

2015 Edmonton Litter Audit

The City of Edmonton, AB

Prepared for

The City of Edmonton

Prepared by

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October 25, 2015

Project No. EDM_WAW1415_067



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Acknowledgements

This report was made possible through the efforts of a team of energetic and dedicated individuals. We wish to acknowledge the following persons:

Kaila Tipton, Acting Program Manager, Capital City Clean Up
Sharon Chapman, Senior Program Planner, Community Standards Branch
Dianna Kim, Research & Report Writer, Community Standards Branch
Chrystal Coleman, Communications

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Don Belanger, Community Relations, Community Standards Branch
Grant Blaines, Community Peace Officers, Community Standards Branch
Troy Courtoreille, Complaints and Investigations, Community Standards Branch
Trevor Dennehy, Edmonton Transit
Katie Hayes, Graffiti Project Manager, Community Standards Branch
Bruce Kobialko, Project Management and Maintenance Services Branch
Tim O'Donnell, Neighbourhoods Branch
Doug Sheremeta, Utility Services Branch
Don Turene, Transportation Operations Branch

EXECUTIVE SUMMARY

The City of Edmonton contracted AET Group Inc. (AET) to conduct litter audits at 123 pre-selected locations within the public realm across the city. The audits were conducted from June 21-25th 2015 with the purpose of assessing the composition and amount of litter present on Edmonton streets.

During the study period AET staff examined large and small litter within the 123 sites across the City of Edmonton. The City has previously completed litter audits in 2007, 2009, 2010, 2011, 2012, 2013, and 2014. The methodology used in this year's audit was similar with those of previous years. AET visually assessed the litter within these 123 locations and recorded the type, and size of litter.

Key findings from the large litter audits:

- The average amount of large litter has decreased from an average of 15.4 items per site in 2014 to 11.6 items per site in 2015;
- The total number of large litter items decreased by 24.49% from 1,895 items in 2014 to 1,431 items in 2015;
- The number of sites with no large litter recorded decreased from 16 sites in 2014 to 15 sites in 2015;
- The most commonly found item in the large litter audit was Miscellaneous Plastic representing 16.07% of all large items audited; Non-brand name napkins/ serviettes were the most commonly found item in 2014; and,
- Evidence of litter clean-up by city crews was observed in the downtown core, while completing litter audits, as well as residents cleaning up streets in residential areas.

Key findings from the small litter audits:

- The average amount of small litter has decreased from an average of 10.2 items per site in 2014 to 8.96 items per site in 2015;
- The total number of small litter items decreased by 12.05% from 1,253 items in 2014 to 1,102 items in 2015;
- The most commonly found small litter item was cigarette butts, accounting for 40.74% of all small litter audited, followed by paper at 30.04%. In 2014, cigarette butts were the most common small litter item, accounting for 47.49% of small litter, followed by paper, which made up 17.24% of small litter; and,
- AET staff witnessed residence of the City of Edmonton utilizing cigarette bins that are placed throughout the city.

1.0 INTRODUCTION

1.1 Background

The City of Edmonton contracted AET Group Inc. (AET) to conduct litter audits at 123 pre-selected locations within the public realm across the city. These sites can be seen below in Figure 1.1. The audits took place from June 21 through June 25, 2015 with the purpose of assessing the composition and amount of litter that was present on Edmonton streets. The type of litter was classified into two size categories: large litter, which is equal to or larger than four square inches, and small litter, which is smaller than four square inches.

The City of Edmonton Public Places Bylaw #14614 Section 4 states that a person shall not leave any garbage litter or other refuse in a public place except in a receptacle designed and intended for such use. The City of Edmonton has litter bins throughout the city with receptacles for garbage and recycling. Within the downtown core there were also receptacles for cigarette butts, these were heavily used by residents.

