Gusts

High wind gusts are a significant factor affecting how *Visible Litter* is statistically measured in Texas. Table 34 shows the percentage of days at each weather station that high wind gusts of 30 mph or greater, capable of moving littered items between sites, were recorded. This data is limited to the dates between the start of the first survey (February 26, 2013) and completion of the second survey (April 18, 2013). For instance, high wind gusts were recorded on 71% of those days in Lubbock. This shows that measuring *Visible Litter* in Texas by purging sites and conducting subsequent surveys will likely result in an overstatement of *Visible Litter*.

Table 34 – Recorded High Wind Gusts

Weather Station	30 mph+
Amarillo	65%
Abilene	62%
Austin	44%
Beaumont	38%
Brownsville	52%
Corpus Christi	73%
Dallas-Fort Worth	63%
El Paso	50%
Houston	37%
Lubbock	71%
Odessa	50%
San Antonio	31%
San Angelo	60%
Tyler	38%
Waco	46%
Wichita Falls	63%

2013 Texas Litter Survey

Appendix G – Litter Categories and Descriptions

Table 35 includes a detailed description of the categories used for *Visible Litter* in the 2013 Texas Litter Survey. These categories and descriptions have been used for a number of recent litter surveys including Texas. Descriptions are also included for the categories of *Micro Litter* although many of those items are identifiable only by material.

Table 35 – Litter Categories and Descriptions

Litter Item	Category	Material	Description
Beer Cans	Beverage	Metal	Beer in aluminum cans
Beer Bottles (Glass)	Beverage	Glass	Beer in glass bottles
Soft Drink (Glass)	Beverage	Glass	Soft drinks in glass bottles
Soft Drink (Cans)	Beverage	Metal	Soft drinks in aluminum cans
Soft Drink (Plastic)	Beverage	Plastic	Soft drinks in plastic bottles
Sport/Energy Drink (Metal)	Beverage	Metal	Sport drinks in aluminum cans
Sport/energy Drink (Plastic)	Beverage	Plastic	Sport drinks in plastic bottles
Tea/Coffee (Metal)	Beverage	Metal	Tea or coffee drinks in aluminum cans
Tea/Coffee (Plastic)	Beverage	Plastic	Tea or coffee drinks in plastic bottles
Tea/Coffee (Glass)	Beverage	Glass	Tea or coffee drinks in glass bottles
Water (Glass)	Beverage	Glass	Packaged water in glass bottles
Water (Plastic)	Beverage	Plastic	Packaged water in plastic bottles
Wine/ Liquor (Glass)	Beverage	Glass	Wine & liquor in glass bottles
Wine/ Liquor (Plastic)	Beverage	Plastic	Wine & liquor in plastic bottles
Milk/Juice (Plastic)	Beverage	Plastic	Milk or juice containers in plastic bottles
Milk/Juice (Glass)	Beverage	Glass	Milk or juice containers in glass bottles
Milk/Juice (Gable)	Beverage	Paper	Milk/juice in gable top cartons
Foil Pouches	Other Bev. Packaging	Composite	Packaged goods and pieces of foil pckg.
Aseptic (Box)	Other Bev. Packaging	Composite	Drink-in-box, juice, fluids, other
Broken Cont. Glass	Other Bev. Packaging	Glass	Glass bottle fragments
Six Pack Plastic Rings	Other Bev. Packaging	Plastic	Retainer plastic for carrying cans
Foil Containers	Other Bev. Packaging	Metal	Foil wraps (e.g., ice cream)
Plastic Drink Cups	Cups	Plastic	Cups, all resin types
Paper Cups (Cold)	Cups	Paper	Cups, all paper types - cold drinks
Paper Cups (Hot)	Cups	Paper	Cups, all paper types - hot drinks
Polystyrene Cups (Foam)	Cups	Plastic	Cups, all polystyrene types - hot drinks

2013 Texas Litter Survey

Other Paper Cups	Cups	Paper	Cups, other materials
Cup Lids, Pieces Lids	Cups	Plastic	Cups, lids, straws and pieces
Plastic Retail Bags - Brand Name	Bags	Plastic	Whole\pieces of branded retail plastic bags
Plastic Retail Bags - No Brand	Bags	Plastic	Whole\pieces of non-branded retail plastic bags
Paper Retail Bags - Brand Name	Bags	Paper	Whole\pieces of branded retail paper bags
Paper Retail Bags - No Brand	Bags	Paper	Whole\pieces of non-branded retail paper bags
Paper Bags - Fast Food	Bags	Paper	Whole\pieces of fast food paper bags
Plastic Bags - Not Retail	Bags	Plastic	Whole\pieces of non-retail plastic bags (e.g., leaf, trash, etc.)
Paper Bags - Not Retail	Bags	Paper	Paper bags & sacks (e.g., leaf debris)
Zipper Bags/ Sandwich	Bags	Plastic	Plastic lunch bags and sacks
Plastic Packaging - Film	Bags	Plastic	Stretch wrap, dry cleaner bags, commercial/industrial non-bag plastic film
Corrugated Boxes & Material	Other Packaging	Paper	All cardboard and box materials
Paperboard	Other Packaging	Paper	Cereal, shoe boxes and pieces etc.
Paper Beverage Cases	Other Packaging	Paper	Paper material outer packaging for beverage products
Polystyrene Clamshells	Other Packaging	Plastic	Whole and pieces of expanded foam containers
Paper Clamshells	Other Packaging	Paper	Whole and pieces of take-away or other paper containers
Other Plastic Shells/Boxes	Other Packaging	Plastic	PET, PVC, HDPE, other material shells
Plastic Jars / Bottles/ Lids	Other Containers	Plastic	Non-beverage plastic jars/bottles, (e.g., detergent bottles)
Glass Jars/ Bottles Misc.	Other Containers	Glass	Glass jars/bottles not described above
Cans - Steel	Other Containers	Metal	Steel food/non-food containers
Cans - Aluminum	Other Containers	Metal	Aluminum food/non-food containers
Container Lids	Other Containers	Plastic	All lids, closures, and pieces > 4 sq. in.
Aerosol Cans	Other Containers	Metal	Aerosol cans, tops, lids for spray paints, oils, etc.
Paper Food Wrap	Food Wraps/Containers	Paper	Commercial/Non-commercial food wrap (e.g., meat wrap)
Paper / Foil Composite Wrap	Food Wraps/Containers	Composite	Wrap for food/non-food (e.g., hamburger paper/foil)
Plastic Wrap	Food Wraps/Containers	Plastic	All retail plastic wrap types, food, non-food
Condiment Package	Take-Out Extras	Plastic	Pouches and containers (e.g., ketchup, salt, creamers, etc.)
Utensils	Take-Out Extras	Plastic	Forks, knives, chop sticks etc.
Branded Fast Food Towels/Napkins	Take-Out Extras	Paper	Towels & napkins with identifiable brand
Paper Fast Food Plates	Take-Out Extras	Paper	Paper Plates used to serve fast food
Polystyrene Fast Food Plates	Take-Out Extras	Plastic	Polystyrene Plates used to serve fast food
Other Plastic Fast Food Plates	Take-Out Extras	Plastic	Other Material Plates used to serve fast food
Plates - Other Materials	Take-Out Extras	Composite	Plates - not fast food (e.g., picnic plates)
Polystyrene Trays	Trays	Plastic	Take-out/non-take out, microwavable, display trays
Paper Trays	Trays	Paper	Take-out/non-take out, microwavable, display trays
Other Material Trays	Trays	Plastic	Take-out/non-take out, microwavable, display trays
Gum Wrappers	Confectionary/ Snack	Composite	Packaging used to seal, sell gum products
Sweet Snack Wraps and Pouches	Confectionary/ Snack	Composite	Packaging used to seal, sell candy and cake products

