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Foreign Object Debris Characterization at a Large International Airport

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16. Abstract

Foreign object debris (FOD) and its corresponding damage is a well-recognized threat to aircraft safety. In support of the Federal Aviation Administration FOD research program, the University of Illinois Center of Excellence for Airport Technology (CEAT) in cooperation with the staff of the Chicago Department of Aviation, O'Hare International Airport (ORD) Operations, initiated an effort to characterize the FOD found on active runways at a major civil airport. The primary objective of the study was to characterize FOD over time by analyzing the FOD collected by common mechanical FOD removal devices during routine runway inspections. The CEAT analysis of FOD collected from runways at ORD showed that FOD was consistently present. The majority of the collected FOD samples was predominantly comprised of material types that could be attributed to runway pavements, such as asphalt, tar, and concrete. The conclusions in this study are based on empirical analysis and the findings in this report follow the interpretative rather than the statistical analysis.

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LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AC	FAA Advisory Circular
CEAT	University of Illinois Center of Excellence for Airport Technology
CDA	Chicago Department of Aviation
FAA	Federal Aviation Administration
FOD	Foreign object debris
NAFPI	National Aerospace FOD Prevention, Inc.
ORD	Chicago O'Hare International Airport

EXECUTIVE SUMMARY

Foreign object debris (FOD) and foreign object damage are well-recognized threats to aircraft safety. Among the long-term efforts in FOD prevention and management, the Federal Aviation Administration (FAA) established a research program designed to support advisory circular development, develop an FOD database, characterize FOD at airports, identify equipment useful in FOD detection, and support continuing safety improvement at airports.

As part of the FAA FOD research program, the University of Illinois Center of Excellence for Airport Technology (CEAT) in cooperation with the staff of the Chicago Department of Aviation (CDA), Chicago O'Hare International Airport (ORD) Operations, engaged in a study to characterize FOD removed during periodic runway inspections conducted by airport personnel. The primary objective of the study was to characterize FOD found on an active runway over time by analyzing the FOD collected by common mechanical FOD removal devices during routine runway inspections. This report provides a summary of FOD collected and the characterization of FOD found on ORD runways.

In this study, the CEAT supported 79 sampling campaigns, resulting in the collection of FOD samples from ORD's 7 runways labeled 4R-22L, 4L-22R, 9R-27L, 9L-27R, 10-28, 14R-32L, and 14L-32R. Sampling campaigns began in July 20, 2011 and concluded on May 8, 2013. The limited availability of CDA equipment and CEAT personnel for FOD collection activities hindered the number of inspections/samples collected during the June 2011 to May 2013 period for the CEAT assessment. The collection methods used varied based on available resources. In some sampling campaigns, three FOD collection methods (i.e., mechanical sweeper, magnet bar, and laborers) were employed, while other campaigns involved only one or two of those collection methods. Of note, the laborer method collected FOD from non-runway areas, such as the grassed areas adjacent to the paved shoulders. In total, 34 sampling campaigns were fully supported by all three methods. These 34 samples were used in the more detailed analyses. Based on the inspection sequence, FOD sampling data was reviewed to identify any possible relationships between time between inspections and FOD sample amounts. Runway inspection schedules were not designed to provide fixed intervals between samples so there was variability in time between samples for each runway. Time between collections varied between short intervals, i.e., on the scale of days, to approximately monthly intervals. In some cases, the time between samples was approximately 100 to 150 days. A review of inspection interval data was unable to provide any relationship between the time between inspections and FOD accumulation. Regular maintenance and routine inspections by operations personnel may have affected FOD presence, and other mechanisms, such as removal from jet blasts, may have limited the amount of collectible FOD on runways during sampling campaigns.

FOD sample data was reviewed to identify differences in FOD amounts over time for a single runway and to determine if there is a relationship between airport characteristics (such as runway length, the number of taxiway intersections, or construction activity) and the presence and type of FOD found. Runway operation, another important factor, was not included in this characterization. Analysis of FOD on each runway over time revealed variability in FOD weight over time for all runways. It was noted that more metal items were found in winter months. Inspections generally produced samples that weighed between 10 lb and 20 lb, but a collection in winter 2013 produced a sample weighing almost 50 lb. Examination of winter samples found

larger asphalt, tar, and concrete items present, which is consistent with the suggestion that high FOD weights may be related to freeze/thaw conditions that would produce FOD from runway pavements. Runway length and the number of taxiway intersections were also examined. The assumption was made that longer runways would produce more FOD, and more intersections would lead to increased traffic and increased FOD. However, due to the small sample size, statistical analysis with a good confidence level could not be performed; hence, analysis found no strong relationship between FOD and runway length or number of intersections. Construction was also considered, examining runway distance from construction and specific construction activity occurring at the Signature Aviation facility. The analysis identified a difference between construction and postconstruction FOD samples for Signature Aviation; however, due to the small sample size, statistical analysis with a good confidence level could not be performed.

Some FOD items were identified as hazardous, i.e., items that could cause damage or could lead to aircraft damage. It was determined that hazardous FOD constituted a very small percentage of the total FOD collected during the study. Hazardous FOD included small metal items and large asphalt, concrete, and tar items, the latter possibly related to the runway surface. Large hazardous items also included paint particles, where the paint bonded to pavement materials, or paint accumulations that produced a single, large particle. A general observation of the FOD material collected was that the most common hazardous items were generated from the pavement surface. Although rare, other large hazardous FOD items were also collected and recorded.

INTRODUCTION

Among the issues related to aircraft safety, few are as well recognized as foreign object debris (FOD) and foreign object damage. In aircraft manufacturing, every effort is made to eliminate the presence of foreign objects that interfere with safe aircraft operation. Because FOD presents such a prevalent issue, the National Aerospace FOD Prevention, Inc. (NAFPI) was created in 1985 to address foreign object issues in all aspects of aerospace programs (www.nafpi.com). Many in the military are familiar with the FOD walk, in which personnel walk down a flightline shoulder-to-shoulder to locate and remove foreign objects from all airport areas used by aircraft. FOD issues were highlighted in 2000, when FOD contributed to the crash of Air France Flight 4590, the Concorde supersonic transport aircraft. During this accident, the Concorde ruptured a tire on a titanium wear strip lying on the runway. Subsequently, a chunk of the ruptured tire debris struck the underside of the aircraft's wing causing a pressure shockwave that ultimately ruptured the aircraft's fuel tank. This accident focused new attention on FOD in aircraft movement areas, particularly the runway.

The Federal Aviation Administration (FAA) has made long-term efforts in FOD prevention and management. In 1996, the FAA issued Advisory Circular (AC) 150/5380-5B on FOD management [1]. While NAFPI efforts in developing FOD prevention guidelines are primarily directed to manufacturing [2], the FAA has continued efforts addressing FOD at airports. In 2009, the FAA issued AC 150/5220-24 on FOD detection equipment [3] and replaced AC 150/5389-B with AC 150/5210-24 to address FOD management [4] in 2010. The FAA also established a research program directed to FOD issues, which was designed to support AC development, develop a FOD database, characterize FOD at airports, identify equipment useful in FOD management, and support continuing safety improvements related to prevention and management of FOD at airports.

The presence of FOD at airports is a well-known problem, but detailed information on type, size, weight, frequency, and origin of the FOD is generally lacking. Management efforts have been based largely on the results of routine inspections of runways with little attention given to FOD characterization. Recent studies on FOD have focused attention on the identification and classification of FOD as an increased safety measure at airports. At an FOD assessment workshop in 2008, one of the initial studies on FOD at airports was presented that reviewed a one-year study performed at Charles De Gaulle Airport [5]. The study found an average of 12 FOD items a month. After the Concorde accident, industry responded by developing airport runway FOD detection systems. In 2011, a study by Herricks et al. [6] reviewed FOD items detected at Changi International Airport in Singapore and concluded that continuous systems provided a real picture of FOD on runways, including identification of items typically too small to be regularly observed during normal inspections. These systems provide continuous surveillance of runways and support better FOD characterization with operational procedures that document all FOD alarms and alerts produced by the system sensors.

As part of the FAA FOD research program, the University of Illinois, Center of Excellence for Airport Technology (CEAT) in cooperation with the Chicago Department of Aviation (CDA), Chicago O'Hare International Airport (ORD) Operations, performed a study of FOD removed during periodic runway inspections. ORD is a large, complex international airport that is recognized as one of the busiest in the world. ORD is in the midst of a major modernization

effort that will eventually replace the present runway crossing configuration with parallel east/west runways, figure 1. Consequently, this study was conducted in the midst of a multiple-year construction project at ORD. The study reviews efforts in FOD characterization and is supported by the FAA William J. Hughes Technical Center, ANG-E261, Airport Safety R&D Section.

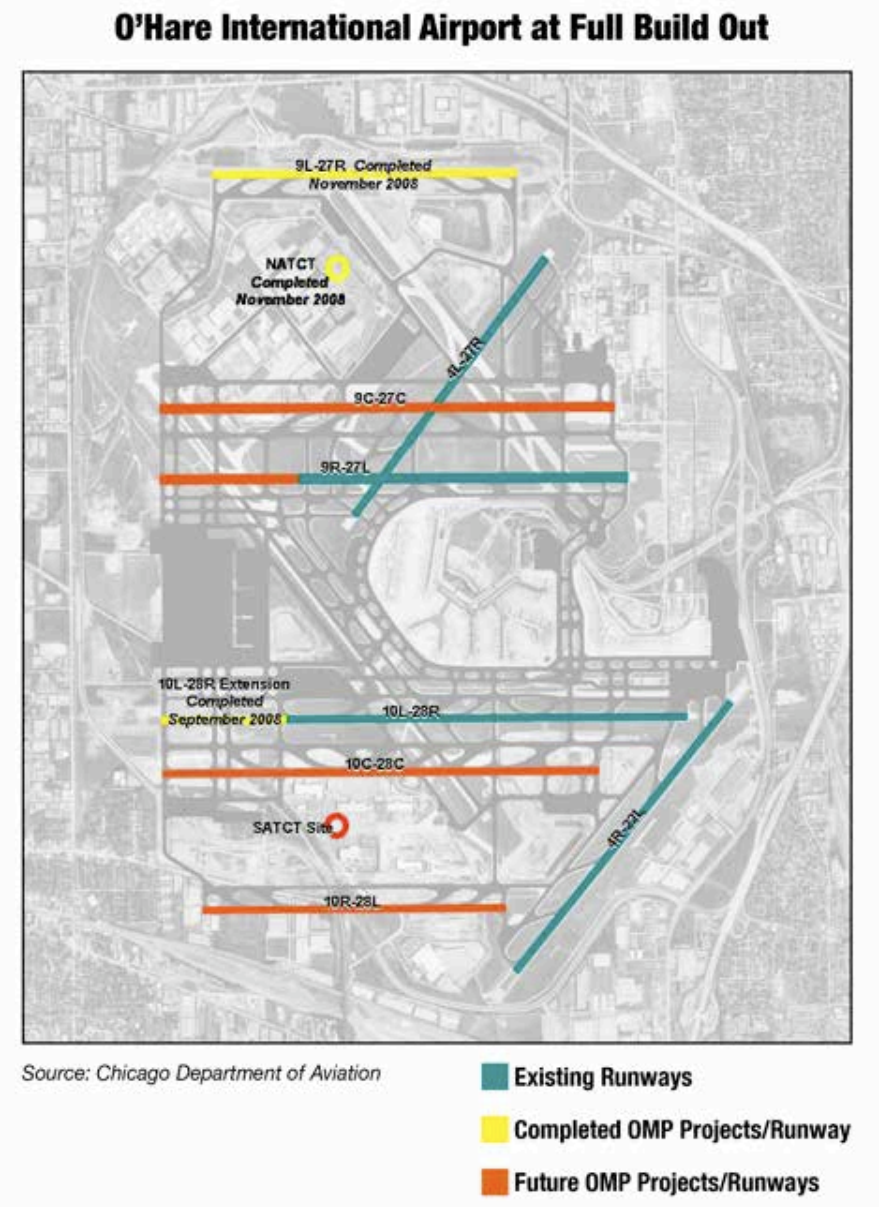


Figure 1. Current Runway Configuration at ORD

In early 2011, the CDA requested assistance from CEAT in developing and implementing a more comprehensive FOD management program at ORD. The program would take advantage of CEAT's capabilities in FOD detection technologies and FOD management to support a comprehensive FOD management effort involving the CDA, airlines, and other tenants at ORD.

As part of routine inspection activities, ORD operations personnel close one runway a week for an intensive daylight inspection. This closure includes a careful inspection of all infrastructure on the runway and a focused FOD collection effort on the runway using tow-behind equipment consisting of either an Aerosweep FOD*BOSS mechanical sweeper and/or a magnet bar, supplemented by personnel removing FOD from grassed areas along the edge of the runway. CEAT took advantage of this existing operational strategy to develop a long-term FOD characterization program. CEAT researchers participated in the runway inspections, processed collected FOD items, and analyzed FOD from 79 runway inspections conducted from July 2011 to May 2013. This report summarizes the FOD collected and characterized from runways at ORD.

BACKGROUND

FOREIGN OBJECT DEBRIS.

The presence of foreign objects in the airport environment presents a major hazard to aircraft safety often with high pecuniary consequences. NAFPI defines foreign object debris and foreign object damage as follows:

> Foreign object debris is any substance, debris, or article alien to the vehicle or system that could potentially cause damage. Foreign object damage is any damage attributed to a foreign object that can be expressed in physical or economic terms which may or may not degrade the product's required safety and/or performance characteristics. [2]

FOD can occur as a part of the manufacture or maintenance of aircraft; or it can occur in the airport environment as the result of the loss of parts from aircraft, pavement cracking, wildlife, ice and salt accumulation, and construction debris. In either case, the damage effects of unremoved FOD can be costly.

> FOD hazards on airports are considered to be comparable to those associated with birds and winter operations. Costs to one major airline average $15,000 per aircraft, which represents an industry cost of over $60 million per year. This is the equivalent of one new medium-sized transport category jet. Tests and experience have shown that foreign objects on airport pavements can be readily ingested by aircraft engines, resulting in engine failure. Debris can also become lodged in mechanisms, affecting the operation of landing gear, flaps, etc. [1]

> Typical foreign objects include the following: aircraft and engine fasteners (nuts, bolts, washers, safety wire, etc.); mechanics' tools; flight line metal (nails, personnel badges, pens, pencils, etc.); stones and sand; paving materials; pieces of wood; plastic and/or polyethylene materials; paper products; and ice formations in operational areas. [1]

> Procedures to eliminate FOD must address two fundamental requirements: (a) the avoidance of debris and (b) the removal of debris from airport pavements. [1]

The existing programs at airports to manage FOD focus on airport activities and require a tailored FOD prevention program, as described in FAA AC 150/5380-5B [1]. The AC makes the following recommendations for inspections and FOD collection equipment:

> Make inspections of operational areas at least once each day, with additional inspections being made in construction areas and immediately after any aircraft or ground vehicle accident or incident or any spill of material which may cause slippery conditions. [1]
>
> Consider using specialized brooms, magnets, and vacuum-type machines to clean aircraft operational areas as well as runway and taxiway safety areas. The acquisition of power sweepers and/or vacuums for use in FOD prevention is considered appropriate. The National Aerospace FOD Prevention, Inc. *FOD Prevention Industry Guideline* recommends that sweeper brushes with metal bristles or spines not be used. Plastic or combination plastic/metal bristles may be appropriate, but the user should consult the equipment manufacturer for specific recommendations. Regardless of the equipment used, a thorough check of the pavement should be conducted at the conclusion of the sweeping procedure. [1]

MANAGEMENT OF FOD.

Most airports use a combination of visual inspection and mechanical devices designed to remove FOD. These devices may simply remove FOD by sweepers or blowers or may be purpose-designed to remove and retain FOD. Two of the most common devices in the latter category include the FOD*BOSS and magnet bars. The FOD*BOSS uses a patented design based on friction to collect FOD items as the device is pulled along a paved surface. The use of friction in the collection process creates the potential that the device may dislodge particles from the surface that may not be readily movable without the friction pad passage. Further, this device flips particles into a retention area, which may differentially retain items of different size or may fill and lose items. Magnet bars collect only ferrous metal items that are attracted to the magnet. The FOD*BOSS and magnet bar are routinely used at airports, and the samples collected by these devices are considered appropriate for a general characterization of FOD. A few airports use new continuous surveillance systems to manage FOD, but these are not common to date.

OBJECTIVES

The primary purpose of the ORD FOD characterization study was to add to the understanding of FOD on airport runways. The study provided a picture of nearly two years of FOD removed from ORD runways during periodic inspections. The study supplements ongoing efforts at other airports that use continuous FOD detection technologies with runway inspection techniques that are commonly available to all airports.

The primary objective of the study was to characterize FOD over time by analyzing the FOD collected by common mechanical FOD removal devices. To meet this objective, the CEAT study sought to

- develop procedures for field processing of FOD collected by mechanical FOD removal equipment, i.e., a FOD*BOSS and a magnet bar.

- develop procedures to separate FOD by size and to quantify FOD by weight.

- provide a characterization of FOD at a large international airport that included

  - a general sense of FOD on runways, including the identification of common FOD items and variability in FOD removed over time.

  - the presence of hazardous items and any trends in occurrence of those items over time.

- provide a detailed analysis of FOD removed from ORD runways that sought to

  - review sampling issues in FOD characterization.
  - relate FOD to runway characteristics.
  - analyze the accumulation of FOD over time.
  - identify seasonal variation in the amounts of FOD collected.

METHODS AND MATERIALS

SAMPLE COLLECTION.

For this study, FOD was collected by CDA personnel during routine runway inspections using equipment regularly used in FOD management at ORD, a magnet bar and a FOD*BOSS (figure 2).

In addition to the FOD collected by this equipment, CDA personnel also removed FOD manually from the grassed areas adjacent to the runway. FOD samples included material retrieved from the magnet bar and the FOD*BOSS and bags of material collected from grassed areas. In general, each sampling campaign proceeded from one end of the runway to the other, with equipment sweeps executed to cover the entire runway surface. CDA personnel retrieved FOD from both sides of the runway. Once the sweeps were complete, CEAT researchers emptied the FOD collection devices and processed samples. Sample processing included field and laboratory components and varied according to collection device.

Figure 2. A Magnet Bar (top) and an Array of Three FOD*BOSS Units (bottom) Used for FOD Collection by ORD Operations

FIELD PROCESSING. Field processing followed procedures specific to each sampling method.

· At the end of each sampling campaign, the material attached to the magnet bar and in the FOD*BOSS was collected and processed by CEAT researchers.