Edmonton Litter Sites 2009 - 2015

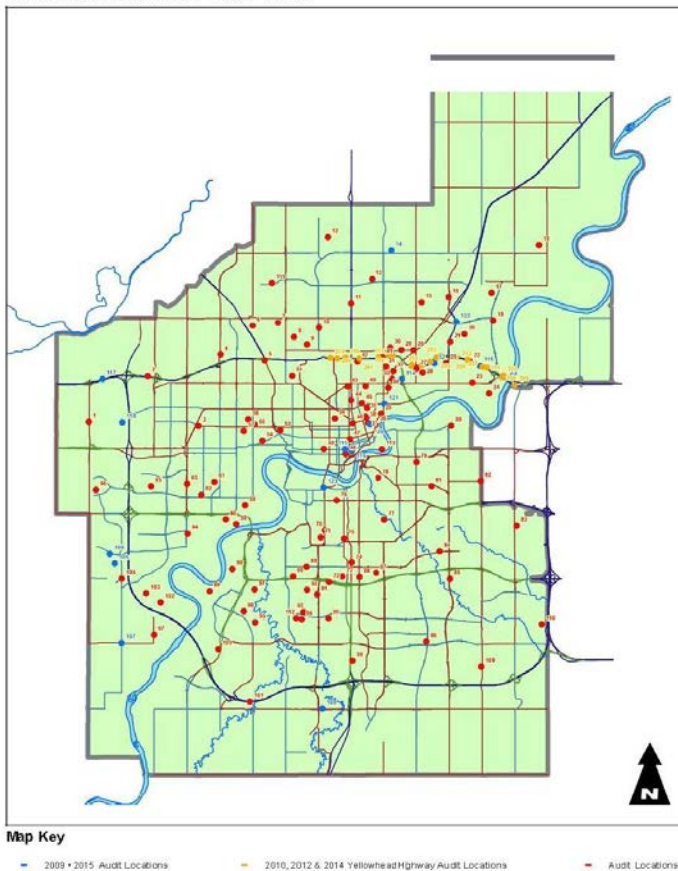


Figure 1.1 Edmonton Litter Audit Site Locations

1.2 Objectives

The litter audits were intended to accomplish the following:

- A detailed analysis of large litter items, that fall within the survey areas;
- A detailed analysis of small litter items that fall within the smaller subsections of the survey areas; and,
- Analysis and reporting of the results with a focus on a comparison between previously completed audits.

2.0 METHODOLOGY

2.1 Litter Audit Summary

The litter audit was conducted by surveying 123 pre-selected locations which were determined by the City of Edmonton. There are at least a few sites in each area of the city, with a higher number in the densely populated downtown core. The audits were conducted from June 21 through June 25, 2015. Two teams of two AET staff were assigned to complete the audits within the one week time period. AET staff were responsible for observing accumulated litter and recording data for the classification of large litter, the classification of small litter and background information for each of the 123 sites. The methodology used in the 2015 litter audit was the same methodology used in previous audits. There are 87 large litter categories and 17 small litter categories, including the 3 new categories added to large and the 1 added small litter in 2015.

2.2 Survey Data Collection

AET staff completed the Site Surveyor Form provided by the City of Edmonton for each of the assigned 123 sites. The following information was recorded on these forms:

- Date and time
- Audit team
- Size of audit area
- Type and characteristics of adjacent road
- General attributes of the area
- Visual rating of site
- GPS Coordinates

GPS coordinates taken with a handheld Garmin GPS unit were also recorded for each site. Data from the Site Surveyor Forms were transferred to an Excel worksheet.

2.3 Large Litter Data Collection

After the site was measured and information about the site was recorded, an AET staff member completed the Large Items Count form. After two passes of the site were completed, information about the type of litter present within the study area was recorded. This data was then transferred to an Excel worksheet. In the worksheet, the total amount of large litter at each site was calculated as the average of the two passes.

2.4 Small Litter Data Collection

Results from the small litter audits were recorded on the Small Litter Count Sheet by AET staff after the site was measured, and information about the site was recorded.

3.0 SUMMARY OF AUDIT RESULTS

3.1 Survey Results

During the audits, AET staff collected information about the roads adjacent to the audit sites. As seen in Figure 3.1, 65.85% of the audit locations were on minor city streets, 34.15% of the audit locations were on major city streets.

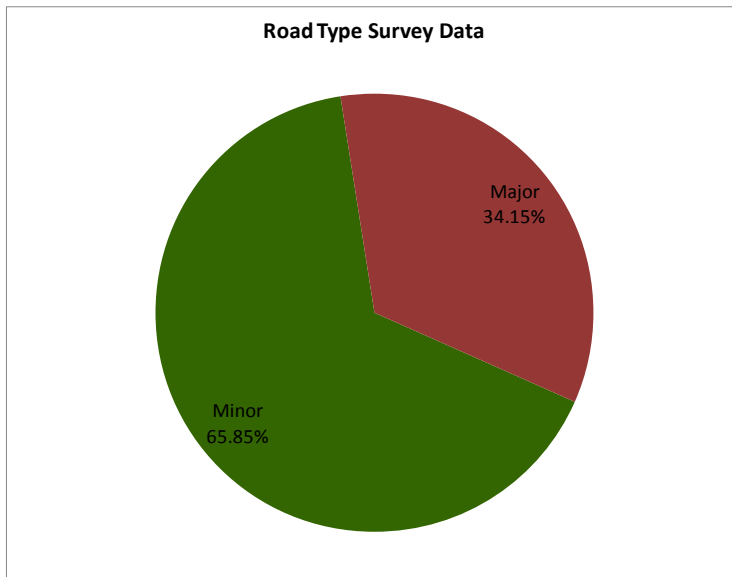


Figure 3.1 Road Type Results -Survey Data

AET staff completed a visual rating for each site based on the amount of litter visible. The sites were rated on a scale from 1-4, 1 representing the cleanest sites with less than 5 pieces of litter visible, and 4 representing the dirtiest sites with greater than 20 pieces of litter visible.