2013 Texas Litter Survey

Snack Food Packaging	Confectionary/ Snack	Composite	Snack foods such as chips, etc.
Food Items	Confectionary/ Snack	Organic	Apple cores, banana peels, etc.
Clothing Or Clothing Pieces	Cloth	Cloth	All cloth, clothing pieces, and clothing discarded on site
Other Cloth	Cloth	Cloth	Tarps, industrial fabrics etc.
Non-Brand Towels & Napkins	Paper	Paper	Napkins and towels - no brand identification
Paper Packaging - Other	Paper	Paper	Paper packaging otherwise not described
Lottery Ticket Debris	Paper	Paper	Tickets, and gaming items
Printed Materials	Paper	Paper	Commercially printed materials (newspapers, flyers, etc.)
Stationary	Paper	Paper	School papers, business forms, etc.
Receipts	Paper	Paper	Receipts, tickets, bus transfers, invoices, packing slips
Cigarette Debris	Tobacco	Tobacco	Cigarette butts and discarded cigarettes ($>= 2$ inches^2)
Cigar Debris	Tobacco	Tobacco	Cigar butts, tips and discarded cigars items ($>= 2$ inches^2)
Tobacco Packaging	Tobacco	Composite	All other tobacco packaging, matches, lighters, matchboxes
Misc. Paper	Other Miscellaneous	Paper	All other paper whole or shredded, unidentifiable
Misc. Plastic	Other Miscellaneous	Plastic	All other plastic whole or shredded, unidentifiable
Misc. Paperboard	Other Miscellaneous	Paper	All other paperboard whole or shredded, unidentifiable
Misc. Cardboard	Other Miscellaneous	Paper	All other cardboard whole or shredded, unidentifiable
Misc. Glass	Other Miscellaneous	Glass	All other glass, whole or broken, unidentifiable
Vehicle & Metal Road Debris	Other Miscellaneous	Composite	Auto parts, debris from auto accidents, other transportation-related
Composite Materials	Other Miscellaneous	Composite	Items made of multiple materials (e.g. metal and plastic, etc.)
Foil Materials/Foil Pieces	Other Miscellaneous	Metal	Foils and pieces, aluminum food foils, industrial foils
Construction Debris	Other Miscellaneous	Composite	Debris associated with construction
Tire & Rubber Debris	Other Miscellaneous	Rubber	Rubber sheets/pieces, tire pieces, shock absorbers
Home Articles	Other Miscellaneous	Composite	All non-described household items, (e.g., lamps, etc.)
Aluminum	Micro Litter	Metal	Micro pieces of aluminum (less than two inches^2)
Bottle Caps	Micro Litter	Composite	Metal or plastic caps for bottles and containers (less than two inches^2)
Candy Wrappers	Micro Litter	Composite	Micro pieces of candy wrappers (less than two inches^2)
Cigar Butts/Tips	Micro Litter	Tobacco	Cigar butts, tips and discarded cigars items (less than two inches^2)
Cigarette Butts	Micro Litter	Tobacco	Cigarette butts and discarded cigarettes (less than two inches^2)
Food	Micro Litter	Organic	Food scraps (less than two inches^2)
Glass	Micro Litter	Glass	Micro pieces of glass (less than two inches^2)
Metal (not Aluminum)	Micro Litter	Metal	Micro pieces of metal other than aluminum (less than two inches^2)
Other Materials	Micro Litter	Composite	Other small materials not otherwise categorized (less than two inches^2)
Tobacco Packaging	Micro Litter	Composite	Micro pieces of tobacco-related materials (less than two inches^2)
Paper	Micro Litter	Paper	Micro paper scraps (less than two inches^2)
Plastic – Film	Micro Litter	Plastic	Micro pieces of plastic film (less than two inches^2)
Plastic – Hard	Micro Litter	Plastic	Micro pieces of hard plastic (less than two inches^2)
Polystyrene Foam - Packaging	Micro Litter	Plastic	Micro pieces of polystyrene packaging (less than two inches^2)

Polystyrene Foam – Food Service	Micro Litter	Plastic	Micro pieces of polystyrene food service items (less than two inches^2)
Tire & Rubber Debris	Micro Litter	Rubber	Micro pieces of rubber (less than two inches^2)
Straws	Micro Litter	Composite	Micro pieces of straws (less than two inches^2)

2013 Texas Litter Survey

Appendix H – Sites Locations

Table 36 provides a detailed description of the site locations used for the 2013 Texas Litter Survey. Locations for each of the *Original Sites* were based on the location information provided from the 2009 survey. *New Sites* were selected in conjunction with Sherry Matthews Advocacy Marketing staff.