· FOD collected from the FOD*BOSS was passed through a sorting device in the field, figure 3. The device had two screens, 0.25 in. (.64 cm) and 0.50 in. (1.27 cm), that separated the FOD into three size categories:

- Small—FOD less than 0.25 in. (0.64 cm)
- Medium—FOD between 0.25 in. (0.64 cm) and 0.50 in. (1.27 cm)
- Large—FOD greater than 0.50 in. (1.27 cm)

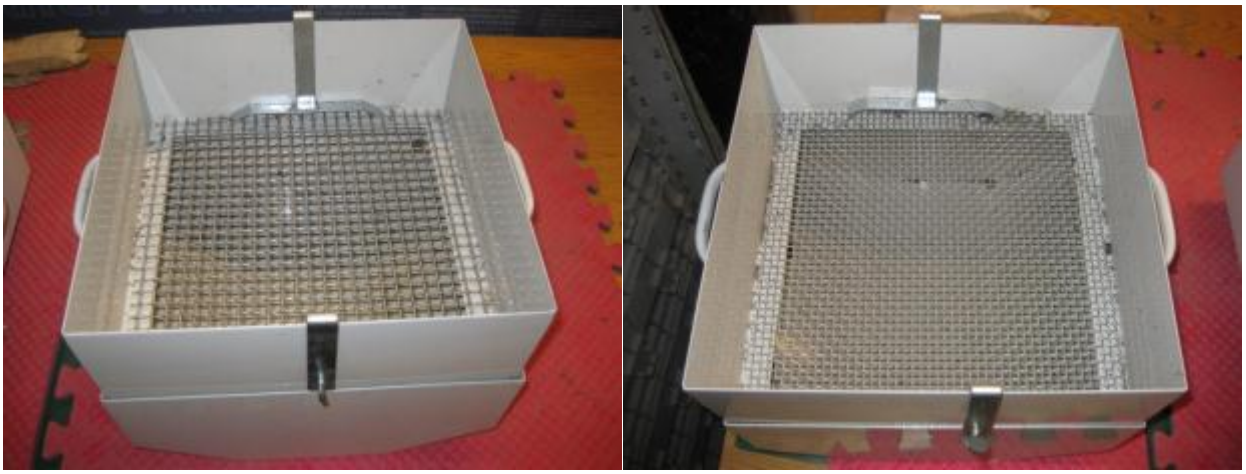


Figure 3. Field Sieve With 12-by-12 in. Frame Showing Different Size Screens Used in the Initial Sorting of FOD Samples

· Material from the magnet bar was not sorted.

· Each category of size-separated FOD and the unsorted material from the magnet bar were then weighed (reported in pounds and ounces), labeled, and placed into plastic bins, as shown in figure 4.

Figure 4. Bins of FOD Samples Collected From the FOD*BOSS

- FOD collected from CDA personnel from non-runway surfaces (typically grassed areas adjacent to the runway) was consolidated, weighed, labeled, and placed into plastic bins, as shown in figure 5.

Figure 5. Trash and Debris Collected by ORD Personnel From Non-Runway Surfaces

LABORATORY ANALYSIS. The collected FOD was returned to the CEAT laboratory for analysis.

- FOD items considered a hazard to aircraft were removed from the FOD samples and characterized as a separate group, termed "hazardous items." (See Characterization of Hazardous Items section.)

- Samples periodically contained grass clippings that, when possible, were separated from the other FOD items.

- All hazardous items were measured for length, width, and height in inches and weight in pounds and ounces.

- Smaller FOD items were weighed in aggregate.

- Digital photographs were taken of all hazardous items.

The FOD samples were often large, so subsampling techniques were used in some analyses. The procedure used was based on the American Association State Highway and Transportation Officials Standard (AASHTO), Designation: C702-98 "Standard Practice for Reducing Samples of Aggregate to Testing Size."[7]

The following procedure was used for the FOD*BOSS samples.

- A size-sorted plastic bin of FOD was selected and the entire sample was poured into a Gilson portable mechanical splitter.

- The sample was divided three times using the AASHTO standard method [7].

- The final division was spread onto a grid and photographed.

Using this procedure, a representative subsample of the FOD collected by the FOD*BOSS was produced for each of the 79 sampling campaigns. The subsamples are shown in figures 6 through 8. The weight of the subsample was then used for the detailed comparative analysis.

Figure 6. Subsample of Small FOD Items Collected by the FOD*BOSS

Figure 7. Subsample of Medium FOD Items Collected by the FOD*BOSS

Figure 8. Subsample of Large FOD Items Collected by the FOD*BOSS

For FOD collected by the magnet bar, detailed analysis used the entire sample; no subsampling was performed due to the smaller quantity of items collected. Magnet bar samples were weighed, then spread out on a grid and photographed, as shown in figure 9. For the trash and debris samples, items were reviewed, hazardous items removed, and then all FOD was photographed in aggregate.

Figure 9. Example of FOD Items Collected by the Magnet Bar

CHARACTERIZATION OF HAZARDOUS ITEMS.

Because items that present a hazard to aircraft are particularly problematic, specific effort was made during the FOD analysis to identify hazardous items. Any FOD items with dimensions greater than 1 in. (2.5 cm) were considered hazardous. However, hazards cannot be specifically related to size or material. For example, dense objects of small size can create a hazard, while large items, such as paper or plastic sheets, may not. CEAT developed a characterization of FOD hazards, listed in table 1. Hazardous item characterization was based on reporting by James Stephan of Delta Airlines, informal reporting of FOD hazards from airports, and the experience of CEAT in FOD studies since 2004 [8 through 11]. Using this hazardous FOD item characterization, CEAT separated hazardous FOD items from the samples for further analysis. The large fraction of the FOD*BOSS sample and the magnet bar sample were used to identify hazardous runway FOD. Hazardous items in this study included:

- Any items listed in table 1
- FOD items with long dimension greater than 1 in. (2.5 cm)
- Pieces of pavement with any dimension greater than 1 in. (2.5 cm)
- Paint chips over 1 in. (2.5 cm)
- Broken glass pieces
- Large metal filings and bristles

Table 1. Foreign Object Debris Items of Varying Hazard Levels

FOD Item		Expected Hazard	Frequency of Occurrence
1.	Small piece of concrete	High	Frequent
2.	Standard lug nut from service vehicle	High	Frequent
3.	Roller bearing	High	Frequent
4.	Chunk of rubber	Low	Frequent
5.	Mechanic's wrench	High	Frequent
6.	Fuel cap	High	Frequent
7.	Cotter key	Moderate	Frequent
8.	Plastic bottle/bottle cap	Low	Frequent
9.	Strapping material	Moderate	Frequent
10.	Expansion joint material	Low	Frequent
11.	Construction material (galvanized nails or sheetrock screws)	Moderate	Based on construction activity
12.	Runway infrastructure part (piece of runway light or signage)	High	Infrequent
13.	Small fasteners	Moderate	Frequent
14.	Metal strip	High	Infrequent
15.	Fiberglass door	Moderate	Frequent

ANALYSIS OF HAZARDOUS ITEMS.

For the analysis of hazardous FOD items, large items or items that met hazardous item criteria were separated from the non-hazardous items. The weight and dimensions of each hazardous item was added to the database, and items were classified by size based on their greatest dimension. Some items were weighed in aggregate due to their small size and did not have a length attributed to them. These were classified as Other. Greatest dimensions for each size class are provided in table 2. Figure 10 shows examples of small, medium, and large hazardous items. In addition to size, each item was also characterized based on material type and the possible source was noted. Appendix B provides a table describing all hazardous items by date, runway location, weight, size, and type of material.

Table 2. Size Classes of Hazardous Items

Size Class	Size in Inches
Small	x<1.5
Medium	1.5=<x<3.0
Large	x=>3.0
Other	No length

Note: x denotes an item's largest dimension.

Figure 10. Examples of Small, Medium, and Large Hazardous Items

The methods used to characterize FOD and identify relationships among airport infrastructure and operations to FOD characteristics were descriptive, not statistical. CEAT determined that the sampling program adopted from ORD runway inspections did not meet study design requirements in the areas of sample replication, sampling interval, and overall sample consistency for statistical analysis. CEAT has analyzed the data to characterize and compare results. CEAT was also able to define FOD categories and relate FOD characteristics to potential sources and/or operational conditions.

RESULTS AND DISCUSSION

SAMPLING CAMPAIGNS.

A total of 79 sampling campaigns, i.e., individual FOD inspections, were conducted between July 20, 2011, and May 8, 2013. Sampling campaigns were conducted on runways 4R-22L, 4L-22R, 9R-27L, 9L-27R, 10-28, 14R-32L, and 14L-32R, as shown in figure 11. The sampling was conducted under dry pavement conditions, during daylight hours.

Figure 11. Configuration of Runways During FOD Characterization Sampling Campaigns

All sampling campaigns were based on CDA schedules for runway inspections. Not all CDA runway inspections involved all FOD collection devices or procedures. As a result, some sampling campaigns involved three FOD collection methods (FOD*BOSS mechanical sweeper, magnet truck, and laborers), while others involved one or two of those three collection methods.

- Nineteen sampling campaigns used one FOD collection method.
- Twenty-six sampling campaigns used two FOD collection methods.
- Thirty-four sampling campaigns used three FOD collection methods.

Table 3 shows the total number of times each method was used during the 79 sampling campaigns.

Table 3. Number of Sampling Campaign Uses for Each FOD Collection Method

FOD Collection Method	Total Number of Sampling Campaign Uses
FOD*BOSS	58
Magnet Bar	48
Laborers	64

The number of sampling campaigns conducted on each runway also varied, as shown in table 4.

Table 4. Number of Sampling Campaigns by Runway

Runway	Number of Sampling Campaigns
4R-22L	12
4L-22R	11
9R-27L	12
9L-27R	12
10-28	12
14R-32L	12
14L-32R	8
Total Sampling Campaigns	79

CEAT designated the 34 sampling campaigns where all FOD collection methods were used as complete sampling campaigns, which provided the best basis for sample comparisons. Table 5 lists the complete sampling campaigns by runway and date of campaign.

Table 5. Number of Complete Sampling Campaigns by Runway and Date

Runway	Sampling Campaigns Using All Three Methods	Dates
4R-22L	7	09/22/11 12/22/11 02/23/12 04/10/12 08/23/12 01/09/13 03/27/13
4L-22R	6	11/10/11 12/07/11 01/10/12 02/28/12 04/24/12 07/05/12
9R-27L	5	10/05/11 12/13/11 02/01/12 05/10/12 11/08/12
9L-27R	4	08/18/11 10/12/11 01/18/12 03/07/12
10-28	5	08/04/11 01/04/12 02/15/12 04/05/12 05/15/12
14R-32L	4	02/09/12 05/24/12 12/19/12 02/14/13
14L-32R	3	09/29/11 01/24/12 03/13/12

Not all CDA runway inspections were supported by CEAT. The availability of CEAT staff, CDA staff, and CDA equipment produced a data record that had inconsistent sampling method usage. Thus, there were variations in the FOD collection methods used and variable time intervals between sampling campaigns. Table 6 provides a list of the days between sampling

campaigns for each runway. Asterisks mark complete sampling campaigns where all three methods (FOD*BOSS, magnet bar, and laborers used) are utilized.

Table 6. Time Between Sampling Campaigns for Each Runway

Runway	Date	Number of Days Between Sampling Campaigns		Runway	Date	Number of Days Between Sampling Campaigns
4R-22L	07/20/11	–		9R-27L	09/01/11	–
	09/22/11*	64			10/05/11*	34
	12/22/11*	91			12/13/11*	69
	02/23/12*	63			02/01/12*	50
	04/10/12*	47			03/21/12	49
	05/30/12	50			05/10/12*	50
	06/14/12	15			08/07/12	89
	07/17/12	33			09/12/12	36
	08/23/12*	37			11/08/12*	57
	10/16/12	54			04/03/13	146
	01/09/13*	85			04/30/13	27
	03/27/13*	77				
4L-22R	08/11/11	–		9L-27R	08/18/11*	–
	11/10/11*	91			10/12/11*	55
	12/07/11*	27			11/22/11	41
	01/10/12*	34			01/18/12*	57
	02/28/12*	49			03/07/12*	49
	04/24/12*	56			04/19/12	43
	06/27/12	64			06/07/12	49
	07/05/12*	8			10/11/12	126
	09/06/12	63			11/13/12	33
	09/26/12	20			01/31/13	79
	01/23/13	119			03/21/13	49
					05/08/13	48

*Complete sampling campaigns, i.e., means all three methods were utilized.

Table 6. Time Between Sampling Campaigns for Each Runway (Continued)

Runway	Date	Number of Days Between Sampling Campaigns
10-28	08/04/11*	–
	09/14/11	41
	11/01/11	48
	01/04/12*	64
	02/15/12*	42
	04/05/12*	50
	05/15/12*	40
	07/11/12	57
	08/30/12	50
	10/04/12	35
	03/07/13	154
	04/16/13	40
14R-32L	11/15/11	–
	12/28/11	43
	02/09/12*	43
	03/29/12	49
	05/24/12*	56
	06/20/12	27
	07/26/12	36
	08/15/12	20
	11/01/12	78
	12/19/12*	48
	02/14/13*	57
	04/09/13	54
14L-32R	08/25/11	–
	09/29/11*	35
	12/01/11	63
	01/24/12*	54
	03/13/12*	49
	05/03/12	51
	12/05/12	216
	04/24/13	140

*Complete sampling campaigns, i.e., means all three methods were utilized.

The FOD*BOSS and magnet bar are devices used specifically for runway collection, and they are the focus of runway FOD analyses. Table 7 lists the number of times each device was used and the number of times both were used simultaneously.

Table 7. Number of Sampling Campaigns Using FOD*BOSS and/or Magnet Bar

Runway	Number of Sampling Campaigns Using FOD*BOSS	Number of Sampling Campaigns Using Magnet Bar	Number of Sampling Campaigns Using FOD*BOSS and Magnet Bar
4R-22L	12	9	9
4L-22R	9	7	7
9R-27L	7	7	6
9L-27R	8	5	5
10-28	7	8	6
14R-32L	7	6	4
14L-32R	7	8	5

WEIGHT OF FOD SAMPLES.

A general summary of the weight of FOD items collected during this study is provided in table 8. These results include all FOD collected on runways and in grassed areas for each sampling campaign. Asterisks indicate complete sampling campaigns. Although FOD from grassed areas often produced the most FOD by weight, the focus of further analysis is on runway samples, which present the greatest direct hazard to aircraft safety.

Table 8. All FOD Material by Weight (lb) and Collection Method for all Sampling Campaigns

Date	FOD*BOSS Small	FOD*BOSS Medium	FOD*BOSS Large	Magnet Bar	Laborers
07/20/11	4.88	1.49	0.48	0.11	–
08/04/11*	2.93	0.98	1.53	0.15	52.68
08/11/11	12.81	3.06	5.93	0.12	–
08/18/11*	5.23	5.46	3.03	0.45	1.01
08/25/11	13.40	9.52	3.41	2.02	–
09/01/11	9.69	6.57	5.22	0.85	–
09/14/11	–	–	–	0.04	10.18
09/22/11*	6.05	3.27	1.12	0.04	6.66
09/29/11*	6.50	11.87	27.45	0.08	11.68
10/05/11*	3.11	4.66	2.42	0.35	1.50
10/12/11	11.34	4.14	3.24	0.34	0.60
11/01/11	3.97	3.18	2.57	–	–
11/10/11*	5.67	6.20	6.03	0.43	1.01
11/15/11	3.56	6.28	1.76	–	1.95
11/22/11	–	–	–	–	0.20
12/01/11	3.61	2.89	0.98	–	3.88
12/07/11*	10.86	5.26	2.67	0.60	3.51

*Complete sampling campaigns

Table 8. All FOD Material by Weight (lb) and Collection Method for all Sampling Campaigns (Continued)

Date	FOD*BOSS Small	FOD*BOSS Medium	FOD*BOSS Large	Magnet Bar	Laborers
12/13/11*	6.41	4.91	1.12	0.45	16.67
12/22/11*	4.92	3.01	2.84	0.82	2.45
12/28/11	–	–	–	0.20	5.49
01/04/12*	1.60	5.36	6.00	0.19	1.47
01/10/12*	4.48	8.23	1.11	0.58	0.65
01/18/12*	1.28	0.94	2.19	0.36	–
01/24/12*	7.63	6.25	0.97	0.91	3.31
02/01/12*	12.30	7.51	2.93	1.86	10.97
02/09/12*	6.68	9.84	2.84	1.75	1.05
02/15/12*	4.79	1.50	1.36	0.11	8.05
02/23/12*	5.25	2.60	1.44	2.48	3.74
02/28/12*	11.74	9.72	2.88	1.89	8.73
03/07/12*	1.76	1.88	1.82	0.68	3.48
03/13/12*	4.63	3.06	1.58	1.15	0.72
03/21/12	–	–	–	2.89	7.97
03/29/12	–	–	–	0.18	5.37
04/05/12*	5.59	4.68	2.93	0.26	–
04/10/12*	4.12	4.12	1.34	0.26	–
04/19/12	2.91	3.23	2.78	0.61	–
04/24/12*	1.66	3.16	1.16	0.12	–
05/03/12	10.63	7.72	3.96	–	5.11
05/10/12*	7.22	6.17	2.78	0.29	3.94
05/15/12*	2.80	2.71	2.60	0.14	11.48
05/24/12*	2.25	4.83	1.33	0.09	6.86
05/30/12	3.99	5.03	2.00	0.02	–
06/07/12	2.31	1.32	1.16	–	0.12
06/14/12	5.48	3.05	1.57	–	16.46
06/20/12	–	–	–	–	2.31
06/27/12	0.62	0.99	0.57	–	7.20
07/05/12*	3.34	4.15	2.13	0.07	2.21
07/11/12	–	–	–	–	3.33
07/17/12	6.58	6.75	2.76	–	–
07/26/12	–	–	–	–	4.36
08/07/12	5.73	5.71	2.40	–	1.10
08/15/12	0.96	0.57	0.31	–	0.49
08/23/12*	27.59	13.11	3.01	0.05	3.47
08/30/12	–	–	–	0.04	8.73
09/06/12	–	–	–	–	1.29

*Complete sampling campaigns

Table 8. All FOD Material by Weight (lb) and Collection Method for all Sampling Campaigns (Continued)

Date	FOD*BOSS Small	FOD*BOSS Medium	FOD*BOSS Large	Magnet Bar	Laborers
09/12/12	–	–	–	–	3.07
09/26/12	1.72	1.92	1.34	–	3.08
10/04/12	8.80	3.13	2.99	–	3.94
10/11/12	1.06	0.75	0.96	–	1.25
10/16/12	1.61	2.70	0.45	–	0.33
11/01/12	2.60	3.65	4.29	–	6.18
11/08/12*	12.57	13.09	5.23	0.43	8.94
11/13/12	0.90	0.73	0.50	–	0.11
12/05/12	2.76	3.01	1.16	–	0.33
12/19/12*	7.31	8.65	2.39	0.19	0.65
01/09/13*	4.45	4.80	1.46	0.03	0.28
01/23/13	–	–	–	–	3.05
01/31/13	–	–	–	–	–
02/14/13*	19.67	20.32	7.90	3.78	1.27
03/07/13	–	–	–	2.94	–
03/21/13	–	–	–	–	–
03/27/13*	15.32	15.76	4.03	1.17	4.08
04/03/13	–	–	–	–	–
04/09/13	–	–	–	–	1.98
04/16/13	–	–	–	–	30.92
04/24/13	–	–	–	–	5.74
04/30/13	–	–	–	–	7.69
05/08/13	–	–	–	–	1.88

*Complete sampling campaigns

THE FOD COLLECTED ON EACH RUNWAY.

FOD was collected on runways 4R-22L, 4L-22R, 9R-27L, 9L-27R, 10-28, 14R-32L, and 14L-32R at ORD using the FOD*BOSS, the magnet bar, and manually along the grassed areas outside each runway by ORD personnel. Tables 9 through 15 and figures 12 through 18 provide summaries for each runway. Tables provide data on the weight of FOD listed by collection method. Figures 12 through 18 show data only for the FOD*BOSS and the magnet bar. Where no weight is listed, the collection device was not used. The weight of grass clippings is provided when available. Grass presence in FOD samples was inconsistent and often seasonal, but it contributed weight to FOD samples.