3.2 Large Litter Results

Large litter is any piece of litter within the site that is equal to or greater than 4 square inches. As shown in Figure 3.2, the average amount of large litter found at each site has been steadily decreasing since the first audit for which data was available, which was conducted in 2009. This trend continued with the 2015 audit, with an average of 11.6 large litter items per site, down from an average of 15.4 items per site in 2014.

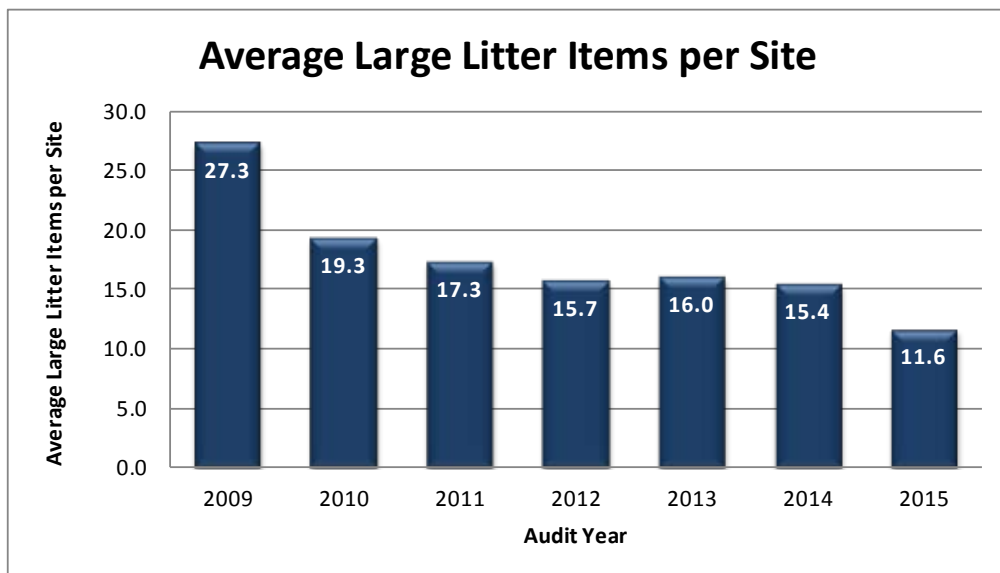


Figure 3.2 Average Amount of Large Litter per Site

The occurrence of the most common type of large litter, Miscellaneous Plastic, grew from 6.38% in 2014 to 16.07% in 2015. Miscellaneous paper was the second most common type of Large Litter and increased in occurrence from 6.38% in 2014 to 13.12% in 2015.

Table 3.1 illustrates the 20 most common items of large litter found during the audit. These items account for 81.71% of the large litter identified.

Table 3.1 Top 20 Large Litter Items

#	Large Litter Items	2015 Count	2015 Percent	2014 Count	2014 Percent	Acc. %
1	Misc. Plastic	230.0	16.07%	107.0	5.65%	16.07%
2	Misc. Paper	187.5	13.10%	107.0	5.65%	29.18%
3	No Brand Name Napkins /Serviettes	119.0	8.32%	219.0	11.56%	37.49%
4	Cup Lids, Pieces, Lids	100.0	6.99%	52.5	2.77%	44.48%
5	Printed Material	59.5	4.16%	68.0	3.59%	48.64%
6	Paperboard (boxboard)	52.0	3.63%	0.0	0.00%	52.27%
7	Construction debris	43.5	3.04%	83.0	4.38%	55.31%
8	Paper Cups (hot)	43.0	3.00%	72.5	3.83%	58.32%
9	Tobacco other	42.5	2.97%	140.0	7.39%	61.29%
10	Other Cloth	40.0	2.80%	39.0	2.06%	64.08%
11	Snack Food Packaging	37.0	2.59%	7.5	0.40%	66.67%
12	Vehicle & Metal Road Debris	30.0	2.10%	97.0	5.12%	68.76%
13	Plastic Drink Cups	29.0	2.03%	27.0	1.42%	70.79%
14	Misc. Cardboard	28.0	1.96%	62.5	3.30%	72.75%
15	Receipts (business forms, bus tickets)	22.0	1.54%	70.5	3.72%	74.28%
16	Misc. Paperboard	22.0	1.54%	87.5	4.62%	75.82%
17	Sweet Packaging	19.0	1.33%	24.0	1.27%	77.15%
18	Paper Cups (cold)	18.0	1.26%	29.5	1.56%	78.41%
19	Zipper Bags/Sandwich Bags	17.0	1.19%	16.5	0.87%	79.59%
20	Tire & Rubber debris	16.0	1.12%	74.0	3.91%	80.71%
Total Top 20		1155.0	80.71%	1384.0	73.03%	
Total - All Litter		1431.0	100.00%	1895.0	100.00%	