Table 36 – Site Locations

Type	ID	Tm	District	County	Site Description
Original	Abl01	West	Abilene	Callahan	IH-20: 0.1 mile past intersection with FM-603
Original	Abl02	West	Abilene	Scurry	US-84: 0.1 mile past intersection with FM-612 in Fluvanna, about 8 miles northwest of Snyder
Original	Abl03	West	Abilene	Callahan	SH-36: 0.1 mile past intersection with US-283
New	Abl04	West	Abilene	Nolan	IH-20: 0.1 mile past Exit 241
New	Abl05	West	Abilene	Taylor	IH-20: 0.1 mile past Exit 277
New	Abl06	West	Abilene	Kent	US-380: 0.1 miles past intersection with FM-1081
New	Abl07	West	Abilene	Scurry	SH-350/SH-208: 0.2 miles past intersection with US-180
New	Abl08	West	Abilene	Haskell	FM-617: 0.2 miles past intersection with US-277 before SH-6
Original	Ama02	West	Amarillo	Carson	IH-40: 0.1 mile past intersection with FM-2880
Original	Ama03	West	Amarillo	Potter	US-287: 200 feet past Burlington/Santa Fe RR track about 0.1 mile south of Potter County/Moore County Line
Original	Ama04	West	Amarillo	Moore	SH-152: 0.1 mile past intersection with FM-1284
New	Ama05	West	Amarillo	Oldham	IH-40: 0.2 miles past Exit 49 (in between Vega and Amarillo)
New	Ama06	West	Amarillo	Carson	IH-40: 2.0 miles east past intersection with SH-207
New	Ama08	West	Amarillo	Hartley	US-385: 3 miles north of intersection with US-354/FM-767
New	Ama09	West	Amarillo	Oldham	SH-214: 0.2 miles south of SH 214 & I-40 intersection (off exit 22)
Original	Atl01	North	Atlanta	Bowie	US-59/US-71: 1 mile north of Loop 14/Texas Blvd/Arkansas Blvd, traveling north
Original	Atl03	North	Atlanta	Bowie	SH-93: 0.1 mile northeast of intersection with FM-558/Old Buchanan Road, north of Wagner Creek, traveling northeast
Original	Atl05	North	Atlanta	Bowie	IH-30: 0.1 mile west of intersection with FM-989, traveling west
Original	Atl06	North	Atlanta	Cass	FM-251/S William Street: 0.1 mile south of intersection with SH-77, south of Atlanta, traveling south
New	Atl07	North	Atlanta	Titus	IH-30: 0.1 mile west of Exit 162, near US-271, traveling west
New	Atl08	North	Atlanta	Bowie	FM-44: 0.1 mile west of intersection with US-259, south of De Kalb, west of New Boston, traveling west

2013 Texas Litter Survey

New	Atl09	North	Atlanta	Bowie	FM-74 (Houston Street): 0.1 mile east of intersection with Co Rd 3775 about 1 mile past SH-236 in Queens City, traveling east
Original	Aus00	South	Austin	Gillespie	SH-16: 0.1 mile past intersection with Triple Creek Road, past City of Fredericksburg
Original	Aus01	South	Austin	Travis	FM-2244: 0.1 mile past intersection with SH-71
Original	Aus04	South	Austin	Travis	US-183: 0.1 mile past intersection with FM-812
Original	Aus05	South	Austin	Travis	FM-969: 0.1 mile past intersection with FM-973 west of Sh-45/SH-130 near Thunderbird Farms
Original	Aus08	South	Austin	Hays	IH-35: 0.1 mile past SH-4 Loop
Original	Aus10	South	Austin	Travis	SH-71: 0.1 mile past FM-973
Original	Aus11	South	Austin	Williamson	US-79: 0.1 mile past intersection with FM-685
Original	Aus12	South	Austin	Mason	SH-29: 0.1 mile past intersection with FM-1222
Original	Aus15	South	Austin	Williamson	US-79: 0.1 mile past intersection with FM-1460
Original	Aus17	South	Austin	Caldwell	FM-2720: 0.1 mile past intersection with SH-142
Original	Aus18	South	Austin	Blanco	FM-2766: 0.1 mile past intersection with US-281
New	Aus19	South	Austin	Hays	IH-35: 0.5 miles directly past FM-150, past Town of Kyle, TX
New	Aus20	South	Austin	Williamson	US-79: 0.1 mile past intersection with FM-1460 near City of Round Rock
New	Aus21	South	Austin	Hays	SH-21: 0.5 miles past SH-21 and FM-150 intersection near City of Uhland, past San Marcos Municipal Airport
Original	Bmt01	East	Beaumont	Orange	IH-10: 0.1 mile past Neches River Bridge
Original	Bmt02	East	Beaumont	Liberty	US-59: 0.1 mile past the intersection with SH-105 near the MONTGOMERY COUNTY Line
Original	Bmt03	East	Beaumont	Liberty	SH-321: 0.1 mile past intersection with FM-1008
Original	Bmt04	East	Beaumont	Liberty	FM-1960: 0.1 mile past intersection with FM-686 about 6 miles west of City of Dayton and US-90
Original	Bmt05	East	Beaumont	Jasper	US-96: 0.1 mile past intersection with FM-2800
Original	Bmt06	East	Beaumont	Jefferson	IH-10: 0.1 mile past intersection with FM-364
New	Bmt07	East	Beaumont	Tyler	US-69: 0.1 mile past intersection with FM-1013 in Town of Hillister
New	Bmt08	East	Beaumont	Hardin	US-69: 0.4 miles past intersection with SH-327 approaching City of Lumberton
New	Bmt09	East	Beaumont	Newton	SH-87: 0.3 miles past intersection with FM-253
Original	Bry01	East	Bryan	Freestone	IH-45: 200 feet past intersection with SH-179 east of Teague about 42 miles south of Corsicana
Original	Bry02	East	Bryan	Burleson	FM-50: 0.1 mile past intersection with FM-1361, west of SH-6 and Mustang Hills, northeast of Somerville
Original	Bry04	East	Bryan	Washington	US-290: 0.1 mile past Loop 2447
Original	Bry05	East	Bryan	Burleson	FM-1362: 0.1 mile past intersection with SH-21
Original	Bry06b	East	Bryan	Brazos	FM-2038: 0.1 mile past Marker 628
New	Bry07	East	Bryan	Grimes	SH-90: 0.1 mile past intersection with SH-6