RUNWAY 4R-22L. Table 9 and figure 12 show that the weights of small- and medium-sized FOD items increased in August 2012 and March 2013 for Runway 4R-22L. The August 2012 collection of over 27 lb was the heaviest weight recorded of any size class in all sampling campaigns. The weight of metal collected was variable over time with the heaviest weight

recorded during the winter months, i.e., December, February and March, in this case. The weight of FOD collected by laborers was greatest in June 2012; however, this could reflect accumulation over time because no collections were performed in April and May. Grass clippings were most common during summer months.

Table 9. All FOD Material by Weight (lb) and Collection Method for Runway 4R-22L Sampling Campaigns

Date	FOD*BOSS Small	FOD*BOSS Medium	FOD*BOSS Large	Magnet Bar	Laborers	Grass Clippings
07/20/11	4.88	1.49	0.48	0.11	–	–
09/22/11*	6.05	3.27	1.12	0.04	6.66	–
12/22/11*	4.92	3.01	2.84	0.82	2.45	–
02/23/12*	5.25	2.60	1.44	2.48	3.74	–
04/10/12*	4.12	4.12	1.34	0.26	–	–
05/30/12	3.99	5.03	2.00	0.02	–	0.05
06/14/12	5.48	3.05	1.57	–	16.46	0.19
07/17/12	6.58	6.75	2.76	–	–	0.09
08/23/12*	27.59	13.11	3.01	0.05	3.47	0.05
10/16/12	1.61	2.70	0.45	–	0.33	–
01/09/13*	4.45	4.80	1.46	0.03	0.28	–
03/27/13*	15.32	15.76	4.03	1.17	4.08	–

*Complete sampling campaigns

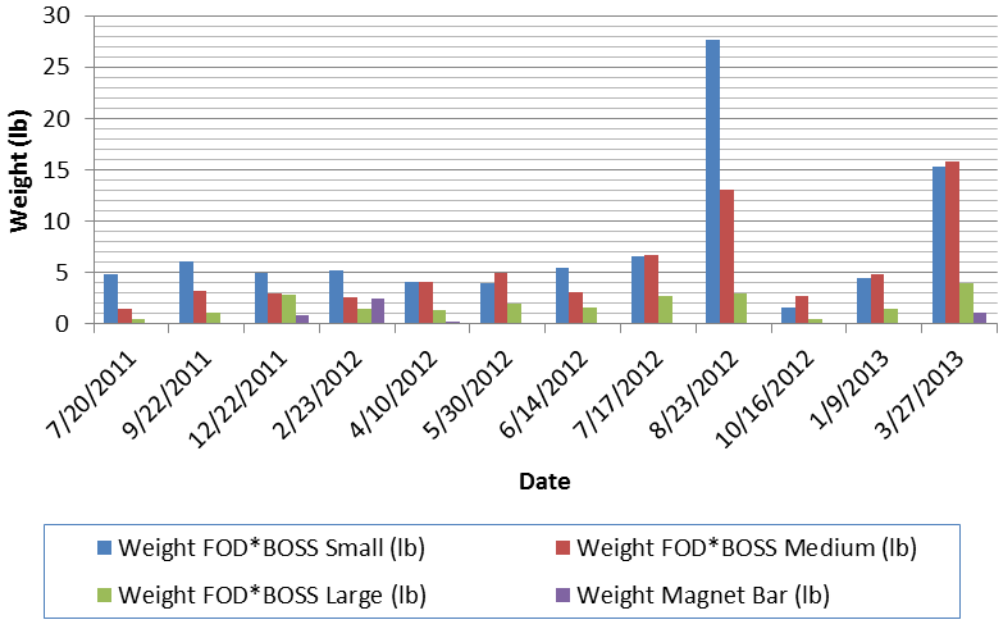


Figure 12. Comparison of FOD Collection Methods by Weight and Date for Runway 4R-22L

RUNWAY 4L-22R. The results for sampling campaigns for Runway 4L-22R showed generally greater FOD weights earlier in the study, with lower FOD weights later. Small items were predominant through February 2012, and medium items were predominant in later collections. Metal presence was more common during winter months, i.e., November 2011 through February 2012. As shown in table 10 and figure 13, the heaviest weight for FOD material collected manually by personnel was recorded in February 2012 and June 2012.

Table 10. All FOD Material by Weight (lb) and Collection Method for Runway 4L-22R Sampling Campaigns

Date	FOD*BOSS Small	FOD*BOSS Medium	FOD*BOSS Large	Magnet Bar	Laborers	Grass Clippings
08/11/11	12.81	3.06	5.93	0.12	–	1.77
11/10/11*	5.67	6.20	6.03	0.43	1.01	–
12/07/11*	10.86	5.26	2.67	0.60	3.51	–
01/10/12*	4.48	8.23	1.11	0.58	0.65	–
02/28/12*	11.74	9.72	2.88	1.89	8.73	–
04/24/12*	1.66	3.16	1.16	0.12	0.00	–
06/27/12	0.62	0.99	0.57	–	7.20	0.02
07/05/12*	3.34	4.15	2.13	0.07	2.21	0.05
09/06/12	–	–	–	–	1.29	0.64
09/26/12	1.72	1.92	1.34	–	3.08	0.01
01/23/13	–	–	–	–	3.05	–

*Complete sampling campaigns

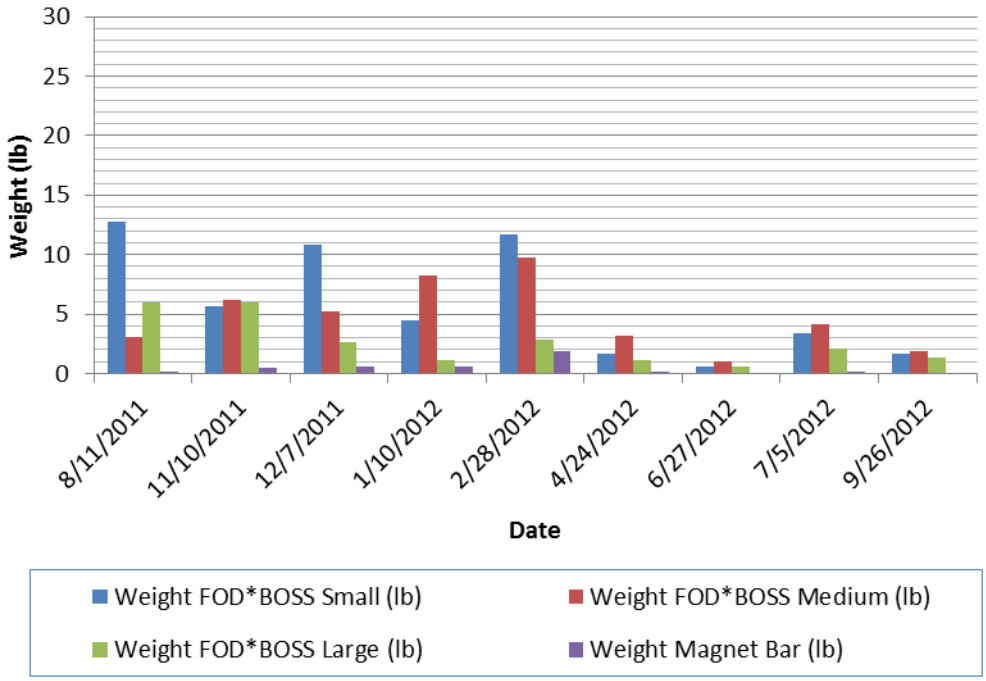


Figure 13. Comparison of FOD Collection Methods by Weight and Date for Runway 4L-22R

RUNWAY 9R-27L. As shown in table 11 and figure 14, sampling campaigns on Runway 9R-27L small-sized FOD*BOSS items had significant weight in September 2011, February 2012, and November 2012. Metal was present in small items, in all samples collected by the magnet bar except for August 2012, with heaviest weights occurring in February 2012 and March 2012. The heaviest sample of FOD was collected in November 2012, with both small- and medium-sized FOD weighing a combined 25 lb. Laborers collected the most FOD in December 2011 (16.67 lb) and February 2012 (10.97 lb). In other sampling campaigns, laborers collected between 1 lb and 9 lb of FOD.

Table 11. All FOD Material by Weight (lb) and Collection Method for Runway 9R-27L Sampling Campaigns

Date	FOD*BOSS Small	FOD*BOSS Medium	FOD*BOSS Large	Magnet Bar	Laborers	Grass Clippings
09/01/11	9.69	6.57	5.22	0.85	–	0.91
10/05/11*	3.11	4.66	2.42	0.35	1.50	0.06
12/13/11*	6.41	4.91	1.12	0.45	16.67	–
02/01/12*	12.30	7.51	2.93	1.86	10.97	–
03/21/12	–	–	–	2.89	7.97	–
05/10/12*	7.22	6.17	2.78	0.29	3.94	0.31
08/07/12	5.73	5.71	2.40	–	1.10	0.66
09/12/12	–	–	–	–	3.07	–
11/08/12	12.57	13.09	5.23	0.43	8.94	–
04/03/13	–	–	–	–	–	–
04/30/13	–	–	–	–	7.69	–

*Complete sampling campaigns

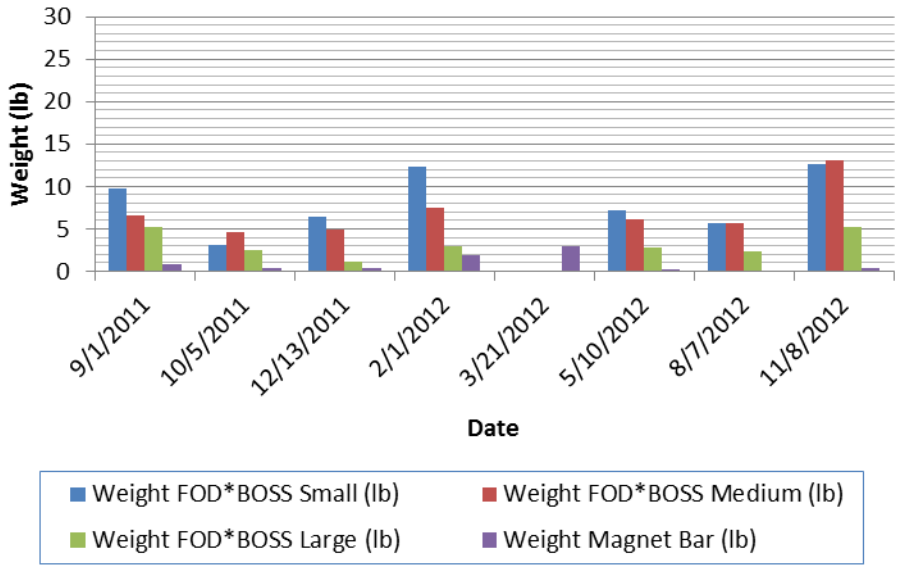


Figure 14. Comparison of FOD Collection Methods by Weight and Date for Runway 9R-27L

RUNWAY 9L-27R. As shown in table 12 and figure 15, sampling campaigns from Runway 9L-27R produced more total FOD early in the study, with 13.72 lb. and 18.72 lb. for August 2011 and October 2011. The weights of FOD in other months ranged from 2 lb. to 9 lb. The magnet bar was not used in the June 2012, October 2012, and November 2012 sampling campaigns. The heaviest weight sample collected by laborers for this runway was recorded in March 2012, when 3.47 lb. were collected. Other samples collected by laborers generally weighed less than 2 lb.

Table 12. All FOD Material by Weight (lb) and Collection Method for Runway 9L-27R Sampling Campaigns

Date	FOD*BOSS Small	FOD*BOSS Medium	FOD*BOSS Large	Magnet Bar	Laborers	Grass Clippings
08/18/11*	5.23	5.46	3.03	0.45	1.01	–
10/12/11*	11.34	4.14	3.24	0.34	0.60	0.01
11/22/11	–	–	–	–	0.20	–
01/18/12*	1.28	0.94	2.19	0.36	–	–
03/07/12*	1.76	1.88	1.82	0.68	3.48	–
04/19/12	2.91	3.23	2.78	0.61	–	1.69
06/07/12	2.31	1.32	1.16	–	0.12	–
10/11/12	1.06	0.75	0.96	–	1.25	0.02
11/13/12	0.90	0.73	0.50	–	0.11	–
01/31/13	–	–	–	–	–	–
03/21/13	–	–	–	–	–	–
05/08/13	–	–	–	–	1.88	–

*Complete sampling campaigns

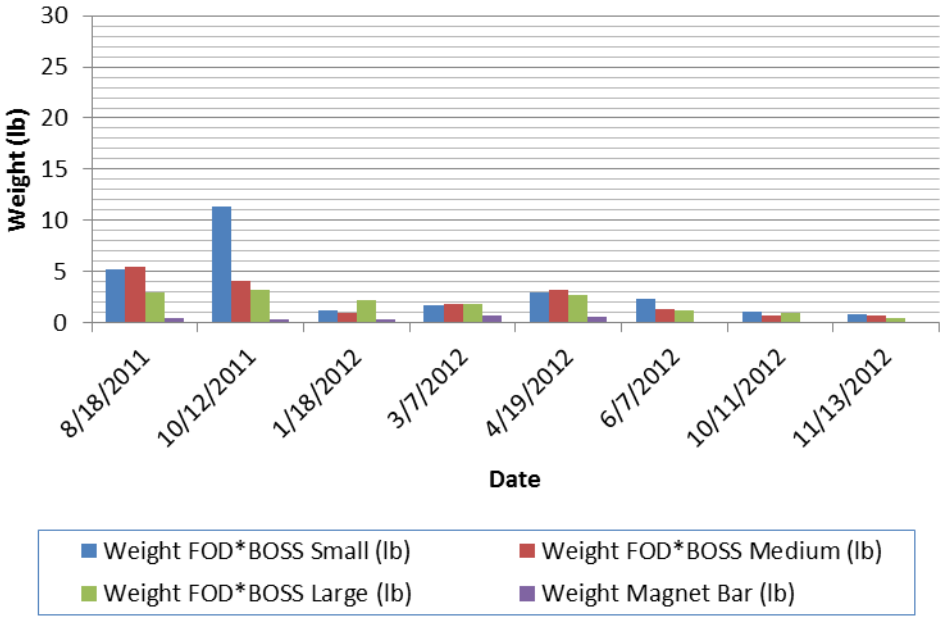


Figure 15. Comparison of FOD Collection Methods by Weight and Date for Runway 9L-27R

RUNWAY 10-28. As shown in table 13 and figure 16, FOD samples from Runway 10-28 produced total weights, by size class, of 6 lb or less. The heaviest weight collected was 8.80 lb for small items in October 2012. The lightest weights for metal FOD collected by the magnet bar were recorded in September 2011 and August 2012; the heaviest weight of metal collected (2.94 lb) was recorded in March 2013. The heaviest sample that laborers collected weighed 52.68 lb, recorded in August 2011, and a 30.92-lb sample collected by the laborers was recorded in March 2013. Other laborer-collected samples ranged from 3 to 11 lb.

Table 13. All FOD Material by Weight (lb) and Collection Method for Runway 10-28 Sampling Campaigns

Date	FOD*BOSS Small	FOD*BOSS Medium	FOD*BOSS Large	Magnet Bar	Laborers	Grass Clippings
08/04/11*	2.93	0.98	1.53	0.15	52.68	0.11
09/14/11	–	–	–	0.04	10.18	–
11/01/11	3.97	3.18	2.57	–	–	–
01/04/12*	1.60	5.36	6.00	0.19	1.47	–
02/15/12*	4.79	1.50	1.36	0.11	8.05	–
04/05/12*	5.59	4.68	2.93	0.26	0.00	–
05/15/12*	2.80	2.71	2.60	0.14	11.48	–
07/11/12	–	–	–	–	3.33	–
08/30/12	–	–	–	0.04	8.73	–
10/04/12	8.80	3.13	2.99	–	3.94	–
03/07/13	–	–	–	2.94	–	–
04/16/13	–	–	–	–	30.92	–

*Complete sampling campaigns

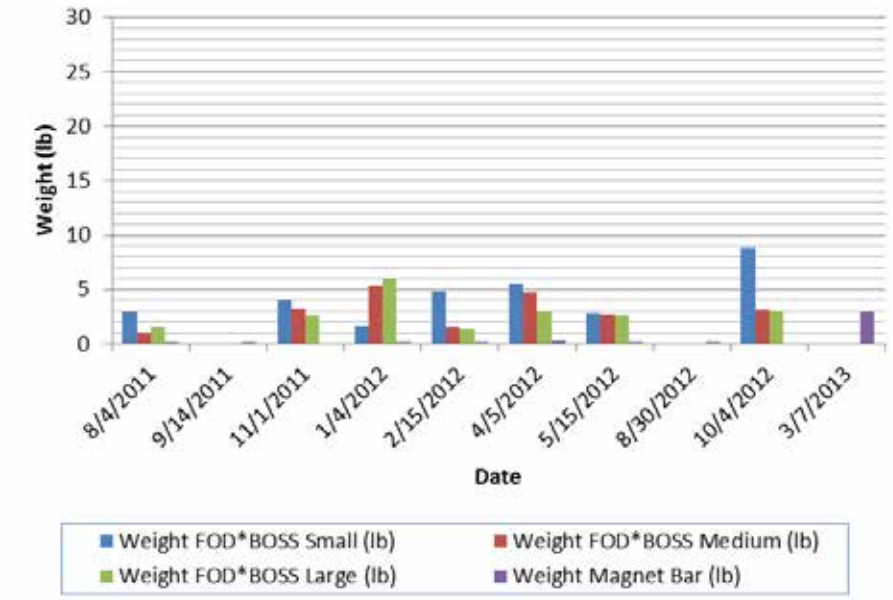


Figure 16. Comparison of FOD Collection Methods by Weight and Date for Runway 10-28

RUNWAY 14R-32L. As shown in table 14 and figure 17, FOD samples from Runway 14R-32L were variable, with the heaviest FOD*BOSS weight collected in February 2013, when the small items recorded weighed 19.67 lb, medium items weighed 20.32 lb, and large items weighed 7.90 lb. However, because the FOD*BOSS was not emptied before the runway inspection, FOD from other areas of the airport were likely included, making this sample an outlier. Total FOD weight collected by the FOD*BOSS ranged from 1.81 lb in August 2012 to 19.36 lb in February 2012. In February 2012, the magnet bar collected metal samples weighing 1.75 lb but a year later, in February 2013, 3.78 lb were collected. Samples collected by laborers on all dates consisted of variable weights of less than 7 lb.