3.2.1 Large Litter by Material Type

Items within the large litter categories are composed of different material types. These items were categorized based on their known composition, including: paper, plastic, composite (made of multiple materials), metal, glass and other. Figure 3.3 illustrates the most common material types of the 1,431 large litter items observed. Paper is the largest material type representing 42.73% of the items observed. Plastic is the second largest material type at 35.08%. Other is the third largest type representing 15.79% of the items observed. This includes cloth, tobacco, and items such as food and road debris.

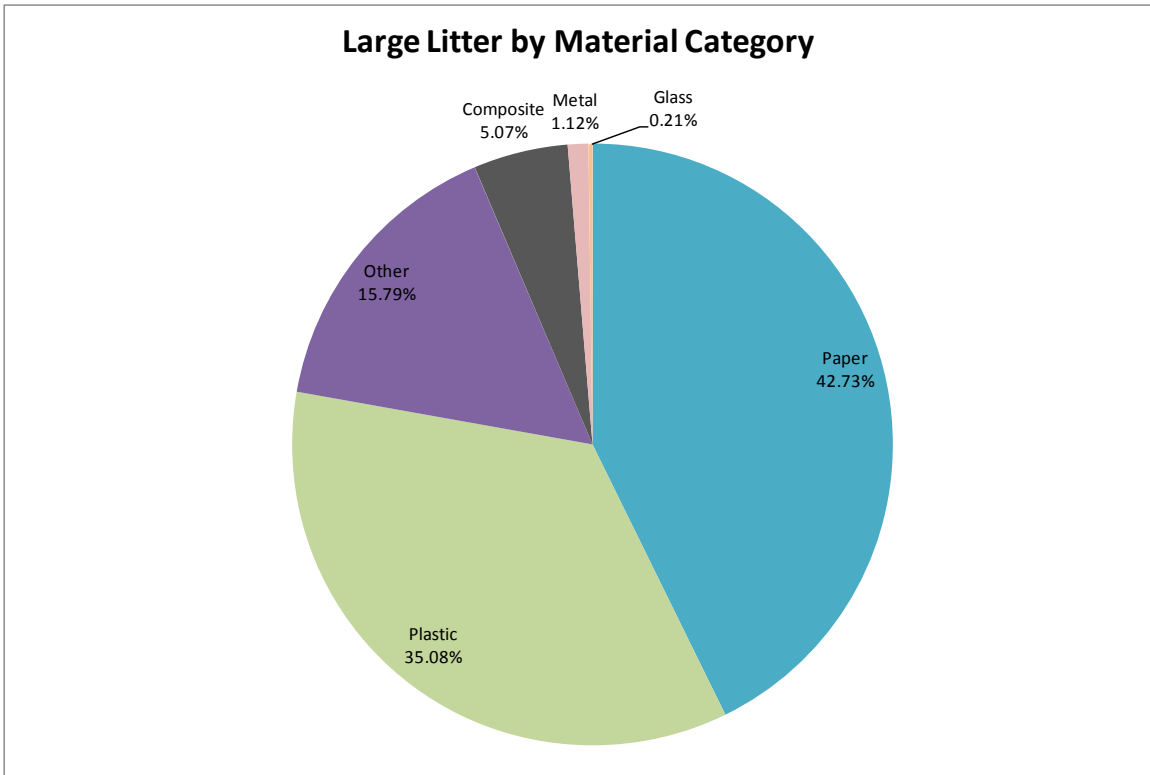


Figure 3.3 Large Litter by Material Type

3.2.2 Large Litter by Category

Table 3.2 below provides a summary of the total amount of large litter observed by each of the 13 categories used for the analysis of the large litter items. The three most common categories of litter audited in 2015 Miscellaneous Litter, Cups, and Household Articles. Miscellaneous Litter includes items such as miscellaneous paper and plastic. These three categories were also the three of the four largest categories observed in 2014.