2013 Texas Litter Survey

New	Bry08	East	Bryan	Madison	SH-75: 0.1 mile past intersection with Old San Antonio Road near IH-45
New	Bry09	East	Bryan	Robertson	US-79: 0.3 miles past intersection with FM-46 in Town of Franklin
New	Bry10	East	Bryan	Washington	FM-50: 0.5 miles past intersection with FM-390, north of SH-105 in between Brenham and Navasota
Original	Bwd01	North	Brownwood	Brown	US-67/US-377: 0.1 mile northwest of intersection with FM-1467, traveling northwest
Original	Bwd02	North	Brownwood	Comanche	SH-16: 0.1 mile southeast of intersection with FM-R 3200, traveling southeast from Comanche
New	Bwd03	North	Brownwood	Brown	US-183: 0.4 miles north of intersection with US-67, traveling north from Brownwood
New	Bwd04	North	Brownwood	Comanche	FM-587: 0.5 miles east of intersection with Co Rd 679 in COMANCHE COUNTY traveling east toward De Leon Municipal Airport
Original	Chs01	West	Childress	King	US-82/SH-114: 0.1 miles past US-83 traveling east
New	Chs02	West	Childress	Knox	US-277: 0.1 mile past intersection of FM-266 at Town of Goree
New	Chs03	West	Childress	Childress	SH-256: 0.5 miles west of intersection with US-62/US-83
Original	Crp01	South	Corpus-Christi	Live Oak	IH-37: 0.1 mile past intersection with FM-799
Original	Crp02	South	Corpus-Christi	Nueces	SH-358: 0.1 mile past intersection with IH-37
Original	Crp04	South	Corpus-Christi	Nueces	US-77: 0.1 mile past intersection with FM 892 (Lincoln Ave), about one mile southwest of NUECES COUNTY Airport
Original	Crp05	South	Corpus-Christi	Refugio	US-183: 0.1 mile past intersection with SH-202
Original	Crp06	South	Corpus-Christi	Bee	SH-359: 0.1 mile past intersection with US-181
New	Crp07	South	Corpus-Christi	Live Oak	IH-37: 0.1 mile past Mile Marker 48
New	Crp08	South	Corpus-Christi	Goliad	US-183/US-77: 0.3 miles past intersection with SH-239
New	Crp09	South	Corpus-Christi	Refugio	US-77: 0.1 mile past intersection with FM-774 at Town of Refugio
New	Crp10	South	Corpus-Christi	Bee	SH-202: 0.4 miles past intersection with FM-2441
New	Crp11	South	Corpus-Christi	Kleberg	FM-771: 0.3 miles past intersection with US-77 traveling towards Riviera Beach
Original	Dal01	North	Dallas	Collin	SH-121/Sam Rayburn Hwy: 0.3 miles north of intersection with FM-2933/Co Rd 1116, 2-3 miles traveling northeast from US-75 and Melissa
Original	Dal02	North	Dallas	Collin	SH-78: 0.3 miles west of intersection with SH-205, north of Lake Ray Hubbard and I-30, west of Plano, traveling west

Original	Dal03	North	Dallas	Dallas	IH-35E/US-77: 1.0 miles north of IH-635 loop, north of downtown, near Valley View Lane traveling northward
Original	Dal04	North	Dallas	Dallas	IH-20: 0.1 mile west of intersection with FM-1382, about 6.5 miles west of US-67, traveling east from Fort Worth
Original	Dal05a	North	Dallas	Dallas	IH-20: 0.1 mile east of intersection with IH-45, traveling east
Original	Dal06	North	Dallas	Ellis	US-287: 0.6 miles southwest of intersection with US-67, traveling southeast, south of Midlothian, near Crossroads Lake
Original	Dal08	North	Dallas	Kaufman	IH-20: 0.3 miles east of intersection FM-2932, near FM-741, about 15 miles west of IH-635, traveling east
Original	Dal09	North	Dallas	Kaufman	IH-20: 0.3 miles southeast of intersection FM-2965, traveling northwest toward Dallas, about 11 miles southwest of Terrell Airport
Original	Dal10	North	Dallas	Kaufman	US-175: 0.3 miles southeast of intersection with US-175 Business, north of Mabank, east of Cedar Creek Reservoir, traveling southeast
Original	Dal11	North	Dallas	Kaufman	SH-274: 0.3 miles south of intersection with FM-148, traveling north toward Kaufman
Original	Dal12	North	Dallas	Navarro	IH-45: 2 miles south of exit 242, traveling south
Original	Dal13	North	Dallas	Navarro	US-287: 0.3 miles east of intersection with FM-3243, traveling southeast from Corsicana, near Campbell Field-Corsicana Airport
Original	Dal14	North	Dallas	Navarro	SH-22: 0.1 mile west of intersection with FM-1839, traveling west from Corsicana (about 5-6 miles)
Original	Dal15	North	Dallas	Rockwall	IH-30: 0.1 miles east of intersection with FM-740 on left-hand side of road
Original	Dal16	North	Dallas	Ellis	IH-45/US-287: 0.1 mile north of intersection with FM-1182, near ELLIS/NAVARRO COUNTY lines, traveling south toward Corsicana
Original	Dal17	North	Dallas	Denton	US-380: 0.1 mile west of intersection with FM-156, 7.5 miles west of Denton, traveling west
Original	Dal18	North	Dallas	Denton	FM-720 (El Dorado Pkwy)/FM-2934: 0.1 mile west of intersection with FM-423, south of US-380, west of City of Frisco, east of Dallas North Tollway, traveling west
Original	Dal19	North	Dallas	Navarro	IH-45: 0.1 mile southeast of intersection with FM-1394/Ranch RD-1934, traveling about 12.5 miles south from Corsicana
Original	Dal21	North	Dallas	Dallas	US-175: 0.1 mile south of intersection with IH-45, traveling south, between Warren Street and Metropolitan Ave
Original	Dal22	North	Dallas	Dallas	SH-356: 0.1 mile south of intersection with SH-183, traveling south
Original	Dal23	North	Dallas	Rockwall	SH-276: 0.1 mile east of intersection with FM-548, about 6.5 miles east of IH-30/US-67, traveling east from Dallas
New	Dal24	North	Dallas	Dallas	IH-30: 0.1 mile east of Exit 34, traveling west
New	Dal25	North	Dallas	Collin	US-75: 0.1 mile north of intersection with SH-121 near Fairview past intersection with US-380, traveling north
New	Dal26	North	Dallas	Denton	FM-455/Chapman Road: 0.2 miles west of intersection with IH-35/US-77, traveling west, near Lake Ray Roberts, about 11.5 miles north of Denton