Table 14. All FOD Material by Weight (lb) and Collection Method for Runway 14R-32L Sampling Campaigns

Date	FOD*BOSS Small	FOD*BOSS Medium	FOD*BOSS Large	Magnet Bar	Laborers	Grass Clippings
11/15/11	3.56	6.28	1.76	–	1.95	–
12/28/11	–	–	–	0.20	5.49	–
02/09/12*	6.68	9.84	2.84	1.75	1.05	–
03/29/12	–	–	–	0.18	5.37	–
05/24/12*	2.25	4.83	1.33	0.09	6.86	–
06/20/12	–	–	–	–	2.31	0.63
07/26/12	–	–	–	–	4.36	–
08/15/12	0.96	0.57	0.31	–	0.49	0.33
11/01/12	2.60	3.65	4.29	–	6.18	–
12/19/12*	7.31	8.65	2.39	0.19	0.65	–
02/14/13*	19.67	20.32	7.90	3.78	1.27	–
04/09/13	–	–	–	–	1.98	–

*Complete sampling campaigns

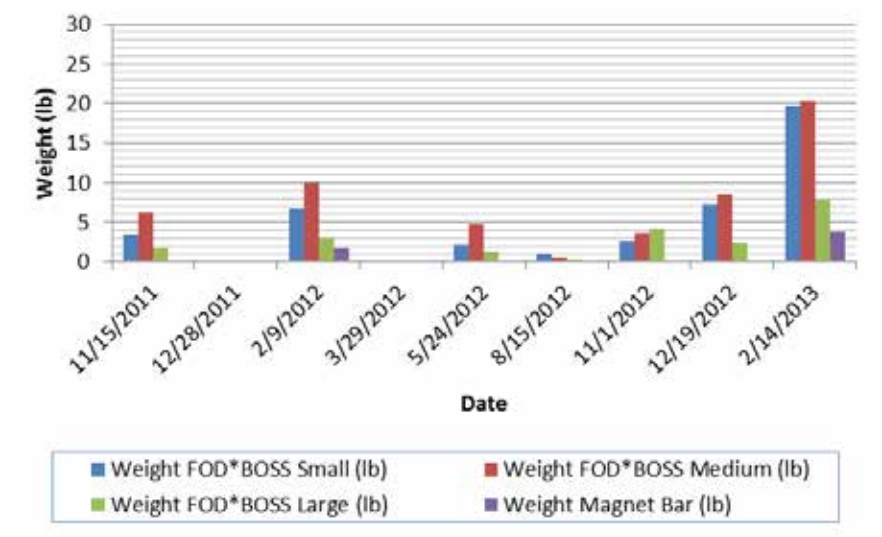


Figure 17. Comparison of FOD Collection Methods by Weight and Date for Runway 14R-32L

RUNWAY 14L-32R. As shown in table 15 and figure 18, the FOD samples from Runway 14L-32R for September 2011 contained 11.87 lb of medium-sized FOD and 27.45 lb of large-sized FOD. Metals present in magnet bar samples weighed less than 2 lb. Samples collected by laborers weighed from less than 1 lb to nearly 12 lb.

Table 15. All FOD Material by Weight (lb) and Collection Method for Runway 14L-32R Sampling Campaigns

Date	FOD*BOSS Small	FOD*BOSS Medium	FOD*BOSS Large	Magnet Bar	Laborers	Grass Clippings
08/25/11	13.40	9.52	3.41	2.02	–	–
09/29/11*	6.50	11.87	27.45	0.08	11.68	–
12/01/11	3.61	2.89	0.98	–	3.88	–
01/24/12*	7.63	6.25	0.97	0.91	3.31	–
03/13/12*	4.63	3.06	1.58	1.15	0.72	–
05/03/12	10.63	7.72	3.96	–	5.11	0.62
12/05/12	2.76	3.01	1.16	–	0.33	–
04/24/13	–	–	–	–	5.74	–

*Complete sampling campaigns

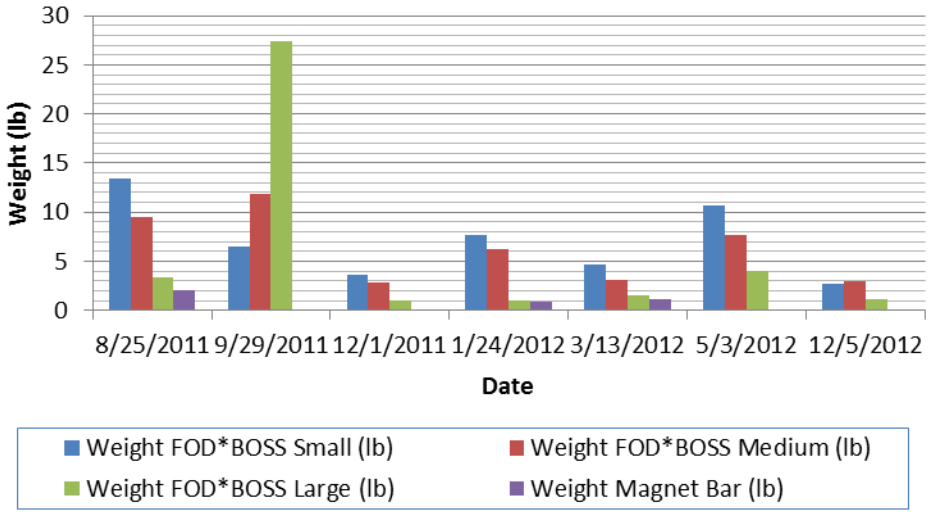


Figure 18. Comparison of FOD Collection Methods by Weight and Date for Runway 14L-32R

SUMMARY.

Figure 19 shows the average weight of FOD collected for each runway by collection method. The weight of the FOD*BOSS FOD samples was heavier for Runways 14R-32L, 9R-27L, and 14L-32R, averaging between 16 lb and 19 lb. of FOD. Magnet bar FOD samples averaged a pound or less, and laborer-collected FOD samples averages ranged from 1 lb to 6 lb. Note that

the average weight was determined by the sum of the collected FOD weight divided by the number of times the equipment was present.

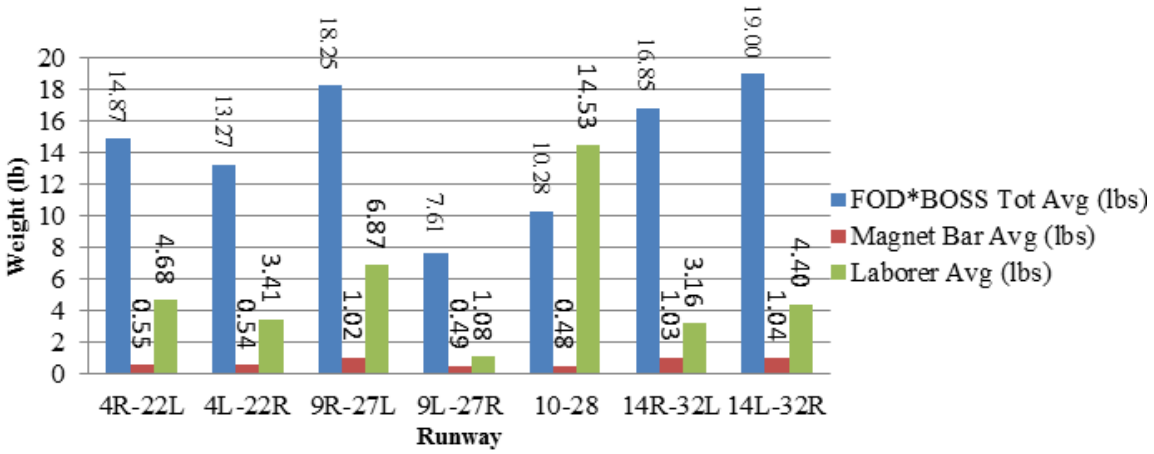


Figure 19. Average Weight by Runway of FOD Collected Using the FOD*BOSS, Magnet Bar, and Laborers

In summary, FOD was collected during all sampling campaigns using different methods that produced different types of samples. The FOD*BOSS samples were separated into size classes, with small-sized FOD items generally predominant although in some cases, medium- (February 2013) and large-sized (September 2011) FOD items were predominant. FOD sampling suggested no specific trends in FOD type; however, magnet bar samples, which on average were reasonably consistent for all runways, often contained metal brush pieces and recorded heavier weights in winter samples. Also, FOD sampling found less FOD weight on Runway 9L-27R.

ANALYSIS OF FOD ACCUMULATION ON RUNWAYS OVER TIME.

The runway sampling campaigns over time provided the opportunity to address several time-related questions, including how much FOD is generated over time. There appeared to be two main sources of FOD on runways:

- FOD generated by the runway, such as paint and pavement materials

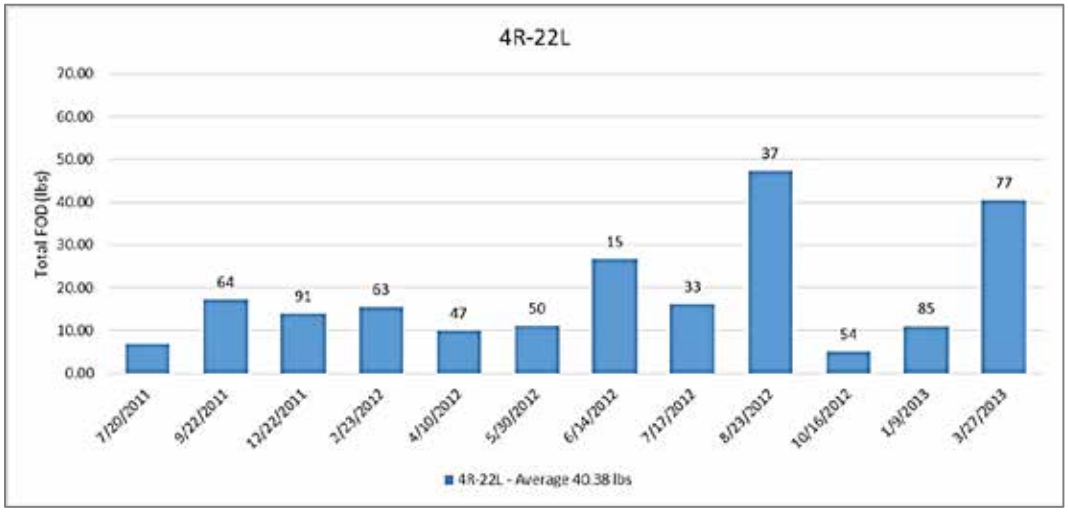
- FOD carried to the runway from a wide range of sources, including aircraft and vehicles, construction activity, or wind-blown materials

Long-term sampling on the same runways during this study provided an opportunity to evaluate if there were any consistent trends in the accumulation of FOD over time. Although it was not possible to schedule runway inspections to produce specific sampling intervals, the campaigns did provide repeat sampling over varying time intervals. One runway (4L-22R) was sampled with only eight days between inspections. Fifteen inspections involved runways where there were approximately 30 days between inspections. In two instances, inspections were performed on only one runway for three consecutive months. These campaign intervals were used to

analyze FOD generation over time. This analysis recognizes that there was no control over operations and, considering previous analyses of FOD by runway, FOD weights varied over time. Figures 20 through 26 illustrate the increase or decrease in total FOD weights for each runway in the sequential sampling; the number of days between samples is provided at the top of the bar for each date. As expected, the increase in days between samples produced larger sample weights of FOD.

In summary, sampling campaigns occurred at intervals of as little as 15 days and as many as 216 days. Because CEAT did not participate in all sampling campaigns, the most reliable samples for assessment of FOD accumulation were those samples in which sequential monthly samples were available, in particular, those runways that had a sequence of three monthly samples.

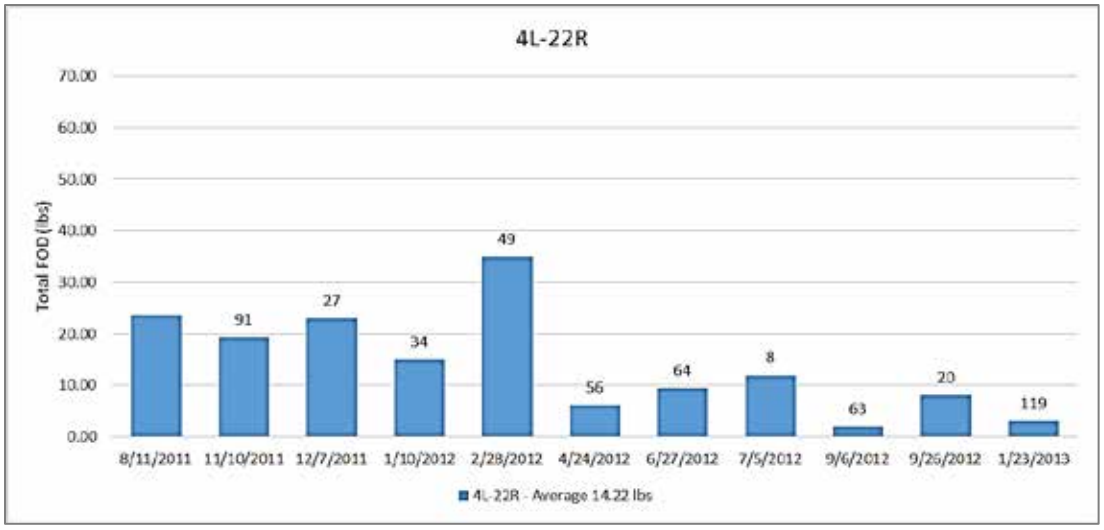
RUNWAY 4R-22L. For Runway 4R-22L, the shortest interval between sampling campaigns was 15 days, with the two following samples collected at 33 and 37 days after the previous sample, as shown in figure 20. The largest interval was 91 days. In June 2012, the FOD weight increased from the previous collection done only 15 days before. The two samples after June 2012 showed a drop in FOD weight for July 2012 from the previous sample 33 days before, and a large increase for August 2012 from the sample 37 days earlier. In addition, FOD weight measurements were much lower in October 2012, but showed a slight increase in January 2013 and an increase in March 2013 that showed weight measurements close to those in August 2012.



Note: The number on the top of each bar in the chart is the number of days between sampling campaigns.

Figure 20. Accumulation of FOD Over Time on Runway 4R-22L

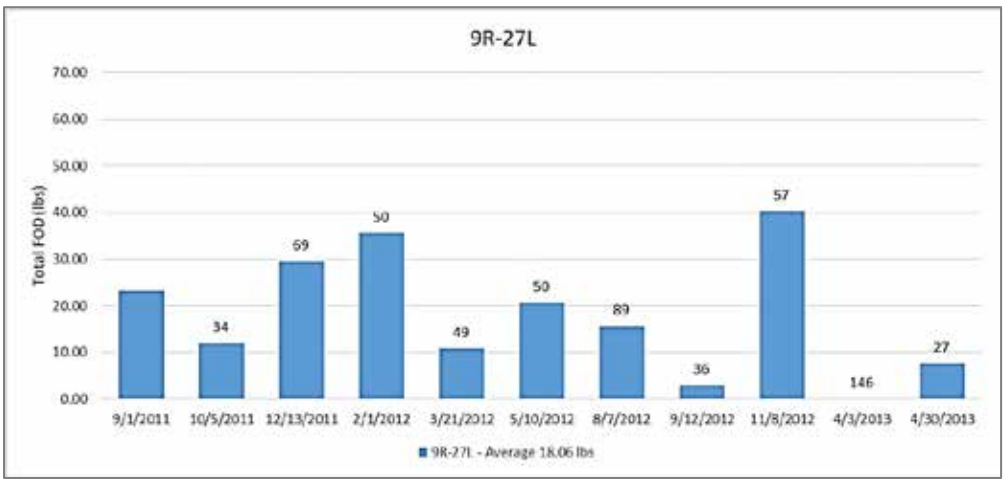
RUNWAY 4L-22R. As shown in figure 21, sampling campaigns on Runway 4L-22R included a three-month sequence with samples in November 2011, December 2011, and January 2012, at intervals of 27 and 34 days for the December and January sample campaigns. FOD weight measurements were approximately 10 lb per sample for April 2012 through January 2013, which were much less than earlier samples with FOD weighing in the 20-lb range.



Note: The number on the top of each bar in the chart is the number of days between sampling campaigns.

Figure 21. Accumulation of FOD Over Time on Runway 4L-22R

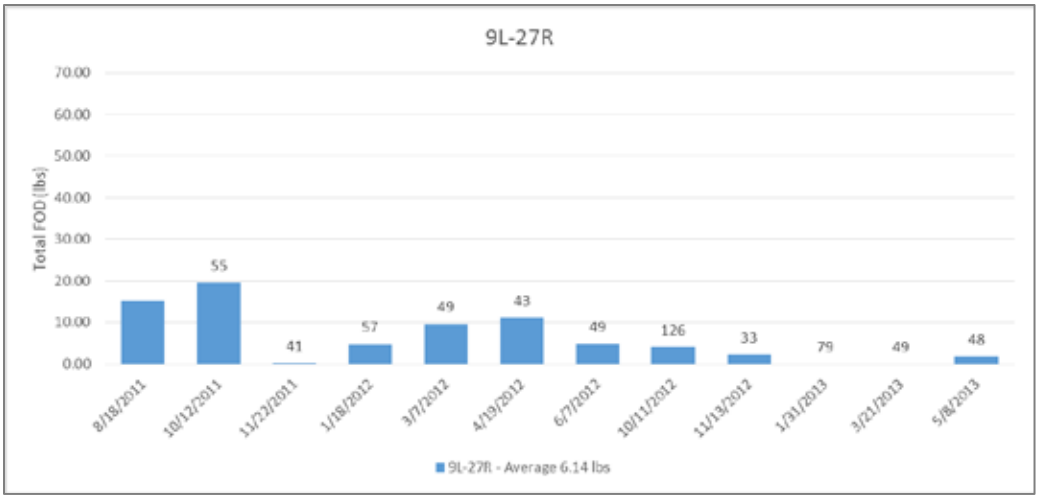
RUNWAY 9R-27L. For Runway 9R-27L, the shortest interval between sampling campaigns was 27 days, and the largest interval was 89 days, as shown in figure 22.



Note: The number on the top of each bar in the chart is the number of days between sampling campaigns.

Figure 22. Accumulation of FOD Over Time on Runway 9R-27L

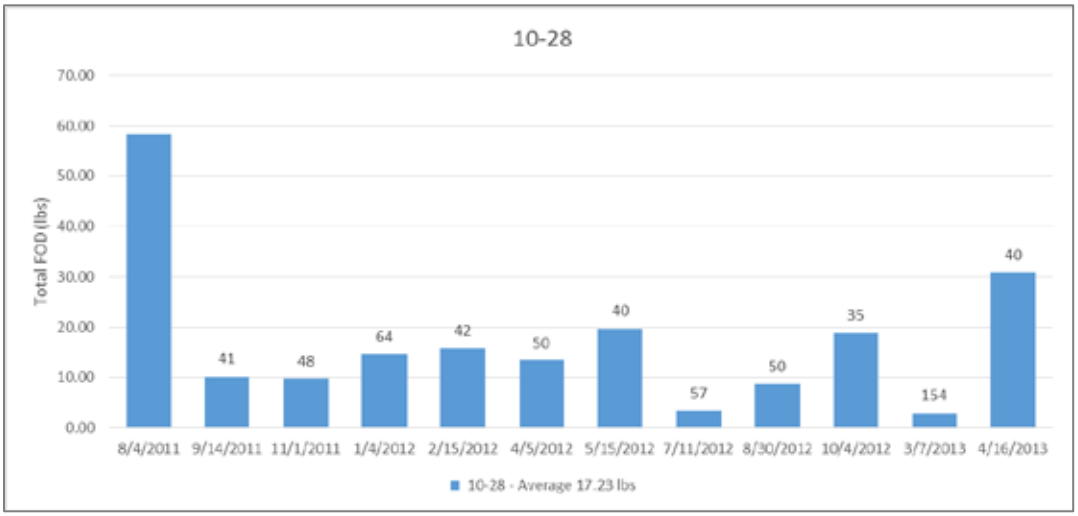
RUNWAY 9L-27R. For Runway 9L-27R, the shortest interval between sampling campaigns was 33 days, and the largest interval was 126 days, as shown in figure 23. The sampling campaign in November 2012 was the only campaign for Runway 9L-27R that occurred within approximately one month of the previous campaign. All other campaigns on this runway had intervals longer than 40 days.