Table 3.2 Large Litter by Category 2014 and 2015

Survey Year	2015		2014	
Category	Items	Percent	Items	Percent
Beverage Containers	21.0	1.47%	50.0	2.64%
Cups	198.0	13.84%	183.5	9.69%
Bags	62.0	4.33%	100.5	5.30%
Boxes	71.0	4.96%	19.0	1.00%
Other Containers	51.5	3.60%	132.5	6.99%
Wraps & Trays	25.0	1.75%	55.0	2.90%
Candy & Gum & Snacks	81.0	5.66%	129.5	6.84%
Fast Food Items	142.0	9.92%	253.5	13.38%
Other Miscellaneous Litter	620.5	10.69%	681.0	35.95%
Printed Materials	91.5	6.39%	150.0	7.92%
Tobacco Products	50.5	3.53%	140.0	7.39%
Additional Categories	17.0	1.19%	0.0	0.00%
Total	1,431	67.33%	1,895	100.00%

Figures 3.4 and 3.5 below provide a comparison of each of the categories in the Large Litter audit in 2014 and 2015, respectively.

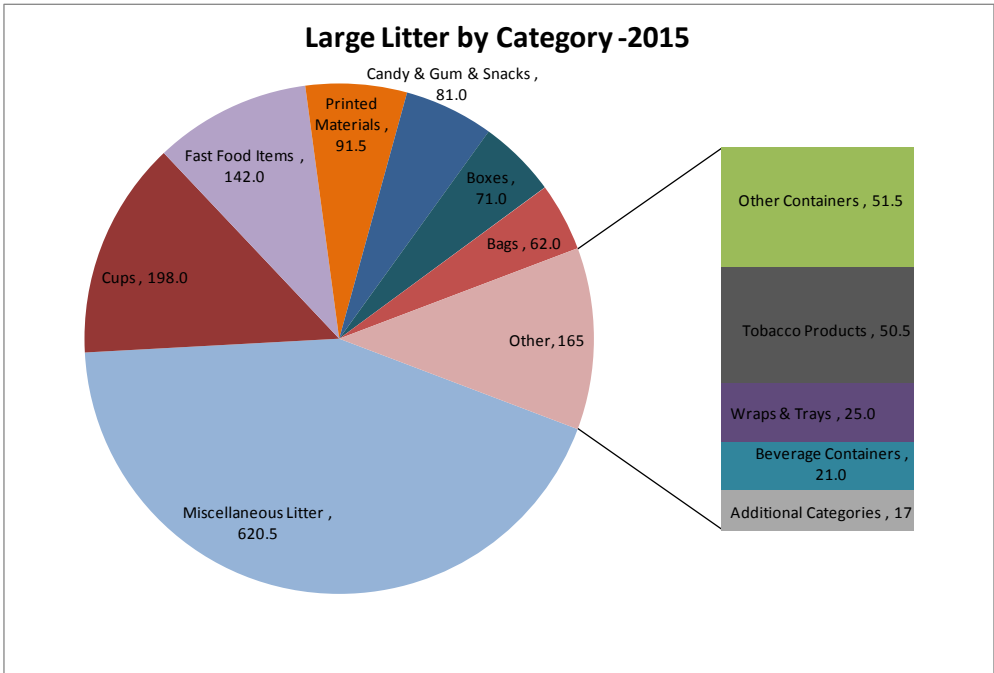


Figure 3.4 Large Litter by Category 2015

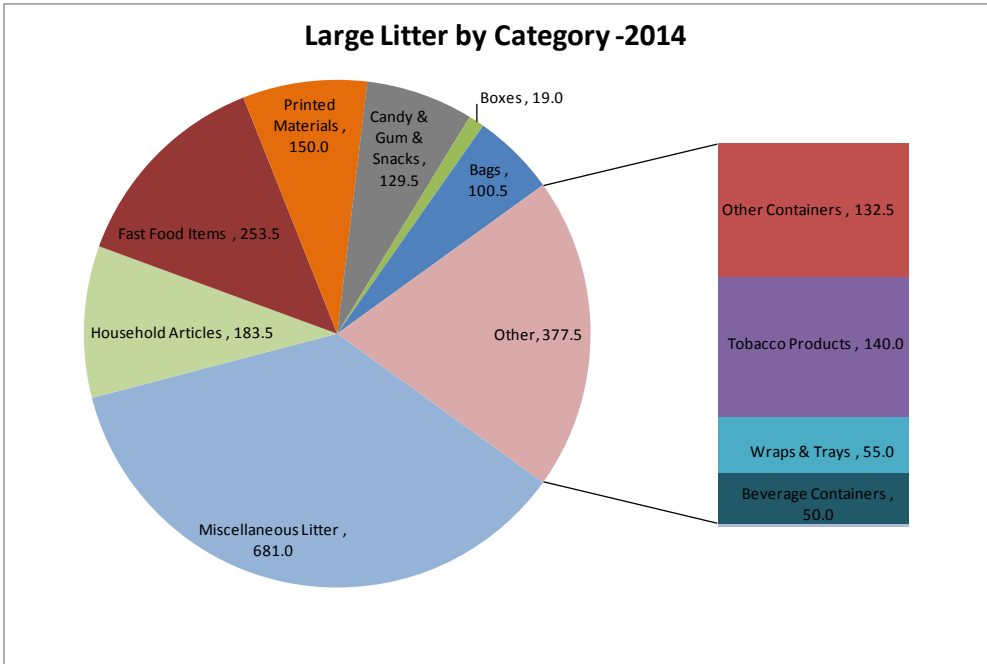


Figure 3.5 Large Litter by Category 2014

3.2.3 Large Litter by Sites

Tables 3.3 and 3.4 below illustrate the 10 sites with the highest item counts for Large Litter in 2014 and 2015. In 2014, site #108 had the highest amount of Large Litter with 116 pieces audited. In 2015 the site with the highest amount of litter was site #22 with 81.5 pieces of Large Litter. The most littered sites are different in 2014 and 2015, with the exception of site #11, 22, 45, 101 & 117.

Table 3.3 Highest Ranking Sites for Large Litter 2015

Site #	Lg Litter	Street Name
22	81.5	YELLOWHEAD TRAIL
45	71.0	93 STREET NW
2	62.5	YELLOWHEAD TRAIL
46	53.5	107A AVENUE NW
27	52.0	66 STREET NW
101	41.5	ANTHONY HENDAY DR.
117	38.0	YELLOWHEAD TR
79	37.0	75 STREET NW
23	35.5	118 AVENUE NW
11	35.0	97 STREET NW

Table 3.4 Highest Ranking Sites for Large Litter 2014

Site #	Lg Litter	Street Name
108	116.0	ELLERSLIE RD
21	110.5	50 STREET NW
101	101.5	ANTHONY HENDAY DR.
45	73.0	93 STREET NW
87	59.5	94 STREET NW
100	54.0	TERWILLEGAR DRIVE NW
11	48.5	97 STREET NW
67	48.5	184 STREET NW
117	48.5	YELLOWHEAD TR
22	41.5	YELLOWHEAD TRAIL

3.2.4 Large Litter Statistical Tests

Statistical tests were conducted on the results of the large litter audits. The number of sites with no large litter decreased from 16 sites in 2014 to 15 sites in 2015. The numbers of sites that rank above, on and below the average number of items audited per site are very similar in 2014 and 2015 as seen in Table 3.5. The average number of large litter items in 2015 is 11.6, compared to 15.4 in 2014.