2013 Texas Litter Survey

Original	Elp01	West	El Paso	Reeves	IH-10: 0.1 miles past intersection with IH-20
Original	Elp02	West	El Paso	El Paso	US-54: 0.1 mile before Texas-New Mexico State line
Original	Elp04	West	El Paso	El Paso	IH-10: 0.1 mile past Spur 375
Original	Elp05	West	El Paso	Jeff Davis	SH-17: 0.1 mile past intersection with Front Street in area of Fort Davis
New	Elp06	West	El Paso	El Paso	IH-10: 0.1 mile past Exit 42
New	Elp07	West	El Paso	Hudspeth	US-180/US-62: 0.1 mile past intersection with Ranch Rd 659
New	Elp08	West	El Paso	Presidio	US-67: 0.2 miles past intersection with US-90 in Town of Marfa
New	Elp09	West	El Paso	Brewster	SH-118: 0.4 miles past intersection with US-67/90
New	Elp10	West	El Paso	Jeff Davis	SH-17: 0.5 miles past intersection with US-118
Original	Ftw01	North	Fort Worth	Johnson	US-67: 0.1 miles west of FM-2331, traveling about 7.5 miles west from Cleburne.
Original	Ftw02	North	Fort Worth	Johnson	SH-171: 0.1 mile south of JOHNSON COUNTY Line traveling south
Original	Ftw03	North	Fort Worth	Johnson	FM-2331: 0.1 mile south of intersection with FM-4, southwest of SH-171 and northwest of US-67 and City of Cleburne
Original	Ftw04	North	Fort Worth	Palo Pinto	IH-20: 0.1 mile east of intersection with SH-193 traveling east
Original	Ftw05	North	Fort Worth	Parker	IH-20: 0.1 mile northeast of intersection with FM-113/Fannin St./N Plum St about 5 miles south of Millsap, traveling north
Original	Ftw06	North	Fort Worth	Parker	SH-199: 0.1 mile south of intersection with FM-2257 traveling south
Original	Ftw07	North	Fort Worth	Parker	SH-171: 0.1 mile south of intersection with FM-51 traveling south
Original	Ftw08	North	Fort Worth	Tarrant	IH-30 East: 0.1 mile east of intersection with SH-360, east of Fort Worth traveling east (exit 30)
Original	Ftw09	North	Fort Worth	Tarrant	IH-20 East: 0.1 mile east of intersection with SH-360, east of Fort Worth traveling east
Original	Ftw10	North	Fort Worth	Johnson	IH-35 west: 0.2 miles north of intersection with FM-917 traveling north
Original	Ftw11	North	Fort Worth	Somervell	US-67: 0.1 mile west of intersection with FM-199 traveling west.
Original	Ftw12	North	Fort Worth	Palo Pinto	IH-20: 0.1 mile west of intersection with US-281 traveling southwest
Original	Ftw13b	North	Fort Worth	Jack	FM-2210: 0.1 mile north of intersection with SH-199 traveling north
Original	Ftw14	North	Fort Worth	Palo Pinto	SH-16: 0.1 mile north of intersection with FM-207 traveling north
New	Ftw15	North	Fort Worth	Johnson	IH-35W: 0.1 mile north of intersection with US-67 in Alvarado, Exit 26 A, traveling north toward Fort Worth
New	Ftw16	North	Fort Worth	Johnson	IH-35E: at intersection with Exit 391
New	Ftw17	North	Fort Worth	Hood	US-377: 0.2 miles south of intersection with SH-171 traveling south
Original	Hou03	East	Houston	Harris	SH-529: 0.1 mile past intersection with SH-6
Original	Hou04r	East	Houston	Harris	IH-10: 0.1 mile past Exit 741 near intersection with Katy Fork Bend Road
Original	Hou05	East	Houston	Harris	IH-45: 0.1 mile past intersection with W Parker Road and E Little York
Original	Hou06	East	Houston	Harris	IH-45: 0.1 mile past intersection with FM-2920
Original	Hou07	East	Houston	Harris	IH-10: 0.1 mile past HARRIS/CHAMBERS COUNTY Line
Original	Hou08	East	Houston	Harris	US-59: 0.1 mile past intersection with SH-288, before IH-610 Loop