Note: The number on the top of each bar in the chart is the number of days between sampling campaigns.

Figure 23. Accumulation of FOD Over Time on Runway 9L-27R

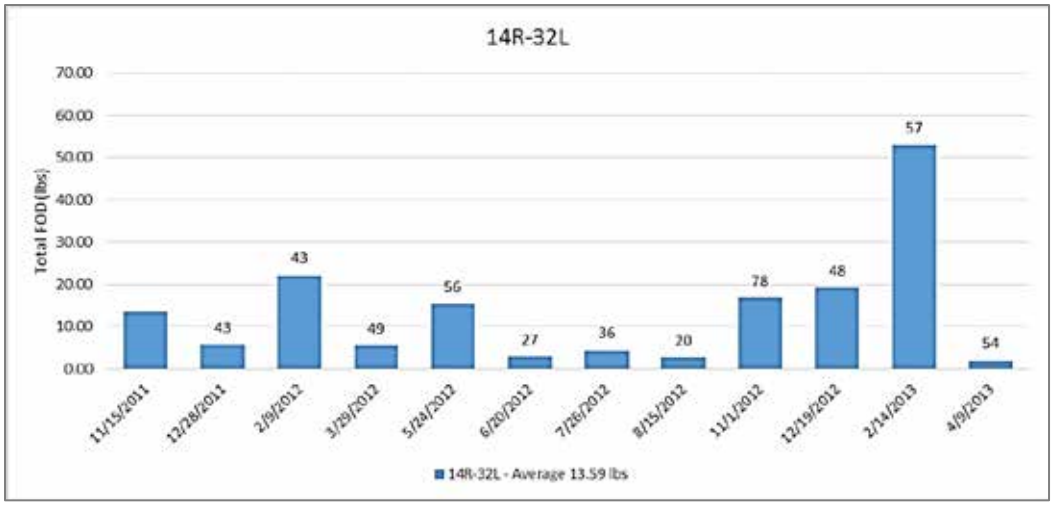
RUNWAY 10-28. The FOD sampling campaigns for Runway 10-28 had variable and generally long intervals between campaigns. The shortest interval between sampling campaigns was 35 days, and the largest interval was 154 days, as shown in figure 24.



Note: The number on the top of each bar in the chart is the number of days between sampling campaigns.

Figure 24. Accumulation of FOD Over Time on Runway 10-28

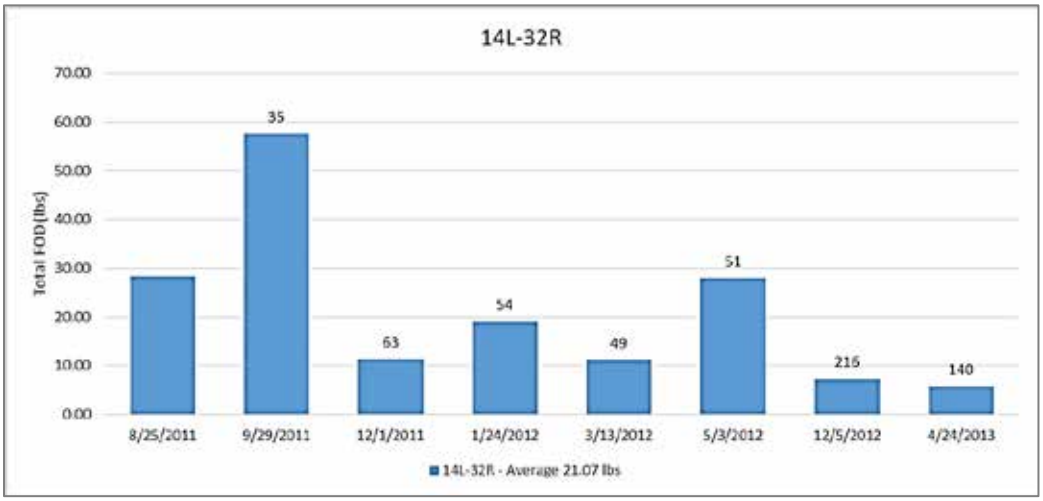
RUNWAY 14R-32L. The sampling campaign sequence for Runway 14R-32L occurred approximately in monthly intervals—June 2012, July 2012, and August 2012—with little change in FOD weight for the three sampling campaigns, as shown in figure 25. There was no clear trend in FOD accumulation for Runway 14R-32L. The shortest interval between sampling campaigns was 20 days, and the largest interval was 78 days.



Note: The number on the top of each bar in the chart is the number of days between sampling campaigns.

Figure 25. Accumulation of FOD Over Time on Runway 14R-32L

RUNWAY 14L-32R. For Runway 14L-32R, the shortest interval between sampling campaigns was 35 days, and the largest interval was 216 days, as shown in figure 26. There was one sampling campaign, September 2011, for Runway 14L-32R within approximately one month of the previous campaign, August 2011. The samples from the September 2011 campaign showed an increase of nearly double the weight of the previous sample. Other campaigns with intervals of 216 and 140 days showed little change in FOD weight.



Note: The number on the top of each bar in the chart is the number of days between sampling campaigns.

Figure 26. Accumulation of FOD Over Time on Runway 14L-32R

ANALYSIS BY MONTH.

To assess the possible differences in FOD weight collected related to seasonal conditions or general operational activities at ORD, the FOD sampling data was compiled by month for each

runway, table 16 and figure 27. Table 16 provides a summary of the number of sampling campaigns for each month during the study and the average weight of FOD by sampling device or method for that month. The averages ranged from 1.66 lb to 47.88 lb for the FOD*BOSS, 0.02 lb to 3.78 lb for the magnet bar, and 0.49 lb to 13.42 lb for laborers. Appendix A details FOD items by date count as well as minimum, average, and maximum weights and standard deviations.

Table 16. Average Weight by Month of FOD Collected Using the FOD*BOSS, Magnet Bar, and Laborers

Month	Number of Sampling Campaigns per Month by Sampling Method			Average of Total Weight per Sampling Method (lb)		
	FOD*BOSS	Magnet Bar	Laborers	FOD*BOSS	Magnet Bar	Laborers
2011						
July	1	1	1	6.85	0.11	–
August	4	4	4	16.82	0.69	13.42
September	4	4	4	19.44	0.25	7.13
October	2	2	2	14.45	0.35	1.05
November	4	4	4	9.80	0.11	0.79
December	5	5	5	9.90	0.41	6.40
2012						
January	4	4	4	11.51	0.51	1.36
February	5	5	5	16.67	1.62	6.51
March	4	4	4	3.68	1.23	4.39
April	5	5	5	11.05	0.51	–
May	5	5	5	13.20	0.11	5.48
June	4	4	4	4.27	–	6.52
July	4	4	4	6.43	0.02	2.47
August	4	4	4	14.85	0.02	3.45
September	3	3	3	1.66	–	2.48
October	3	3	3	7.48	–	1.84
November	3	3	3	14.52	0.14	5.08
December	2	2	2	12.64	0.10	0.49
2013						
January	3	3	3	3.57	0.01	1.11
February	1	1	1	47.88	3.78	1.27
March	3	3	3	11.71	1.37	1.36
April	5	5	5	–	–	9.27
May	1	1	1	–	–	1.88
Total	79	79	79	10.47	0.43	4.28

Figure 27 plots the results shown in table 16 and shows the relative consistency within collection methods of the FOD in samples. February 2013 shows an exception to this, when the FOD collected in the FOD*BOSS weighed over 47 lb. Depending on winter weather conditions, it is possible for freeze/thaw conditions to influence runway-produced FOD. A review of runway results for February indicates a peak in weight measurements for large FOD from Runway 14L-32R in February 2012 and February 2013, and high overall FOD*BOSS weight measurements for Runways 4L-22R and 9R-27L. There was no clear trend evident in higher weight measurements in the magnet bar samples; although the greatest weight measurement occurred in months when metal bristles from snow removal equipment may have been present.

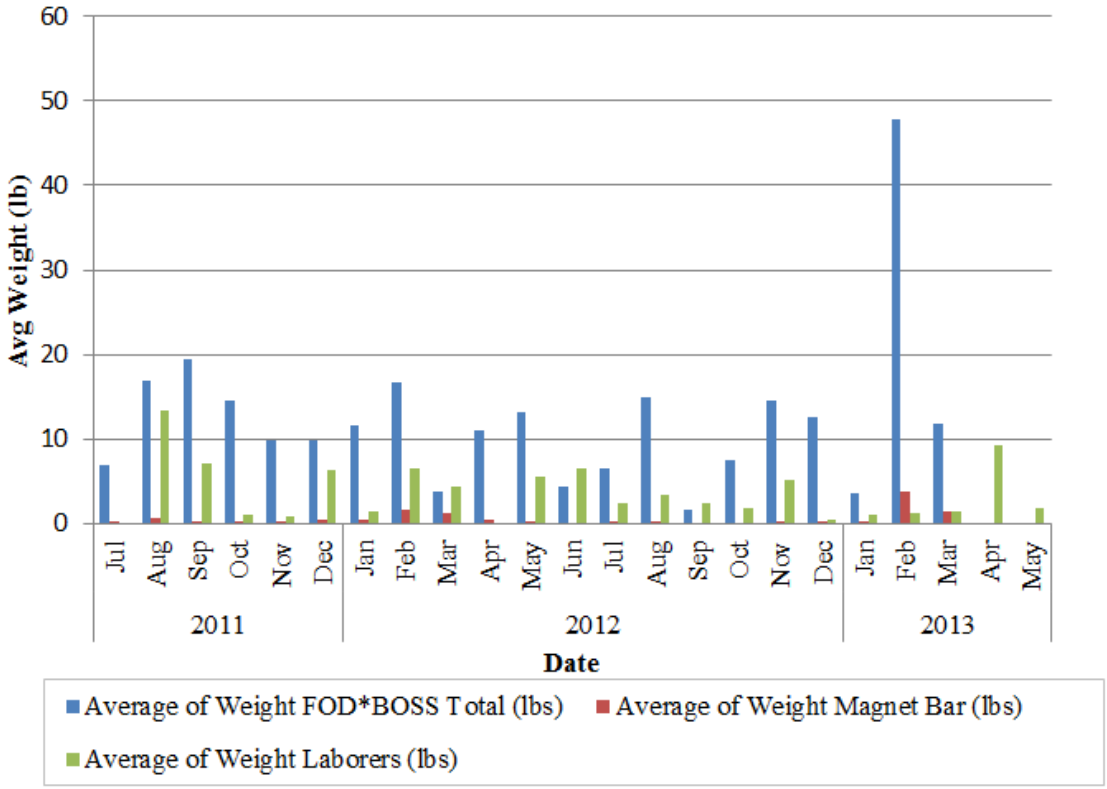


Figure 27. Average Weight by Month of FOD Collected Using the FOD*BOSS, Magnet Bar, and Laborers

ANALYSIS BASED ON RUNWAY CHARACTERISTICS.

Other factors that may influence FOD sample characteristics include runway length, runway operations, taxiway crossings, or construction and the frequency of airport inspections. To determine if runway characteristics could be related to FOD sampling results, FOD sampling results were analyzed relative to each of the characteristics.

RUNWAY LENGTH. Figure 28 shows the results of the comparison of FOD*BOSS sample weight to runway length. Figure 29 shows similar results for magnet bar samples.

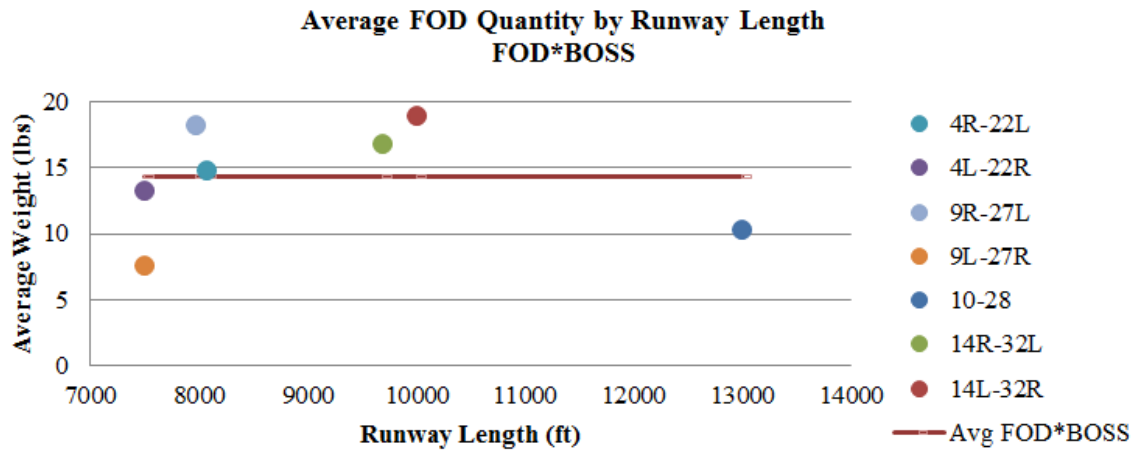


Figure 28. Average Weight of FOD Collected From the FOD*BOSS Against Runway Length

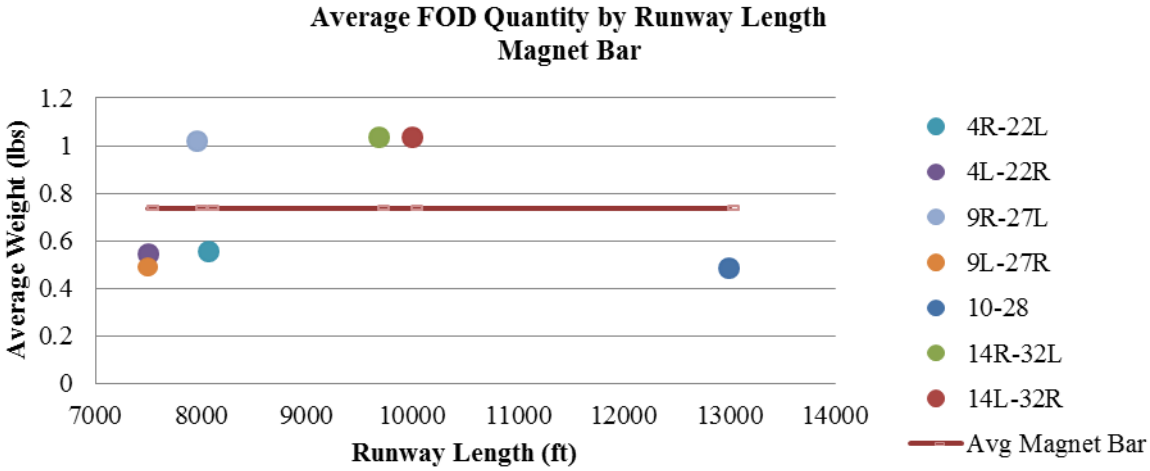


Figure 29. Average Weight of FOD Collected From the Magnet Bar Against Runway Length

Figures 28 and 29 do not show any relationship between FOD weight and runway length

TAXIWAY INTERSECTIONS. Another runway characteristic that could influence FOD samples is the number of taxiway intersections. An increase in intersections could create potential for aircraft and airport vehicles to influence FOD on the runway. In figures 30 and 31, the weight of FOD from the FOD*BOSS and the magnet bar, respectively, were plotted against the number of intersecting runways. In both instances, the weight of FOD collected in sampling campaigns showed no trend in relation to the number of taxiway intersections.

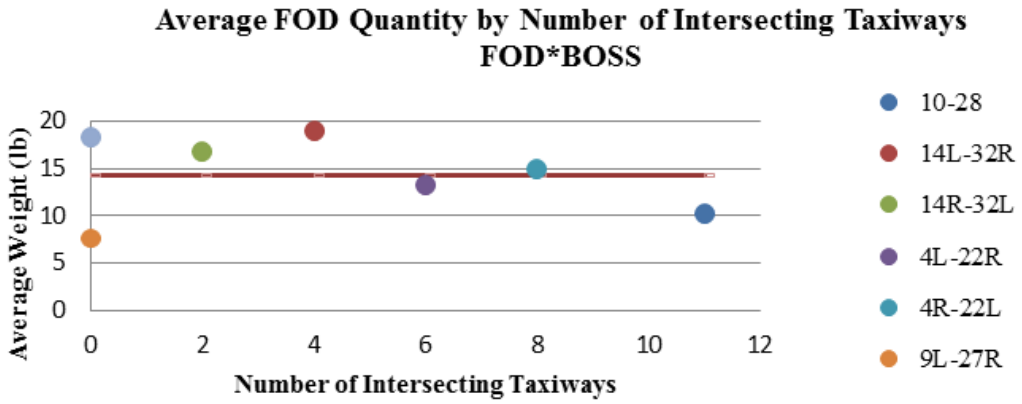


Figure 30. Average Weight of FOD Collected by the FOD*BOSS Against the Number of Intersecting Taxiways

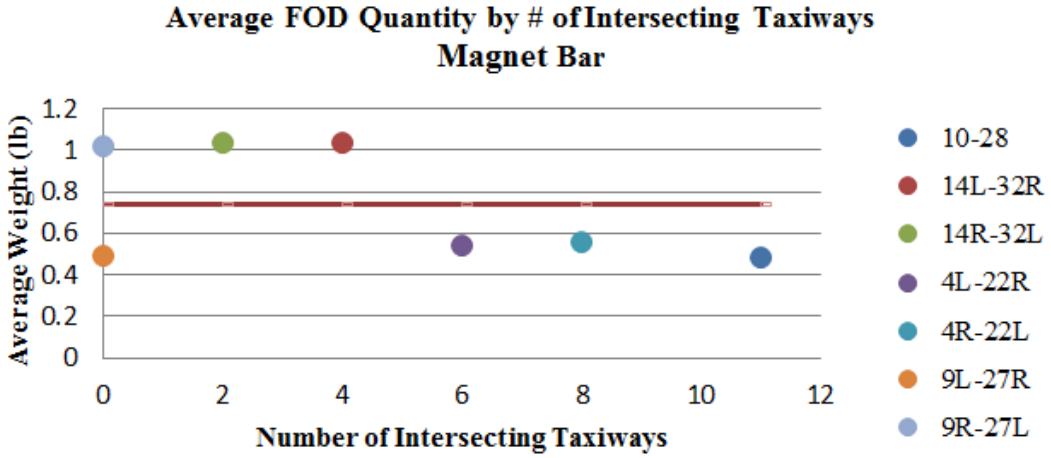


Figure 31. Average Weight of FOD Collected Using the Magnet Bar Against the Number of Intersecting Taxiways

CONSTRUCTION. Due to the O'Hare Modernization Program, there has been major construction at ORD for some years. The FOD characterization studies were initiated during a period when construction activities were at a high level. In March 2011, construction began on Runway 10R-28L. The construction was near an active runway, Runway 4R-22L. Additional construction was initiated on the Signature Terminal in June 2011 and completed in August 2012. Runways 4L-22R, 14L-32R, and 9R-27L were located near this construction. Other construction was noted near Runways 14R, 32L, and 10-28. The following runways were near the primary construction site.