Table 3.5 Site Ranking Distribution 2015, 2014

Site Ranking	2015		2014	
	# of Sites	Percent	# of Sites	Percent
Above Average	41	33.33%	41	33.33%
Average	1	0.81%	2	1.63%
Below Average	81	65.85%	80	65.04%

3.3 Small Litter Results

There was a total of 1,102 pieces of Small Litter (< 4 square inches) observed by AET staff in the 2015 Small Litter audits for the City of Edmonton. This represents a decrease in Small Litter of 12.05% compared to 2014.

Table 3.6 illustrates the differences in the audited small litter from 2014 to 2015. As seen in the table, the occurrence of the majority of items has decreased from 2014 to 2015. Caution should be taken when observing the percentage change between 2014 and 2015 due to the relatively small number of items observed in several categories.

Table 3.6 Small Litter Results 2014 & 2015

Small Litter: 2014 & 2015					
Item Description	2015		2014		Change (2014-2015)
	Count	Percent	Count	Percent	
Cigarette butts/debris	449	40.74%	595	47.49%	(24.54%)
Other tobacco	0	0.00%	1	0.08%	(100.00%)
Bottle caps	5	0.45%	12	0.96%	(58.33%)
Straws	1	0.09%	10	0.80%	(90.00%)
Candy packaging and wrappers	9	0.82%	0	0.00%	n/a
Polystyrene packing materials, ie. foam peanuts	9	0.82%	1	0.08%	800.00%
Other polystyrene debris, ie. poly foam pieces	3	0.27%	44	3.51%	(93.18%)
Glass	17	1.54%	17	1.36%	0.00%
Paper	331	30.04%	216	17.24%	53.24%
Plastic film	82	7.44%	101	8.06%	(18.81%)
Hard plastic	51	4.63%	119	9.50%	(57.14%)
Aluminum/foil debris	41	3.72%	71	5.67%	(42.25%)
Rubber	3	0.27%	6	0.48%	(50.00%)
Metal (not aluminum)	6	0.54%	11	0.88%	(45.45%)
Other material	54	4.90%	20	1.60%	170.00%
Chewing gum (stuck on pavement)	40	3.63%	29	2.31%	37.93%
Food & Other Organics	1	0.09%	0	0.00%	n/a
Total Small Litter	1,102	100.00%	1,253	100.00%	-12.05%

3.3.1 Small Litter by Sites

Tables 3.7 and 3.8 illustrate the 10 sites with the highest item counts for Small Litter in 2014 and 2015. In 2014 site #63 had the highest amount of Small Litter with 44 pieces audited. In 2015 the site with the highest amount of Small Litter was site #48 with 44 pieces. A little more than half of the highest ranking sites are different from the 2014 to 2015 audits, while the similar sites are #21, #49 #101 & #16.