2013 Texas Litter Survey

Original	Hou09	East	Houston	Harris	SH-288: 0.1 mile past intersection with US-90A past Houston
Original	Hou11	East	Houston	Montgomery	FM-2854: 0.1 mile past intersection with SH-105
Original	Hou12	East	Houston	Harris	IH-10: 0.1 mile past SH-8, past Houston, before IH-610 Loop
Original	Hou13r	East	Houston	Harris	IH-10: 0.1 mile past intersection with SH-99 near Mason Creek Park
Original	Hou14	East	Houston	Harris	US-90: 0.1 mile past intersection with SH-8, near FM-2100
Original	Hou15	East	Houston	Waller	IH-10: 0.1 mile past WALLER COUNTY Line
Original	Hou16	East	Houston	Waller	US-290: 100 past WALLER/WASHINGTON COUNTY Line
Original	Hou17	East	Houston	Montgomery	SH-249: 0.1 mile past HARRIS/MONTGOMERY COUNTY Line
Original	Hou18	East	Houston	Montgomery	IH-45: 0.1 mile past the HARRIS/MONTGOMERY COUNTY line, near The Woodlands
Original	Hou21	East	Houston	Montgomery	FM-1314: 0.1 mile past intersection with SH-242
Original	Hou22	East	Houston	Montgomery	FM-2090: 0.1 mile past intersection with US-59 near Splendora
Original	Hou25	East	Houston	Fort Bend	SH-36: 0.1 mile past intersection with between FM-361, near City of Needville
Original	Hou26	East	Houston	Galveston	IH-45: 0.1 mile past intersection with FM-646, near HARRIS COUNTY Line
Original	Hou27	East	Houston	Montgomery	IH-45: 0.1 mile past intersection with FM-830/1097
Original	Hou28	East	Houston	Fort Bend	US-59: 0.1 mile past Williams Way to FM-762
Original	Hou29	East	Houston	Fort Bend	US-59: 0.1 mile past intersection with FM-2919/Main Street southwest of Houston
Original	Hou30	East	Houston	Harris	IH-10: 0.1 mile past intersection with SH-99
Original	Hou31	East	Houston	Galveston	IH-45: 0.1 mile past intersection with SH-275
Original	Hou32	East	Houston	Montgomery	SH-105: 0.1 mile past intersection with Millmac Rd in City of Cut and Shoot
Original	Hou33	East	Houston	Galveston	SH-146: 0.1 mile past intersection with SH-197/25th Avenue North adjacent to Moses Lake
Original	Hou34	East	Houston	Fort Bend	FM-723: 0.1 mile past intersection with FM-359, south of IH-10 near Katy/Memorial Parkway, north of US-59 near City of Rosenberg
Original	Hou35	East	Houston	Brazoria	FM-2004: 0.1 mile past intersection with FM-523, several miles east of SH-288, north of City of Angleton
Original	Hou36	East	Houston	Waller	FM-1488: 0.1 mile past intersection with FM-1736, past US-290 and SH-6, near City of Hempstead
New	Hou37	East	Houston	Harris	IH-10: 0.1 mile past intersection with FM-526 near Exit 778
New	Hou38	East	Houston	Montgomery	IH-45: 25 feet past Exit 103 near FM-1375
New	Hou39	East	Houston	Fort Bend	SH-36: 0.5 miles past intersection with FM-442 near City of Needville
Original	Ldo01	South	Laredo	Kinney	US-90: 0.1 mile past intersection with FM-693, about 1-2 miles north of Brackettville
Original	Ldo02	South	Laredo	La Salle	IH-35: 0.1 mile past intersection with FM-469 (near Mile Marker 77)
New	Ldo03	South	Laredo	La Salle	IH-35: 0.1 mile past intersection with SR 44 near LA SALLE/WEBB COUNTY border
New	Ldo04	South	Laredo	Webb	IH-35: 0.1 mile past Mile Marker 25
New	Ldo05	South	Laredo	Kinney	US-90: 0.1 mile past intersection with FM-1572
New	Ldo06	South	Laredo	Val Verde	SH-163: 0.2 miles past intersection with US-90
New	Ldo07	South	Laredo	Dimmit	SH-85: 0.5 miles past intersection with FM-65 in Town of Brundage

2013 Texas Litter Survey

Original	Lub01	West	Lubbock	Hockley	SH-114: 0.1 mile past intersection with FM-303 near Levelland
Original	Lub02	West	Lubbock	Lubbock	FM-179/Dowden Ave/Co Rd 1400: 0.1 mile past intersection with US-82/US-62/Brownfield Hwy, in City of Wolfforth
Original	Lub03	West	Lubbock	Terry	US-385: 0.1 mile past intersection with Ranch Road 2196
New	Lub04	West	Lubbock	Lubbock	IH-27: 0.1 mile past exit 14
New	Lub05	West	Lubbock	Swisher	IH-27: 0.1 mile past exit 77
New	Lub06	West	Lubbock	Castro	SH-194: 0.3 miles southeast of intersection with SH-86 (at Town of Dimmitt)
New	Lub07	West	Lubbock	Lynn	FM-1054: 0.4 miles past intersection with FM-213 near Town of Draw
New	Lub08	West	Lubbock	Floyd	FM-788: 0.3 miles east of intersection with FM-2301 about 6 miles east of IH-27/US-87 near Plainview
Original	Luf03	East	Lufkin	San Jacinto	US-59: 0.1 mile past LIBERTY COUNTY Line
Original	Luf04	East	Lufkin	Polk	SH-146: 0.1 mile past City of Livingston ETJ (Extra Territorial Jurisdiction)
Original	Luf06	East	Lufkin	Shelby	US-84: 0.1 mile past intersection with FM-1970 near Timpson
Original	Luf07	East	Lufkin	San Augustine	FM-2213: 0.1 mile past intersection with Texas Avenue south of City of San Augustine Line near US-96 and SH-147
New	Luf08	East	Lufkin	Nacogdoches	US-259: 0.1 mile past intersection with US-59 near Stephen F. Austin University
New	Luf09	East	Lufkin	Houston	US-287: 0.2 miles past intersection with FM-227
New	Luf10	East	Lufkin	Angelina	SH-63: 0.3 miles past intersection with SH-147
Original	Oda01	West	Odessa	Ector	IH-20: 0.1 mile past intersection with US-385
Original	Oda03	West	Odessa	Ward	SH-18: 5.0 miles north of intersection with Ranch Road -1219
Original	Oda04	West	Odessa	Pecos	US-285: 0.1 mile past intersection with FM-1776
New	Oda05	West	Odessa	Midland	IH-20: 0.1 mile past Exit 136
New	Oda06	West	Odessa	Ector	IH-20: 0.1 mile past Exit 101
New	Oda07	West	Odessa	Reeves	US-285: 0.4 miles past intersection with FM-1450
New	Oda08	West	Odessa	Martin	SH-176: 25 feet past intersection with SH-349
New	Oda09	West	Odessa	Pecos	SH-18: 0.3 miles past intersection with IH-10
New	Oda10	West	Odessa	Pecos	US-285: 0.1 mile past intersection with FM-1776
Original	Phr01	South	Pharr	Brooks	US-281: 0.1 mile past intersection with FM-3066 near Brooks County Airport
Original	Phr02	South	Pharr	Hidalgo	SH-107: 0.1 mile past intersection with FM-493
Original	Phr03	South	Pharr	Willacy	FM-1762/Co Rd 3401: 100 past intersection with US-77 about 2-3 miles north of E Hidalgo Ave in Raymondville
Original	Phr04	South	Pharr	Starr	US-83: 0.1 mile past intersection with North Blanca Road south of Rio Grande City
Original	Phr05	South	Pharr	Brooks	US-281: 0.1 mile past intersection with FM-1418
Original	Phr06	South	Pharr	Hidalgo	FM-490: 0.1 mile past intersection with FM-1425 several miles west of US-77
New	Phr07	South	Pharr	Brooks	US-281: 0.1 mile past intersection with FM-755, near Town of Rachal about 53 miles north of McAllen