- 4R-22L—Construction on 10R-28L
- 4L-22R—Enabling construction for 9C-28C
- 14L-32R—Signature Construction
- 9R-27L—Signature Construction

Of the runways included in the FOD sampling campaigns, the following runways were not near primary construction sites.

- 9L-27R
- 10-28
- 14R-32L

Table 17 and figure 32 provide the results of a comparison between average FOD weight measurements of samples from runways near construction and the average FOD weight measuremnets from runways not near construction. It was assumed that construction activity near a runway could influence the amount and/or weight FOD collected. However, no such relationship between proximity to construction was determined.

Table 17. Average FOD Weights Based on Runway Proximity to Construction

Near Construction		Not Near Construction	
Runway	Average of All FOD (lb)	Runway	Average of All FOD (lb)
4R-22L	18.41	10-28	17.22
9R-27L	17.88	14R-32L	13.51
14L-32R	20.99	9L-27R	6.00
4L-22R	13.99		

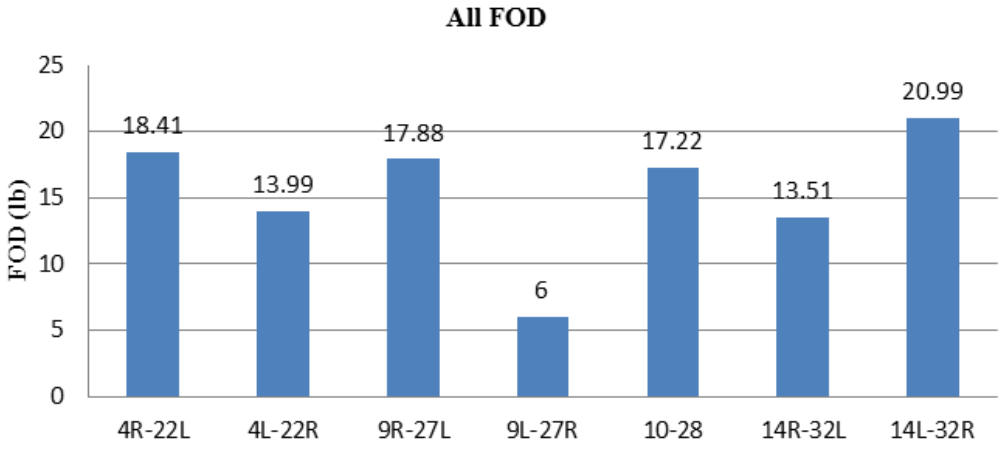


Figure 32. Average Weight of FOD by Runway

The Signature Aviation Project was located near Runways 14L-32R and 9R-27L. During the construction period, six sampling campaigns were completed. After construction, two sampling campaigns were completed on Runway 14L-32R and five on Runway 9R-27L. Table 18 shows a reduction in FOD weight collected after construction. No definite conclusions can be made based on the high variability of the data.

Table 18. Average Weight of FOD by Runway

Runway	Average Weight Jun 2011–Aug 2012	Average Weight Aug 2012–Present
14L-32R	25.82	6.5
9R-27L	22.07	13.19

Although no conclusions could be drawn from average weight analysis, further analysis examined the different material type of the FOD during and after construction, figures 33 through 36. During the construction period, FOD samples from Runway 14L-32R had more metal items than samples collected after construction. The items present were small, producing a low average weight. Paint chips had the highest average weight during construction, although average weight of all categories was similar during construction and after construction.

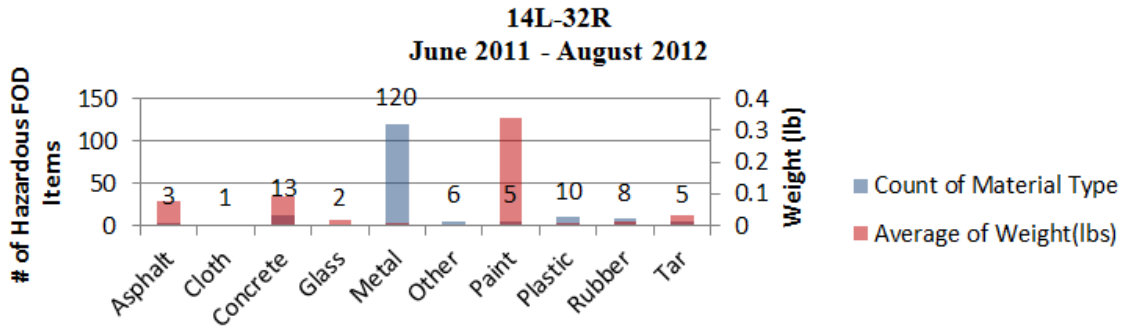


Figure 33. Number of Hazardous FOD Items by Weight Collected on Runway 14L-32R During Construction Period

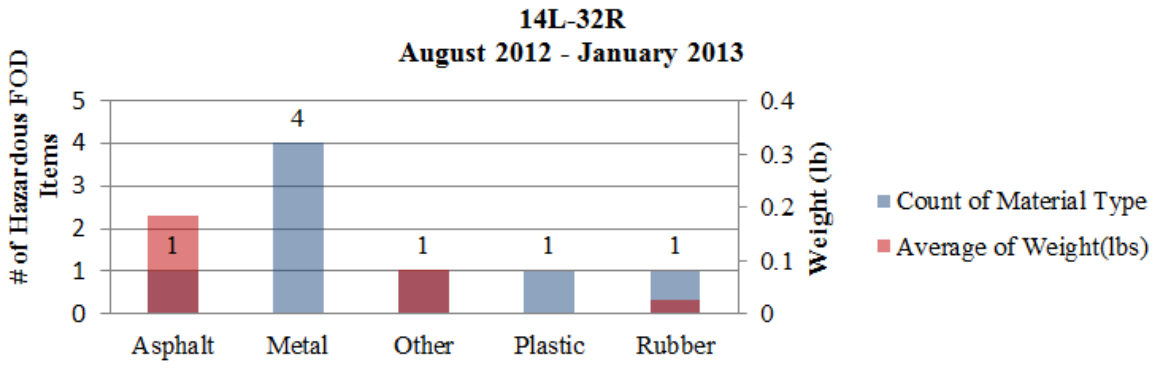


Figure 34. Number of Hazardous FOD Items by Weight Collected on Runway 14L-32R After Construction Period

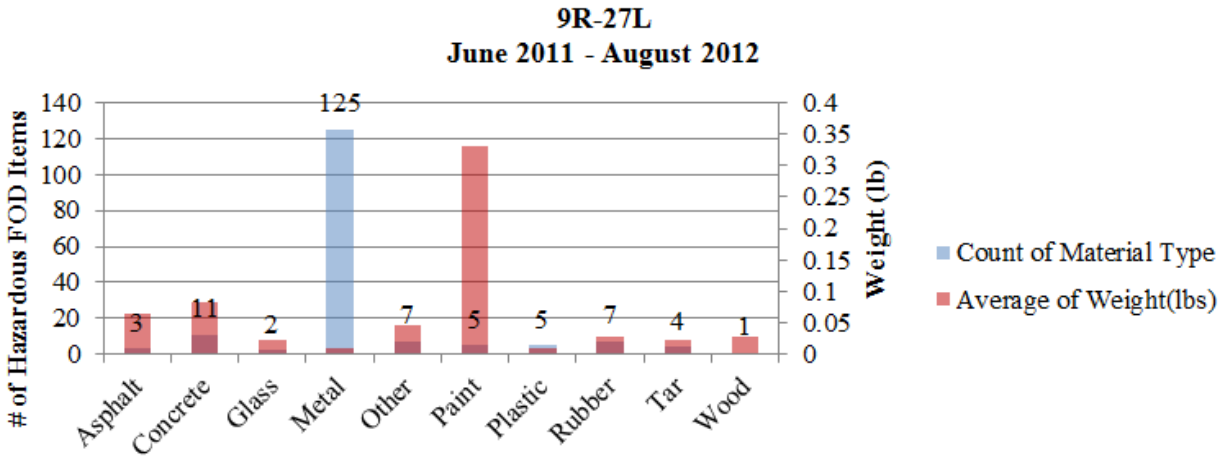


Figure 35. Number of Hazardous Items by Weight Collected From Runway 9R-27L During Construction

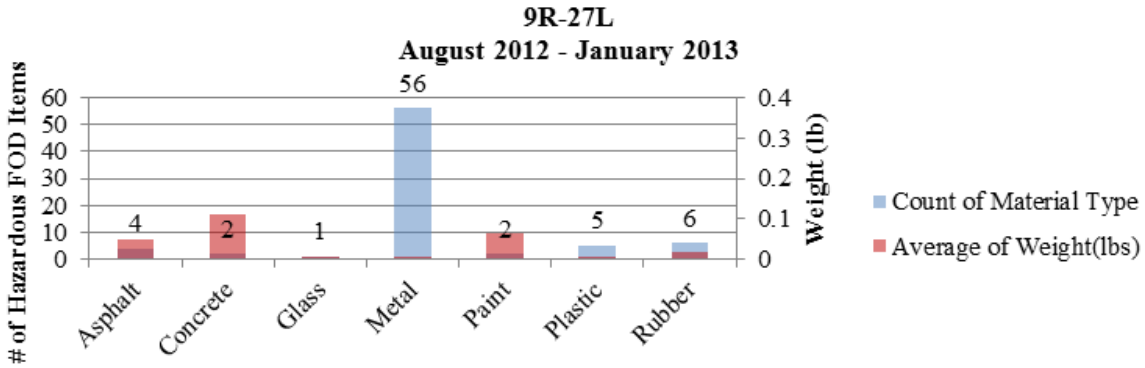


Figure 36. Number of Hazardous Items by Weight Collected From Runway 9R-27L After Construction

In summary, the analysis of FOD in relation to runway characteristics found no comparative differences associated with runway length, number of runway intersections, nor adjacent construction activity.

REVIEW OF HAZARDOUS ITEMS IN FOD SAMPLES.

As part of the overall analysis process, each FOD sample was examined. FOD items meeting the definition of hazardous items were separated, characterized, and recorded. Appendix B provides a detailed inventory of all hazardous FOD samples. Although the general criterion was size greater than 1 inch, smaller items, particularly metal items, were identified as hazardous and size classification was consistent with items listed in table 19. The analysis of hazardous FOD items has been completed for 55 of the 78 sampling campaigns. The total number of FOD items characterized as hazardous in these 55 campaigns was 1146, with 399 of the items having at least one dimension greater than one inch. In this data set, 996 hazardous items had size designations (i.e., classified as hazardous due to their size) and 150 items were characterized as other. The

total weight of hazardous items in all categories was 33.61 lb. Table 19 lists the relative percent of hazardous FOD items, and figure 37 shows a plot of the data.

Table 19. Percentage of Total Hazardous Items by Size Class

Size Class	Percentage of Total Hazardous Items (%)
Small	49.04
Medium	26.44
Large	11.43
Other	13.09

Figure 37. A Total of 1146 Hazardous Items by Size Class

The result of hazardous item analysis provides a basis for connecting general FOD collections with the potential hazard of FOD to safe aircraft operations. Figure 38 compares the average weight of hazardous FOD items by runway. While the average weights of all FOD (figure 32) ranged from 6 lb to nearly 21 lb, the weights of hazardous items ranged from an average of 0.02 lb to 0.04 lb. Clearly, hazardous items make up a small part of the overall FOD materials collected by weight during each sampling campaign.

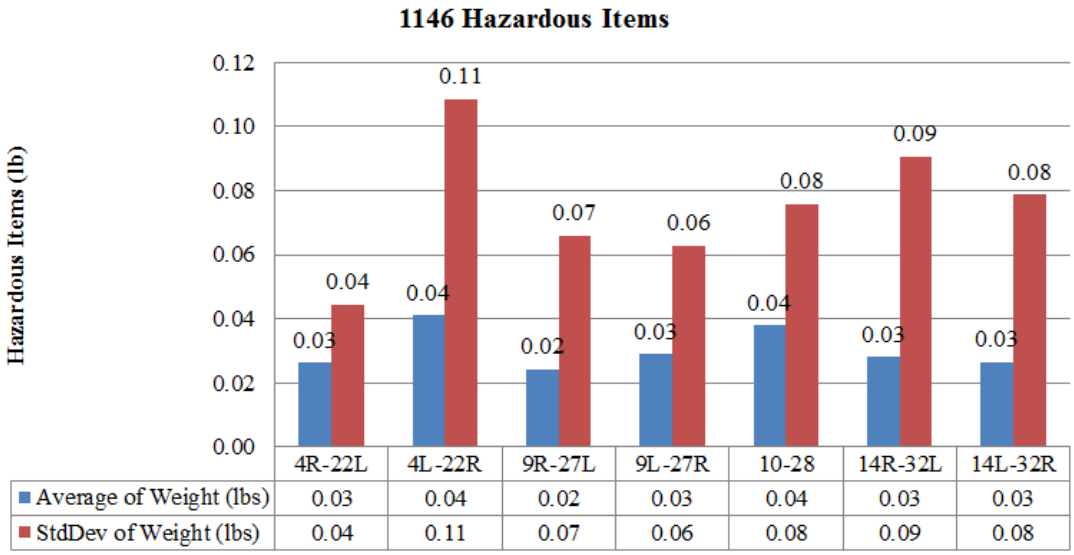


Figure 38. Average Weight of Hazardous Items by Runway

ANALYSIS OF HAZARDOUS ITEMS BASED ON WEIGHT AND SIZE CLASS. Hazardous FOD items were also analyzed by weight and size class. Table 20 presents the relative percent of hazardous FOD items by weight for each size class, and figure 39 illustrates this data.

Table 20. Percentage of all Hazardous Items by Weight for Each Size Class

Size Class	Percentage of all Hazardous Items by Weight (%)
Small	13.07
Medium	38.88
Large	19.03
Other	29.02

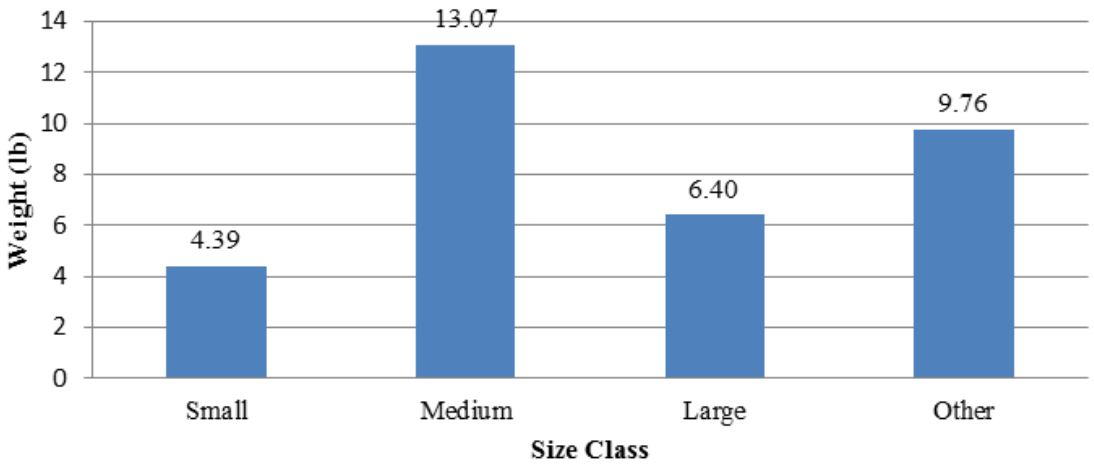


Figure 39. Total Weight of all Hazardous Items by Size Class

A comparison between tables 19 and 20 shows that small-sized FOD items were present in the greatest number, but medium-sized FOD items had the greatest aggregate weight. Both large and other FOD item categories had fewer items, but relatively high aggregate weights.

ANALYSIS OF HAZARDOUS ITEMS BASED ON MATERIAL TYPE. The hazardous items were also characterized by material type. Table 21 lists FOD items by material type and the percentage of total hazardous FOD items for these categories. Figure 40 illustrates these results.

Table 21. Percentage of Total Hazardous Items for Each Material Type

Material Type	Percentage of Total Hazardous Items (%)
Metal	59.69
Rubber	7.24
Concrete	6.72
Plastic	6.11
Asphalt	5.06
Tar	4.54
Paint	3.75
Other	3.32
Glass	1.57
Wood	0.87
Paper	0.52
Animal	0.26
Cloth	0.26
Leather	0.09

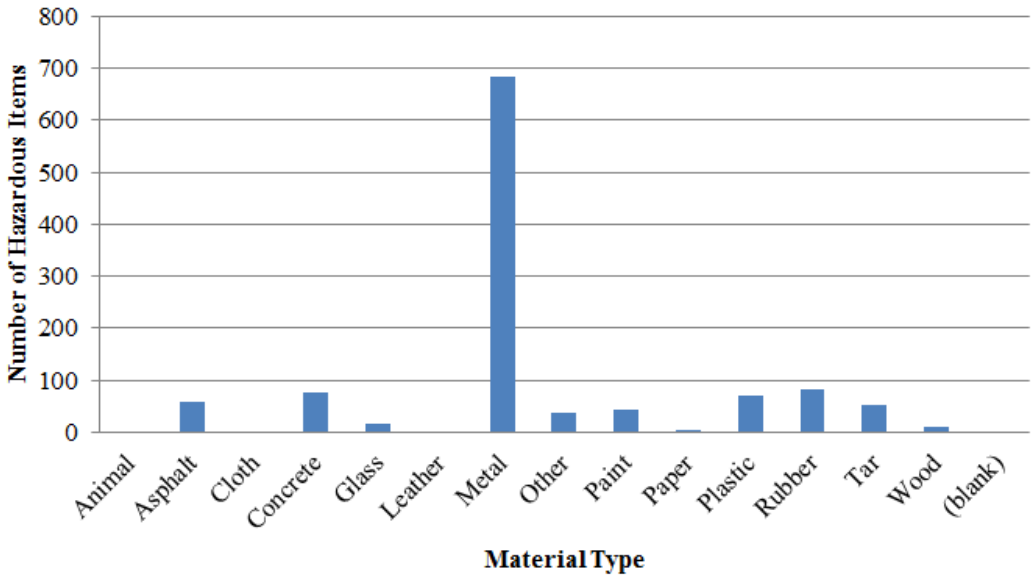


Figure 40. Total Number of Hazardous Items by Material Type

Table 22 lists the percentage of the total hazardous FOD items' weight in pounds by material type, and figure 41 shows total weights by material types.