Table 3.7 Highest Ranking Sites for Small Litter 2015

Site #	Sm Litter	Street Name
48	44	100 AVENUE NW
2	43	YELLOWHEAD TRAIL
21	43	50 STREET NW
117	43	YELLOWHEAD TR
49	40	JASPER AVENUE
120	40	92 STREET NW
22	33	YELLOWHEAD TRAIL
85	33	50 STREET NW
101	33	ANTHONY HENDAY DR.
16	30	146 AVENUE NW

Table 3.8 Highest Ranking Sites for Small Litter 2014

Site #	Sm Litter	Street Name
63	44	170 St - near West Edm
101	40	JASPER AVENUE
23	39	50 STREET NW
48	37	JASPER AVENUE NW
16	35	50 STREET NW
21	33	82 AVENUE (Whyte
22	31	109 STREET NW
47	30	146 AVENUE NW
49	28	50 STREET NW
11	27	JASPER AVENUE NW

3.3.2 Small Litter Statistical Tests

Statistical tests were conducted on the results of the small litter audit (Table 3.9). The number of sites with no small litter increased from 19 sites in 2014 to 27 sites in 2015. The numbers of sites that rank above, on and below the average number of items audited per site are very similar in 2014 and 2015. The average number of small litter items per site was 10.2 in 2014 and 8.96 in 2015.

Table 3.9 Site Ranking Distribution 2014, 2015

Site Ranking	2015		2014	
	# of Sites	Percent	# of Sites	Percent
Above Average	42	34.15%	48	39.02%
Average	4	3.25%	2	1.63%
Below Average	77	62.60%	73	59.35%

4.0 ADDITIONAL OBSERVATIONS

AET staff noted the presence of any City of Edmonton litter bins within a 200 meter radius from the site boundary. Figures 4.1 and 4.2 are examples of litter bins that were present within or near some of the 123 audited sites. Figure 4.1 shows the City's litter bins that are present at bus stops. Figure 4.2 illustrates litter bins that were commonly found in City of Edmonton downtown core for cigarette disposal. Of the 123 sites that were audited, 36 sites (29.27%) had litter bins present within a 200 meter radius, while 87 sites did not (70.73%).



Figure 4.1 City of Edmonton Street Litter Bin at a Bus Stop



Figure 4.2 City of Edmonton Cigarette Butt Disposal

The areas with City of Edmonton litter bins nearby had on average 12.65 pieces of Large Litter within the site, and the areas without a nearby City of Edmonton litter bin had an average of 11.21 pieces of large litter. Litter bins were generally observed in areas with more public foot traffic. This could be the reason for the difference in the average amount of litter within areas with and without city litter bins.

AET staff also made note of any significant changes in litter distribution within and surrounding the site.

5.0 SITE RANKING AND ATTRIBUTES

AET staff ranked each of the 123 audited sites three different ways: 1) By the total number of large litter items that were audited within each site; 2) By the total number of small litter items that were audited within each site; and, 3) The total combined amount of large and small litter. Table 5.1 illustrates the sites that have the greatest amount of large and small litter combined.

Table 5.1 Site Ranking for Combined Large and Small Litter

Site #	All Litter	Street Name
22	114.5	YELLOWHEAD TRAIL
2	105.5	YELLOWHEAD TRAIL
45	82.0	93 STREET NW
117	81.0	YELLOWHEAD TR
101	74.5	ANTHONY HENDAY DR.
27	74.0	66 STREET NW
46	70.5	107A AVENUE NW
120	68.0	92 STREET NW
21	64.0	50 STREET NW
11	60.0	97 STREET NW

Attributes of the sites with the highest amount of combined small and large litter are provided in Table 5.2. Within these sites 20% have fast food and a convenience store, 60% are by a stop sign or light and 70% do not have litter bins present. Major roads account for 90% of these areas, with 50% of the areas having commercial attributes.