New	Phr08	South	Pharr	Zapata	US-83: 0.1 miles past intersection with FM-2687 near Town of Lopeno
New	Phr09	South	Pharr	Cameron	US-83: 0.1 mile past Guadalupe Flores Road near Sullivan City, near Town of Lopeno
New	Phr10	South	Pharr	Willacy	SH-186: 0.5 miles past intersection with FM-1420
New	Phr11	South	Pharr	Brooks	FM-755: 0.5 miles past intersection with US-281
Original	Prs01	North	Paris	Lamar	US-82: 0.1 mile south of intersection with FM-38 traveling south
Original	Prs02	North	Paris	Lamar	SH-19: 0.1 mile north of the DELTA COUNTY Line traveling north
Original	Prs04	North	Paris	Hopkins	IH-30W: 0.1 mile east of intersection with SH-19 in Sulphur Springs city limit near Exit 122, traveling east
Original	Prs05	North	Paris	Red River	FM-114: 0.1 mile east of intersection with FM-44, past Town of Annona, near US-82 northwest of New Boston traveling east
New	Prs06	North	Paris	Hopkins	IH-30: 0.1 mile west of Exit 137 traveling east
New	Prs07	North	Paris	Red River	SH-37: 0.5 miles north of intersection with US-82 in Clarksville, about 41 miles north of IH-30 and Mt. Pleasant, traveling south
New	Prs08	North	Paris	Lamar	FM-195: 0.1 miles north of intersection with FM-2648 & FM-906 about 10 miles east of US-271, 10 miles south of SH-109, north of US-82, traveling north from Paris
Original	Sat02	South	San Antonio	Comal	IH-35: 0.1 mile past HAYS COUNTY Line
Original	Sat03	South	San Antonio	Bexar	SH-16: 0.1 mile past IH-410 Loop
Original	Sat05	South	San Antonio	Comal	FM-3009: 0.1 mile past intersection with FM-2252, about 2 miles north of I-35 about 10 miles east of US-281
Original	Sat06	South	San Antonio	Bexar	US-181: 0.1 mile past intersection with SH-122
Original	Sat07	South	San Antonio	Bexar	US-87: 0.1 mile past FM-1628 (Stuart Road), near IH-410 Loop
Original	Sat08	South	San Antonio	Bexar	IH-35: 0.1 mile past intersection with FM-Loop 1604, near BEXAR/ATASCOSA COUNTY Line
Original	Sat09	South	San Antonio	Bexar	IH-10/US-90: 0.1 mile past intersection with FM-1518, near FM-1604 in City of Adkins past San Antonio
Original	Sat10	South	San Antonio	Guadalupe	SH-123: 0.1 mile past HAYS COUNTY Line, past GUADALUPE COUNTY
Original	Sat11	South	San Antonio	Kerr	IH-10: 0.1 mile past Mile Marker 522 near KERR COUNTY Line
Original	Sat12	South	San Antonio	McMullen	SH-72: 0.1 mile past intersection with SH-16
Original	Sat13	South	San Antonio	Guadalupe	IH-10: 0.1 mile past intersection with FM-1104 near GUADALUPE COUNTY Line