Table 22. Percentage of all Hazardous Items by Weight for Each Material Type

Material Type	Percentage of all Hazardous Items by Weight (%)
Metal	22.95
Paint	21.48
Concrete	21.00
Asphalt	16.38
Tar	5.97
Rubber	4.62
Glass	3.07
Other	2.10
Plastic	1.39
Wood	0.55
Cloth	0.24
Paper	0.18
Animal	0.05
Leather	0.01

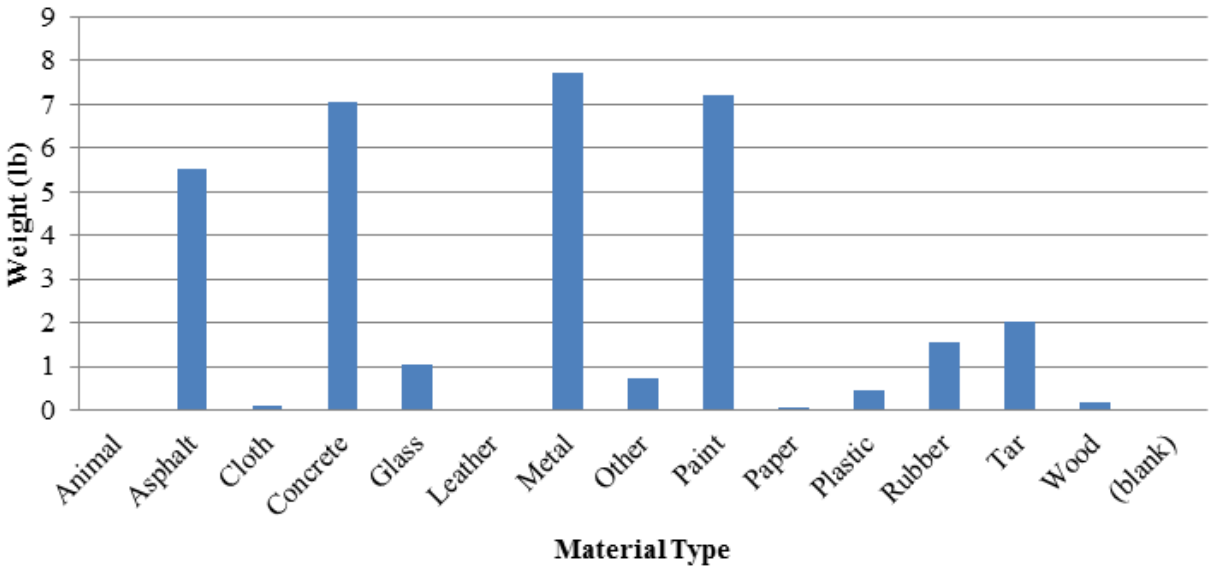


Figure 41. Total Weight of all Hazardous Items by Material Type

Figure 42 shows the number of hazardous items in each material type.

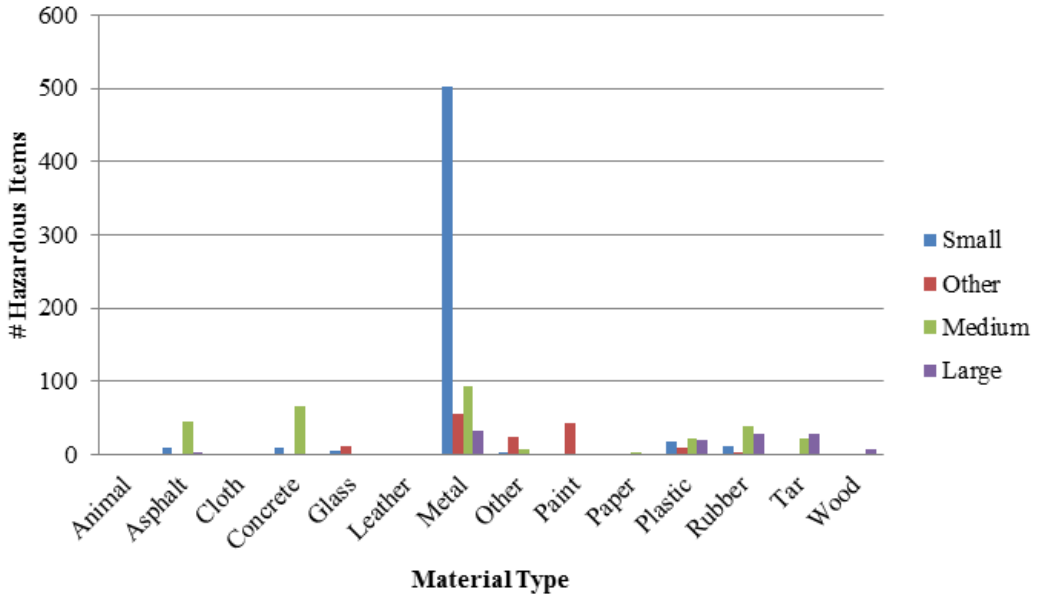


Figure 42. Number of Hazardous Items by Material Type

Figure 43 shows weight of items in each material type.

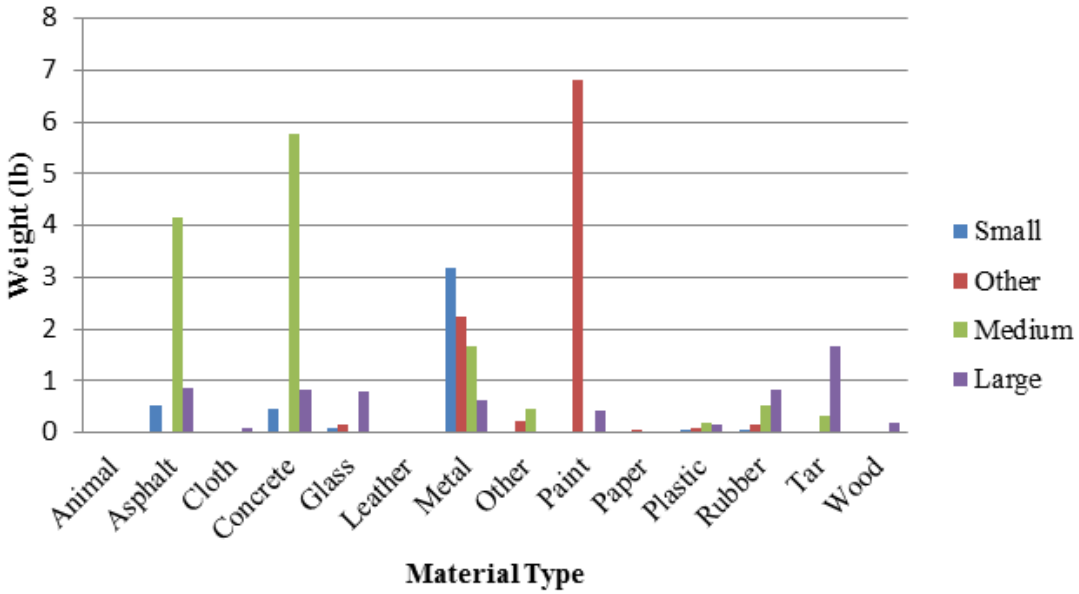


Figure 43. Weight of Hazardous Items by Material Type

The analysis by material type provides further insight into hazardous FOD items. Rubber, concrete, plastic, and asphalt were present comprising greater than 5% of the total; the remaining material types comprised less than 5% of the total. In terms of weight, paint particles had the highest aggregate weight of nearly 23 lb; but concrete, metal, and asphalt followed closely with weights of 17 lb to 21 lb. Evaluating material type by size class, metal FOD items had the greatest numbers in all size classes, with nearly 90% of the small items. In the medium size class, cloth, asphalt, and rubber were also present in higher weights. Rubber and tar were well represented in large weights. Metal items and paint particles accounted for the highest weight in the Other category. In the Other category, paint accounted for 78% of the total weight, while metal was 14% of the weight. Although more than 60% of the total items were metal, these items were generally small.

CONCLUSIONS

Note: The conclusions in this study are based on descriptive anlaysis, and the findings in this report follow the interpretative rather than statistical analyses.

As part of the Federal Aviation Administration's (FAA) long-term efforts in the prevention and management of foreign object debris (FOD), the University of Illinois Center of Excellence for Airport Technology (CEAT), in cooperation with the Chicago Department of Aviation, O'Hare Operations staff, engaged in a sudy to characterize FOD at a major airport, Chicago-O'Hare International Airport (ORD). The primary objective of this study was to characterize FOD using common mechanical FOD removal devices, the FOD*BOSS sweeper and a magnet bar, during routine runway inspections; manual FOD collection was also employed during the study. The FOD*BOSS uses friction to collect FOD items as the device is pulled along a paved surface. The use of friction in the collection process creates the potential that the device may dislodge particles from the surface that may not be readily movable without the friction pad passage.

Further, the FOD*BOSS flips particles into a retention area, which may retain items of different size or may overfill and lose items. The magnet bar collects only ferrous metal items that are attracted to the magnet. With these considerations in mind, the use of the FOD*BOSS and magnet bar are commonly used at airports for the removal of FOD, and the samples collected by these devices are considered appropriate for a general characterization of FOD. The conclusions in this study are based on descriptive anlaysis. The data from ORD FOD collections are used to generally characterize collected FOD at one airport.

In this study, CEAT supported a total of 79 sampling campaigns, resulting in FOD samples from ORD Runways 4R-22L, 4L-22R, 9R-27L, 9L-27R, 10-28, 14R-32L, and 14L-32R. Sampling campaigns began on July 20, 2011 and continued through May 8, 2013. The availability of the Chicago Department of Aviation equipment and CEAT personnel for FOD collection activities varied, which was a limitation of the study. The number of collection methods used for each sampling campaign also varied. In some campaigns, all three FOD collection methods (FOD*BOSS, magnet truck, and laborers) were used, while others involved only one or two collection methods. In total, 34 sampling campaigns were completed using all 3 methods. These 34 samples were used in the more detailed analyses. Another limitation of the study was the time intervals between inspections, which were varied due to operational needs. In a number of instances, collection intervals were sometimes very short and others were very long. Also, FOD presence and weight counts were sometimes affected by regular maintenance and inspection as well as other mechanisms, such as jet blast removal, which tends to limit FOD on runways.

Metal FOD items were found to be more common in winter months. Inspections generally produced samples that wieghed between 10 and 20 lb, but a collection in winter 2013 produced a sample weighing almost 50 lb. An examination of winter samples found larger items composed of asphalt, tar, and concrete present, which is consistent with the suggestion that high FOD weights may be related to freeze/thaw conditions that would produce FOD from runway pavements. Analysis was also performed to examine the potential relationships between FOD and runway length and the number of taxiway intersections. The assumption was made that longer runways would produce more FOD, and the more intersections would lead to increased traffic and increased FOD. However, a statistically valid conclusion could not be reached due to small sample size. Analysis also considered construction, examining runway distance from construction and specific construction activity at Signature Aviation. The analysis identified differences between construction and postconstruction FOD samples for Signature Aviation; however, differences could not be confirmed statistically due to small sample size.

Certain FOD items were identified as hazardous items. Analysis performed on these hazardous items found that hazardous FOD constituted a very small percentage of the total FOD collected. Small, metal items made up a majority of hazardous FOD. Larger items included asphalt, concrete, and tar items related to the runway surface. Paint particles were common among the larger hazardous items, i.e., paint bound to pavement materials or paint accumulations that led to large particle production. Other large hazardous FOD items were observed, but their origin was random.

In summary:

- Over the course of 22 months, 79 FOD sampling campaigns were conducted on 7 different runways.
- Of the 79 sampling campaigns, 34 included all sample collection methods (i.e., FOD*BOSS, magnet truck, and laborers).
- The total number of FOD items identified as hazardous was 1146.
- The total weight of FOD items identified as hazardous was 537.9 lb.
- A total of 1180.27 lb. of FOD were collected during the study.
- In terms of the material type, over 60% of hazardous FOD items were metal and small in size.
- In terms of weight, the small size category consisted of metals; the medium category consisted of concrete and asphalt; and the large category consisted of tar, asphalt, concrete, and glass items.
- The most common, larger hazardous items collected in the study were possibly generated from the pavement surface because they were comprised of asphalt, concrete and tar.
- Hazardous FOD constituted a very small percentage of the total FOD collected.

REFERENCES

1. Federal Aviation Administration, “Debris Hazards at Civilian Airports,” Advisory Circular (AC) 150/5380-5B, July 5, 1996.
2. National Aerospace FOD Prevention, Inc. (NAFPI), “FOD Prevention Guideline,” July 2000, http://www.nafpi.com/nafpiguideline.pdf (last visited October 24, 2014).
3. Federal Aviation Administration, “Airport Foreign Object Debris (FOD) Detection Equipment,” AC 150/5220-24, September 30, 2009.
4. Federal Aviation Administration, “Airport Foreign Object Debris (FOD) Management,” AC 150/5210-24, September 30, 2010.
5. EUROCONTROL Workshop, “Information Paper on French Study on Automatic FOD Detection Systems,” *Second Workshop for the Assessment of Automatic FOD Detection*, Brussels, Belgium, June 9-10, 2008.

6. Herricks, E.E., Woodworth, E., and Koh, M.S., "Long Term FOD Detection from a Continuous Runway Scanning Technology," *32nd National Aerospace FOD Prevention Conference*, Dallas, Texas, August 16-18, 2011.

7. Designation: C702-98 "Standard Practice for Reducing Samples of Aggregate to Testing Size," American Association of State Highway and Transportation Officials, 444 North Capital Street NW, Suite 225, Washington, DC, 20001.

8. Herricks, E.E., Woodworth, E., and Patterson, Jr., J., "Performance Assessment of a Hybrid Radar and Electro-Optical Foreign Object Debris Detection System," FAA report DOT/FAA/TC-12/22, June 2012.

9. Herricks, E.E., Lazar, P. III, Woodworth, E., and Patterson, Jr., J., "Performance Assessment of an Electro-Optical-Based Foreign Object Debris Detection System," FAA report DOT/FAA/AR-11/13, March 2012.

10. Herricks, E.E., Woodworth, E., Majumdar, Sid., and Patterson, Jr., J., "Performance Assessment of a Mobile, Radar-Based Foreign Object Debris Detection System," FAA report DOT/FAA/AR-11/12, September 2011.

11. Herricks, E.E., Woodworth, E., Majumdar, Sid., and Patterson, Jr., J., "Performance Assessment of a Radar-Based Foreign Object Debris Detection System," FAA report DOT/FAA/AR-10/33, February 2011.

Date	FOD*BOSS Count	Magnet Bar Count	Laborers Count	FOD*BOSS Minimum Weight Total (lb)	FOD*BOSS Average Weight Total (lb)	FOD*BOSS Maximum Weight Total (lb)	FOD*BOSS Standard Deviation Weight (lb)	Magnet Bar Minimum Weight Total (lb)	Magnet Bar Average Weight Total (lb)	Magnet Bar Maximum Weight Total (lb)	Magnet Bar Standard Deviation Weight (lb)	Laborers Minimum Weight Total (lb)	Laborers Average Weight Total (lb)	Laborers Maximum Weight Total (lb)	Laborers Standard Deviation Weight (lb)
2011															
July	1	1	1	6.85	6.85	6.85	0.00	48.00	48.00	48.00	0.00	–	–	–	N/A
August	4	4	4	5.43	16.82	26.33	9.21	53.00	311.25	917.00	409.63	0.00	13.42	52.68	26.18
September	4	4	4	0.00	19.44	45.82	19.65	18.00	115.00	387.00	181.49	0.00	7.13	11.68	5.20
October	2	2	2	10.19	14.45	18.72	6.03	156.00	157.00	158.00	1.41	0.60	1.05	1.50	0.64
November	4	4	4	0.00	9.80	17.90	7.41	196.00	196.00	196.00	0.00	0.00	0.79	1.95	0.89
December	5	5	5	0.00	9.90	18.79	6.89	91.00	234.75	373.00	118.76	2.45	6.40	16.67	5.85
2012															
January	4	4	4	4.41	11.51	14.86	4.80	86.00	230.75	411.00	140.09	0.00	1.36	3.31	1.43
February	5	5	5	7.65	16.67	24.34	7.72	51.00	734.60	1126.00	403.49	1.05	6.51	10.97	4.02
March	4	4	4	0.00	3.68	9.26	4.52	83.00	556.25	1312.00	534.50	0.72	4.39	7.97	3.06
April	5	5	5	5.98	11.05	17.56	4.45	55.00	231.20	590.00	216.59	0.00	0.00	0.00	0.00
May	5	5	5	8.11	13.20	22.31	6.03	10.00	61.25	131.00	51.19	0.00	5.48	11.48	4.19
June	4	4	4	0.00	4.27	10.10	4.36	–	–	–	N/A	0.12	6.52	16.46	7.25
July	4	4	4	0.00	6.43	16.10	7.88	32.00	32.00	32.00	0.00	0.00	2.47	4.36	1.87
August	4	4	4	0.00	14.85	43.71	20.20	18.00	20.50	23.00	3.54	0.49	3.45	8.73	3.75
September	3	3	3	0.00	1.66	4.98	2.87					1.29	2.48	3.08	1.03

Date	FOD*BOSS Count	Magnet Bar Count	Laborers Count	FOD*BOSS Minimum Weight Total (lb)	FOD*BOSS Average Weight Total (lb)	FOD*BOSS Maximum Weight Total (lb)	FOD*BOSS Standard Deviation Weight (lb)	Magnet Bar Minimum Weight Total (lb)	Magnet Bar Average Weight Total (lb)	Magnet Bar Maximum Weight Total (lb)	Magnet Bar Standard Deviation Weight (lb)	Laborers Minimum Weight Total (lb)	Laborers Average Weight Total (lb)	Laborers Maximum Weight Total (lb)	Laborers Standard Deviation Weight (lb)
October	3	3	3	2.77	7.48	14.92	6.52	–	–	–	N/A	0.33	1.84	3.94	1.88
November	3	3	3	2.12	14.52	30.89	14.79	196.00	196.00	196.00	0.00	0.11	5.08	8.94	4.52
December	2	2	2	6.92	12.64	18.35	8.08	87.00	87.00	87.00	0.00	0.33	0.49	0.65	0.23
2013															
January	3	3	3	0.00	3.57	10.71	6.18	14.00	14.00	14.00	0.00	0.00	1.11	3.05	1.69
February	1	1	1	47.88	47.88	47.88	0.00	1715.00	1715.00	1715.00	0.00	0.00	1.27	1.27	0.00
March	3	3	3	0.00	11.71	35.12	20.28	532.00	933.50	1335.00	567.81	0.00	1.36	4.08	2.36
April	5	5	5	–	–	–	N/A	–	–	–	N/A	0.00	9.27	30.92	12.48
May	1	1	1	–	–	–	N/A	–	–	–	N/A	1.88	1.88	1.88	0.00
Total	79	79	79	0.00	10.47	47.88	10.82	0.00	320.33	1715.00	405.24	0.00	4.28	52.68	7.40