Table 5.2 Top Ten Sites with the Highest Quantity of Large and Small Litter Items and Site Attributes

Site #	All Litter	Fast Food	Conv Store	Stop	Litter Bin	Road Type	Area	Street Name
22	114.5	N	N	N	N	Major	COM	YELLOWHEAD TRAIL
2	105.5	N	N	Y	N	Major	IND	YELLOWHEAD TRAIL
45	82.0	N	N	N	N	Major	RES	93 STREET NW
117	81.0	N	N	Y	N	Major	COM	YELLOWHEAD TR
101	74.5	N	N	N	N	Major	PARK	ANTHONY HENDAY DR.
27	74.0	N	N	Y	N	Major	COM	66 STREET NW
46	70.5	Y	Y	Y	N	Major	COM	107A AVENUE NW
120	68.0	N	N	N	Y	Minor	RES	92 STREET NW
21	64.0	Y	Y	Y	Y	Major	COM	50 STREET NW
11	60.0	N	N	Y	Y	Major	RES	97 STREET NW

6.0 LITTER ABATEMENT

The average amount of large litter has decreased from an average of 15.4 items per site in 2014 to 11.6 items per site in 2015. The following litter abatement practices are utilized for the City of Edmonton.

6.1 Capital City Clean Up Programs

Adopt a Block

Edmonton residents, businesses and community groups are encouraged to adopt the block surrounding their home, business area, or any block of space in their community, such as a schoolyard or a neighbourhood park to help keep it litter-free during the spring and summer months. Each registered volunteer receives a clean-up kit with supplies like garbage bags, gloves, etc.

Business Supporting Community

Capital City Clean Up's Business Supporting Community (BSC) initiative offers Edmonton-area companies a unique opportunity to fight litter while supporting local non-profit groups. Participating businesses pay organizations for litter cleanup as a unique fundraising opportunity. Schools and non-profit groups can provide an enthusiastic volunteer force.

From May to August, these groups are paid a weekly rate to clean up litter around a one-block area of the company's site. Businesses may also choose to have the group clean up another area, such as a playground, seniors' residence or Neighbourhood Park.

Community Bin Grants

Each spring, dozens of Edmonton community groups apply for help to get rid of any large, bulky items cluttering up the back alleys, streets or other areas in their neighbourhoods. Under the Community Bin Grant Program, the City offers funds on a first-come, first-served basis that can be used for bin rentals (including the truck, driver and disposal costs) and truck rentals to drive through the area and collect large items.

Fifteen to Clean Challenge

Capital City Clean Up has the 15-to-Clean challenge which challenges citizens to all throughout the year to spend 15 minutes cleaning up an area around their home, school, business or workplace. Capital City Clean Up offers free cleanup packages (one glove and garbage bag).

River Valley Clean Up

Throughout the summer and into the fall, Capital City Clean Up encourages people to pick up litter along the river valley and throughout the connecting ravines. People can register a group clean up at one of the City's river valley parks and Capital City Clean Up provides them with clean up supplies.

Ashtray Program

Our ashtray program works within Edmonton Business Revitalization Zones. We have installed and maintain 447 ashtrays throughout 9 commercial districts throughout the city.

7.0 CONCLUSION

AET Group Inc. conducted litter audits at 123 pre-selected locations within the public realm across the City of Edmonton. The audits were conducted from June 21-25th 2015 with the purpose of assessing the composition and amount of litter present on Edmonton streets. The type of litter was classified into two sizes: large litter, which is equal or larger than four square inches, and small litter, which is smaller than four square inches.

7.1 Large Litter Conclusions

Over the one-week study period, 123 sites within the City of Edmonton were audited for large litter. The key findings include:

- The average amount of large litter has decreased from an average of 15.4 items per site in 2014 to 11.6 items per site in 2015;
- The total number of large litter items decreased by 24.49% from 1,895 items in 2014 to 1,431 items in 2015;
- The total number of large litter items decreased by 57.42% from 3,361 items in 2009 to 1,431 items in 2015;
- The number of sites with no large litter recorded decreased from 16 sites in 2014 to 15 sites in 2015; and,
- The most commonly found item in the large litter audit was Miscellaneous Plastic representing 16.07% of all large items audited.

7.2 Small Litter Conclusions

Over the one-week study period, 123 sites within the City of Edmonton were audited for small litter. The key findings include:

- The average amount of small litter has decreased from an average of 10.2 items per site in 2014 to 8.96 items per site in 2015;
- The total number of small litter items decreased by 12.05% from 1,253 items in 2014 to 1,102 items in 2015;
- The total number of small litter items decreased by 47.87% from 2,114 items in 2009 to 1,102 items in 2015;
- The total amount of cigarette butts decreased by 24.54% from 595 items in 2014 to 449 items in 2015; and,
- The most commonly found small litter item was cigarette butts, accounting for 40.74% of all small litter audited, followed by paper at 30.04%. In 2014, cigarette butts were the

most common small litter item, accounting for 47.49% of small litter, followed by paper, which made up 17.24% of small litter.

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Disclaimer

AET Group Inc. makes no warranty and assumes no liability for the information contained in this report outlining the litter audit results. These results reflect measurements made over a onetime “snapshot” time period, meaning they only represent the conditions for the period of time in which they were collected. Seasonal variability, holidays and weather, among other factors, can affect the amount of litter within an area.