Original	Sat14	South	San Antonio	Atascosa	IH-37: 0.1 mile past FM-1099 near Town of Campbellton
Original	Sat15	South	San Antonio	Frio	FM-140: 0.1 mile past FM-472, east of IH-35 east of City of Pearsall
New	Sat16	South	San Antonio	Frio	IH-35: 0.1 mile past Exit 111 near US-57
New	Sat17	South	San Antonio	Bexar	IH-410: 0.1 mile past Southton Road near Exit 42
New	Sat18	South	San Antonio	Frio	US-57: 0.5 miles past intersection with FM-140
Original	Sjt02	West	San Angelo	Tom Green	US-87: 0.1 mile past intersection with FM-2105 past City of San Angelo
Original	Sjt03	West	San Angelo	Irion	FM-853: 0.1 mile past intersection with US-67 about 5 miles west of IRION/TOM GREEN COUNTY Line
New	Sjt04	West	San Angelo	Crockett	IH-10: 0.1 mile past Exit 372
New	Sjt05	West	San Angelo	Irion	SH-163: 0.6 miles past intersection with US-67, past Town of Barnhart
Original	Tyl01	North	Tyler	Cherokee	FM-747: 0.5 miles south of intersection with US-79, traveling north toward Jacksonville, near US-175
Original	Tyl02	North	Tyler	Gregg	SH-300: 3.0 miles north of Spur 281 traveling north
Original	Tyl03	North	Tyler	Henderson	SH-19: 100 south of intersection with FM-2709 traveling about 7 miles north from Athens
Original	Tyl04	North	Tyler	Smith	US-69: 0.1 mile south of intersection with IH-20, about 10 miles north of Tyler, traveling south
Original	Tyl05	North	Tyler	Van Zandt	IH-20: 0.1 mile southeast of intersection with FM-1255, traveling southeast from Canton
Original	Tyl06	North	Tyler	Rusk	US-259: 0.1 mile south of intersection with FM-3310, about 3.5 miles south of US-79/US-259 intersection, traveling south from Henderson
New	Tyl07	North	Tyler	Van Zandt	US-80: 1.5 miles east of intersection with SH-19 about 13 miles north of City of Canton traveling east
New	Tyl08	North	Tyler	Cherokee	FM-241: 0.1 mile north of intersection with SH-21 traveling north toward Rusk, northwest of Nacogdoches
New	Tyl09	North	Tyler	Smith	FM-849: 0.2 miles north of intersection with IH-20 Exit 552 traveling north
New	Tyl10	North	Tyler	Smith	FM-850: 0.1 miles west of intersection with SH-31 near Headache Springs Natural Park traveling west
Original	Wac03	East	Waco	McLennan	US-84: 0.1 mile past intersection with SH-317 near MCLENNAN/CORYELL COUNTY Line
Original	Wac04	East	Waco	McLennan	SH-6: 0.1 mile past intersection with FM-185 near Waco Bridge
Original	Wac05	East	Waco	McLennan	IH-35: 0.1 mile past intersection with FM-308 (West Elm Mott Lane) near FM-3149
Original	Wac06	East	Waco	Bosque	FM-2490: 0.1 mile past intersection with RC Granger Rd/Co Rd 3650 near BOSQUE/MCLENNAN COUNTY Line about 20 miles west of IH-35/US-77
Original	Wac07	East	Waco	McLennan	IH-35: 0.1 mile past N Pecan Street past Town of Hillsboro, past intersection with US-

					77/Abbott Ave
Original	Wac08	East	Waco	Hamilton	SH-22: 0.1 mile past intersection with FM-1602 near Cranfills Gap
New	Wac09	East	Waco	Hill	IH-35: 0.1 mile past intersection with FM-1242 (Pine Street) near Exit 358 and City of Abbott
New	Wac10	East	Waco	McLennan	IH-35: 0.1 mile past intersection with FM-434 near Exit 335A
New	Wac11	East	Waco	Coryell	US-84: 0.3 miles past intersection with FM-116
New	Wac12	East	Waco	Bosque	SH-22: 0.5 miles past intersection with SH-6 and SH-124
Original	Wfs01	North	Wichita Falls	Cooke	IH-35/US-77: 0.1 mile south of intersection with FM-1306/Co Rd 218 near Exit 494 traveling south from Gainesville toward Denton
Original	Wfs02	North	Wichita Falls	Wichita	US-287/Old Iowa Park Rd: 750 feet west of intersection with FM-369, traveling west from Wichita Falls/IH-44 area toward Wichita Valley Airport
New	Wfs03	North	Wichita Falls	Wichita	IH-44: 3 miles north of intersection with US-287, just south of the Texas/Oklahoma border, traveling south
New	Wfs04	North	Wichita Falls	Archer	FM-368: 0.1 mile north of intersection with US-277/US-82, traveling south past City of Wichita Falls
Original	Ykm01	South	Yoakum	Jackson	US-59: 0.1 mile past intersection with FM-234
Original	Ykm02	South	Yoakum	Victoria	SH-185: 0.1 mile past intersection with US-59 southeast side of VICTORIA COUNTY
Original	Ykm03	South	Yoakum	Wharton	FM-102: 0.1 mile past intersection with US-59
Original	Ykm04	South	Yoakum	Austin	IH-10: 0.1 mile past intersection with SH-36
New	Ykm05	South	Yoakum	Fayette	IH-10: 0.1 mile past Mile Marker 670
New	Ykm06	South	Yoakum	Lavaca /Colorado	FM-155: 0.4 miles past intersection with US-90 Alt. near LAVACA/COLORADO COUNTY line
New	Ykm07	South	Yoakum	Victoria	FM-616: 0.1 mile past intersection with US-87 south past City of Victoria

2013 Texas Litter Survey

Company Background

ER Planning's senior staff led Keep America Beautiful's 2008 National Litter Survey, 13 citywide and statewide litter surveys along with other important litter-related projects. These include:

- Texas (2013)
- Toronto (2012)
- Oakland, CA (2011-12)
- San Francisco, CA (2011-12)
- Washington, D.C. (2011-12)
- Maine (2010)
- New Hampshire (2010)

- Vermont (2010)
- KAB National Litter Survey (2008)
- Litter: Literature Review (2007)
- Georgia (2007)
- Tennessee (2007)
- Santa Monica and Malibu (2005)
- New Jersey (2004)

The 2013 Texas Litter Survey was led by Steven Stein. The statistical aspects of this project were overseen by Dr. Ron Visco, who holds a Ph.D. in Research Design and Statistics. The field work planning was overseen by Kristian Ferguson. Emilie Knapp led the field survey on the ground. Each of these senior staff has worked on at least eight litter surveys.

For further information, visit: *www.erplanning.com*

Steven R. Stein, Principal
Environmental Resources Planning, LLC
624-B Main Street
Gaithersburg, MD 20878

Office: (240) 631-6532

sstein@erplanning.com

ER PLANNING