APPENDIX B—INVENTORY OF HAZARDOUS FOREIGN OBJECT DEBRIS ITEMS

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
07/20/11	4R-22L	Bird bit	0.035274	1.25	1	0.5	Animal
07/20/11	4R-22L	Metal fragment	0.035274	1.5	0.375	0.125	Metal
07/20/11	4R-22L	Screw	0.141096	1.125	0.375	0.375	Metal
07/20/11	4R-22L	Screw	0.105822	0.875	0.375	0.375	Metal
07/20/11	4R-22L	Screw	0.070548	0.625	0.25	0.25	Metal
07/20/11	4R-22L	Metal BB	0.070548	0.25	0.25	0.25	Metal
07/20/11	4R-22L	Square metal fragment	0.070548	0.75	0.75	0.125	Metal
07/20/11	4R-22L	Coiled metal wire	0.035274	0.75	0.5	0.125	Metal
07/20/11	4R-22L	Plastic wire cover	0.035274	1	0.25	0.25	Plastic
07/20/11	4R-22L	Plastic knife	0.105822	6.25	0.5	0.125	Plastic
07/20/11	4R-22L	Nut	0.105822	0.375	0.375	0.25	Metal
07/20/11	4R-22L	Bolt	0.070548	0.375	0.375	0.375	Metal
07/20/11	4R-22L	Luggage zipper	0.17637	1.5	0.5	0.125	Metal
07/20/11	4R-22L	Luggage zipper	0.17637	1.75	0.75	0.125	Metal
08/04/11	10-28	Paper trash	0.458562	–	–	–	Paper
08/04/11	10-28	Asphalt chunk	2.363358	3	2	1	Asphalt
08/04/11	10-28	Asphalt chunk	1.834248	2.375	1.25	1.125	Asphalt
08/04/11	10-28	Concrete chunk	2.64555	2.125	1.75	1.25	Concrete
08/04/11	10-28	Roll electrical tape	1.23459	2	2	0.75	Plastic
08/04/11	10-28	Runway joint material	0.564384	3.625	1	0.75	Rubber
08/04/11	10-28	Plastic tie tag	0.105822	7	3	0.125	Plastic
08/04/11	10-28	Bent metal wire	0.070548	2.25	1.125	0.125	Metal
08/04/11	10-28	Washer	0.035274	0.625	0.625	0.125	Metal
08/04/11	10-28	Washer	0.035274	0.625	0.625	0.125	Metal
08/04/11	10-28	Washer	0.035274	0.625	0.625	0.125	Metal
08/04/11	10-28	Bobby pin	0.035274	2	0.625	0.125	Metal
08/04/11	10-28	Bobby pin	0.035274	2	0.375	0.125	Metal
08/04/11	10-28	Leather strap	0.035274	2	0.5	0.125	Leather
08/04/11	10-28	Screw	0.141096	0.125	0.375	0.125	Metal
08/04/11	10-28	Screw	0.070548	0.625	0.375	0.125	Metal
08/04/11	10-28	Nut	0.282192	0.75	0.75	0.375	Metal
08/04/11	10-28	Luggage lock	0.811302	0.875	0.75	0.25	Metal
08/04/11	10-28	Metal fitter piece	0.70548	1	0.75	0.5	Metal
08/04/11	10-28	Metal piece	0.035274	0.375	0.375	0.125	Metal
08/04/11	10-28	Flattened metal piece	0.035274	0.875	0.375	0.125	Metal
08/04/11	10-28	Curved metal piece	0.035274	0.75	0.25	0.125	Metal
08/11/11	4L-22R	Glass pieces	0.88185	1	1	1	Glass
08/11/11	4L-22R	Large paint chips	6.737334	6.5	6.5	6.5	Paint
08/11/11	4L-22R	Paper trash	0.35274	–	–	–	Paper
08/11/11	4L-22R	Asphalt chunk	3.35103	2.375	1.875	1.25	Asphalt
08/11/11	4L-22R	Asphalt chunk	2.045892	1.875	1.625	1.125	Asphalt
08/11/11	4L-22R	Asphalt chunk	0.564384	1.5	1.125	0.75	Asphalt
08/11/11	4L-22R	Concrete chunk	0.811302	1.5	1.25	0.875	Asphalt
08/11/11	4L-22R	Concrete chunk	0.776028	1.375	1	0.75	Concrete
08/11/11	4L-22R	Tar strip	0.17637	2.5	0.75	0.375	Tar

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
08/11/11	4L-22R	Tar strip	0.458562	5.375	1	0.125	Tar
08/11/11	4L-22R	Animal dropping	0.070548	2.875	0.5	0.5	Animal
08/11/11	4L-22R	Porous concrete	2.433906	2	1.75	1.5	Concrete
08/11/11	4L-22R	Porous concrete strip	0.740754	3.625	0.75	0.5	Concrete
08/11/11	4L-22R	Runway light dome	12.69864	3.375	3.625	6.625	Glass
08/11/11	4L-22R	Screw	0.070548	0.625	0.375	0.375	Metal
08/11/11	4L-22R	Metal hose joint	0.070548	0.5	0.375	0.375	Metal
08/11/11	4L-22R	Metal rotator	0.105822	0.625	0.375	0.375	Metal
08/11/11	4L-22R	Washer	0.17637	0.875	0.875	0.125	Metal
08/11/11	4L-22R	Nut	0.282192	0.5	0.5	0.5	Metal
08/11/11	4L-22R	Metal BB	0.070548	0.25	0.25	0.25	Metal
08/11/11	4L-22R	Nut	0.035274	0.375	0.375	0.125	Metal
08/11/11	4L-22R	Broken valve cap	0.035274	0.5	0.5	0.25	Metal
08/11/11	4L-22R	Plastic roller	0.035274	0.75	0.75	0.375	Plastic
08/11/11	4L-22R	Metal wire	0.035274	9.5	0.125	0.125	Metal
08/11/11	4L-22R	Guitar string	0.211644	41.125	0.125	0.125	Metal
08/18/11	9L-27R	Concrete chunk	1.552056	1.375	1.25	1.125	Concrete
08/18/11	9L-27R	Concrete chunk	1.552056	1.5	1.125	1	Concrete
08/18/11	9L-27R	Concrete flake	0.564384	1.625	1.5	0.5	Concrete
08/18/11	9L-27R	Concrete flake	0.634932	1.625	1.25	0.625	Concrete
08/18/11	9L-27R	Concrete flake	0.52911	1.625	1.25	0.25	Concrete
08/18/11	9L-27R	Expansion joint material	0.105822	1.75	0.5	0.25	Rubber
08/18/11	9L-27R	Expansion joint material	0.246918	3.25	0.5	0.25	Rubber
08/18/11	9L-27R	Expansion joint material	0.211644	3.625	0.5	0.25	Rubber
08/18/11	9L-27R	Expansion joint material	0.282192	4.325	0.5	0.25	Rubber
08/18/11	9L-27R	Expansion joint material	0.599658	7.5	0.5	0.25	Rubber
08/18/11	9L-27R	Broken knife blade	0.17637	2	0.75	0.125	Metal
08/18/11	9L-27R	Broken pocket knife	2.610276	4.125	1	0.375	Metal
08/18/11	9L-27R	Rubber housing	0.17637	1.5	1.125	0.5	Rubber
08/18/11	9L-27R	Metal fragment	0.035274	0.875	0.25	0.25	Metal
08/18/11	9L-27R	Screw	0.105822	0.875	0.375	0.375	Metal
08/18/11	9L-27R	Screw	0.070548	0.625	0.25	0.25	Metal
08/18/11	9L-27R	Screw	0.035274	0.625	0.375	0.375	Metal
08/18/11	9L-27R	Screw	0.070548	0.5	0.325	0.325	Metal
08/18/11	9L-27R	Screw	0.070548	0.625	0.25	0.25	Metal
08/18/11	9L-27R	Nut	0.070548	0.375	0.375	0.25	Metal
08/18/11	9L-27R	Metal rotator	0.070548	0.5	0.375	0.375	Metal
08/18/11	9L-27R	Washer	0.035274	0.625	0.625	0.125	Metal
08/18/11	9L-27R	Washer	0.035274	0.625	0.25	0.125	Metal
08/18/11	9L-27R	Ribbed washer	0.035274	0.625	0.625	0.125	Metal
08/18/11	9L-27R	Paint chips	0.564384	–	–	–	Paint

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
08/18/11	9L-27R	Metal bristles	0.070548	–	–	–	Metal
08/18/11	9L-27R	Broken glass	0.17637	–	–	–	Glass
08/18/11	9L-27R	Trash	0.035274	–	–	–	Other
08/25/11	14L-32R	Concrete chunk	0.987672	2	1.375	5.75	Concrete
08/25/11	14L-32R	Concrete chunk	0.952398	2	1.25	0.75	Concrete
08/25/11	14L-32R	Concrete chunk	0.952398	1.625	1.125	0.75	Concrete
08/25/11	14L-32R	Concrete chunk	1.728426	1.875	1.625	0.875	Concrete
08/25/11	14L-32R	Asphalt chunk	0.846576	2	1.5	0.375	Asphalt
08/25/11	14L-32R	Expansion joint material	0.952398	6.875	0.875	0.375	Rubber
08/25/11	14L-32R	Wire bristle	0.035274	4.75	0.125	0.125	Metal
08/25/11	14L-32R	Washer	0.070548	0.75	0.75	0.125	Metal
08/25/11	14L-32R	Broken washer	0.035274	0.25	0.25	0.125	Metal
08/25/11	14L-32R	Green metal tag	0.070548	1.25	0.75	0.125	Metal
08/25/11	14L-32R	Nut	0.141096	0.5	0.5	0.25	Metal
08/25/11	14L-32R	Metal rotator	0.246918	0.875	0.375	0.375	Metal
08/25/11	14L-32R	Trash	0.141096	–	–	–	Other
09/01/11	9R-27L	Trash	0.493836	–	–	–	Other
09/01/11	9R-27L	Broken glass	0.634932	–	–	–	Glass
09/01/11	9R-27L	Paint chips	12.557544	–	–	–	Paint
09/01/11	9R-27L	Concrete chunk	1.481508	1.5	1.375	1.125	Concrete
09/01/11	9R-27L	Bent black pin	0.070548	3.375	0.25	0.125	Metal
09/01/11	9R-27L	Black metal side	1.481508	6.875	1.5	0.125	Metal
09/01/11	9R-27L	Broken chain link	1.340412	2.625	1.75	0.25	Metal
09/01/11	9R-27L	Broken metal grating	0.282192	6	1	0.5	Metal
09/01/11	9R-27L	Broken nail	0.070548	1.625	0.125	0.125	Metal
09/01/11	9R-27L	Broken rotator	0.070548	0.625	0.25	0.125	Metal
09/01/11	9R-27L	Broken zipper	0.317466	2.25	0.75	0.25	Metal
09/01/11	9R-27L	Broken zipper head	0.070548	0.5	0.375	0.25	Metal
09/01/11	9R-27L	Chain link	1.305138	1.875	1.125	0.25	Metal
09/01/11	9R-27L	Concave washer	0.035274	0.375	0.375	0.125	Metal
09/01/11	9R-27L	Concrete chunk	1.481508	1.5	1.375	1.125	Concrete
09/01/11	9R-27L	Concrete chunk	1.446234	1.5	1.25	1	Concrete
09/01/11	9R-27L	Concrete chunk	1.516782	1.5	1.25	1	Concrete
09/01/11	9R-27L	Concrete chunk	1.199316	1.625	1.375	0.75	Concrete
09/01/11	9R-27L	Concrete chunk	1.798974	1.5	1.5	1.25	Concrete
09/01/11	9R-27L	Curled metal pin	0.070548	1.875	0.5	0.125	Metal
09/01/11	9R-27L	Curled metal wire	0.070548	3.25	1	0.125	Metal
09/01/11	9R-27L	Expansion joint material	0.88185	4	1.125	0.5	Rubber
09/01/11	9R-27L	Expansion joint material	0.493836	3	1.5	0.25	Rubber
09/01/11	9R-27L	Expansion joint material	0.52911	2.75	1.375	0.75	Rubber
09/01/11	9R-27L	Expansion joint material	0.423288	4	0.5	0.5	Rubber

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
09/01/11	9R-27L	Flat rivet	0.035274	0.5	0.5	0.375	Metal
09/01/11	9R-27L	Hair pin	0.035274	2	0.125	0.125	Metal
09/01/11	9R-27L	Hair pin	0.035274	2	0.125	0.125	Metal
09/01/11	9R-27L	Lady bug hair clip	0.035274	1	0.375	0.25	Metal
09/01/11	9R-27L	Lock washer	0.070548	0.5	0.5	0.125	Metal
09/01/11	9R-27L	Nail	0.035274	1.75	0.25	0.125	Metal
09/01/11	9R-27L	Safety pin	0.035274	2	0.25	0.125	Metal
09/01/11	9R-27L	Luggage key	0.035274	1	0.625	0.125	Metal
09/01/11	9R-27L	Luggage key	0.035274	1	0.625	0.125	Metal
09/01/11	9R-27L	Luggage wheel	3.668496	2.5	2.5	1.75	Other
09/01/11	9R-27L	Notched washer	0.070548	0.75	0.75	0.125	Metal
09/01/11	9R-27L	Nut	0.141096	0.375	0.375	0.25	Metal
09/01/11	9R-27L	Nut	0.070548	0.375	0.375	0.125	Metal
09/01/11	9R-27L	Ribbed nail	0.17637	3	0.25	0.125	Metal
09/01/11	9R-27L	Ribbed washer	0.035274	0.625	0.625	0.125	Metal
09/01/11	9R-27L	Ribbed washer	0.035274	0.625	0.625	0.125	Metal
09/01/11	9R-27L	Ribbed washer	0.035274	0.625	0.625	0.125	Metal
09/01/11	9R-27L	Rivet	0.070548	0.625	0.375	0.125	Metal
09/01/11	9R-27L	Rubber strip	0.846576	4	0.75	0.5	Rubber
09/01/11	9R-27L	Nail	0.035274	1.5	0.125	0.125	Metal
09/01/11	9R-27L	Rusted crimped wire	0.070548	2.5	1.25	0.125	Metal
09/01/11	9R-27L	Rusted curled wire	0.105822	1.25	0.5	0.125	Metal
09/01/11	9R-27L	Rusted lock washer	0.070548	0.75	0.625	0.125	Metal
09/01/11	9R-27L	Rusted rivet	0.105822	0.5	0.375	0.125	Metal
09/01/11	9R-27L	Screw	0.070548	0.5	0.375	0.125	Metal
09/01/11	9R-27L	Screw	0.070548	0.5	0.375	0.125	Metal
09/01/11	9R-27L	Screw	0.070548	0.625	0.375	0.125	Metal
09/01/11	9R-27L	Bb	0.070548	0.25	0.25	0.25	Metal
09/01/11	9R-27L	Small corrugated metal strip	0.035274	1.875	0.125	0.125	Metal
09/01/11	9R-27L	Small cotter key	0.035274	0.875	0.375	0.125	Metal
09/01/11	9R-27L	Small cotter pin	0.035274	1.125	0.25	0.125	Metal
09/01/11	9R-27L	Small paper clip	0.035274	1.25	0.375	0.125	Metal
09/01/11	9R-27L	Small paper clip	0.035274	1.25	0.375	0.125	Metal
09/01/11	9R-27L	Small paper clip	0.035274	1.25	0.375	0.125	Metal
09/01/11	9R-27L	Small paper clip	0.035274	1.25	0.375	0.125	Metal
09/01/11	9R-27L	Small safety pin	0.035274	1.125	0.25	0.125	Metal
09/01/11	9R-27L	Small safety pin	0.035274	1.125	0.25	0.125	Metal
09/01/11	9R-27L	Small screw bracket	0.035274	0.375	0.25	0.25	Metal
09/01/11	9R-27L	Small thin screw	0.035274	0.5	0.125	0.125	Metal
09/01/11	9R-27L	Small tri width rod	0.035274	2.875	0.125	0.125	Metal
09/01/11	9R-27L	Smashed luggage wheel part	0.141096	1.125	0.875	0.25	Metal
09/01/11	9R-27L	Thick rusted wire	0.141096	4.125	0.125	0.125	Metal
09/01/11	9R-27L	Tiny rivet	0.035274	0.25	0.25	0.125	Metal
09/01/11	9R-27L	Tiny screw	0.035274	0.375	0.25	0.125	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
09/01/11	9R-27L	Tiny washer	0.035274	0.375	0.375	0.125	Metal
09/01/11	9R-27L	U-shaped wire	0.070548	0.75	0.5	0.125	Metal
09/01/11	9R-27L	Washer	0.105822	0.75	0.75	0.125	Metal
09/01/11	9R-27L	Washer	0.211644	1	1	0.125	Metal
09/01/11	9R-27L	Wide convex pin	0.035274	1.625	0.25	0.125	Metal
09/01/11	9R-27L	Wire	0.035274	5	1.75	0.125	Metal
09/01/11	9R-27L	Zipper tag	0.17637	1.5	0.5	0.125	Metal
09/01/11	9R-27L	Zipper with Cloth Tag	0.246918	5	0.625	0.25	Other
09/01/11	9R-27L	Metal bristles	0.917124	–	–	–	Metal
09/07/11	14R-32L	Trash	0.035274	–	–	–	Other
09/07/11	14R-32L	Paint chips	0	–	–	–	Paint
09/07/11	14R-32L	Metal bristles	0.035274	–	–	–	Metal
09/07/11	14R-32L	Concrete chunk	1.622604	2	1.5	0.25	Concrete
09/07/11	14R-32L	Asphalt chunk	0.846576	1.625	1.5	1	Asphalt
09/07/11	14R-32L	Rodent	0.141096	4.25	2	0.5	Animal
09/07/11	14R-32L	Plastic tab	0.17637	3.375	0.725	0.25	Plastic
09/07/11	14R-32L	Metal tag	0.282192	3.75	0.25	0.125	Metal
09/07/11	14R-32L	Metal bracket	0.17637	1.5	0.5	0.125	Metal
09/07/11	14R-32L	Metal fragment	0.423288	0.625	0.5	0.5	Metal
09/07/11	14R-32L	Metal fragment	0.035274	0.5	0.375	0.25	Metal
09/07/11	14R-32L	Screw	0.105822	1.125	0.25	0.25	Metal
09/07/11	14R-32L	Washer	0.035274	0.375	0.375	0.125	Metal
09/07/11	14R-32L	Washer	0.035274	0.375	0.375	0.125	Metal
09/07/11	14R-32L	Metal button	0.035274	0.375	0.375	0.125	Metal
09/07/11	14R-32L	Coiled wire	0.035274	0.375	0.375	0.125	Metal
09/22/11	4R-22L	Trash	0.035274	–	–	–	Other
09/22/11	4R-22L	Metal bristles	0.070548	–	–	–	Metal
09/22/11	4R-22L	Luggage keys	0.105822	1	0.625	0.125	Metal
09/22/11	4R-22L	Luggage key	0.070548	1.125	0.5	0.125	Metal
09/22/11	4R-22L	Safety pin	0.035274	2	0.25	0.125	Metal
09/22/11	4R-22L	Twisted wire	0.035274	2.75	0.25	0.125	Metal
09/22/11	4R-22L	Thin u shaped wire	0.035274	1	0.25	0.125	Metal
09/22/11	4R-22L	Luggage lock shackle	0.070548	1.125	0.5	0.125	Metal
09/22/11	4R-22L	Quarter	0.282192	0.875	0.875	0.125	Metal
09/22/11	4R-22L	Screw	0.070548	0.875	0.875	0.125	Metal
09/22/11	4R-22L	Screw	0.070548	0.625	0.375	0.125	Metal
09/22/11	4R-22L	Screw	0.070548	0.625	0.375	0.125	Metal
09/22/11	4R-22L	Silver luggage lock roller	0.070548	0.5	0.5	0.125	Metal
09/22/11	4R-22L	Gold luggage lock roller	0.070548	0.5	0.5	0.125	Metal
09/22/11	4R-22L	Nut	0.17637	0.5	0.5	0.5	Metal
09/22/11	4R-22L	Washer	0.105822	0.625	0.625	0.125	Metal
09/29/11	14L-32R	Broken glass	0.493836	–	–	–	Glass
09/29/11	14L-32R	Paint chips	14.532888	–	–	–	Paint
09/29/11	14L-32R	Concrete chunk	1.728426	2.125	1.75	0.75	Concrete

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
09/29/11	14L-32R	Concrete chunk	1.834248	2	1.25	1.125	Concrete
09/29/11	14L-32R	Concrete chunk	1.164042	1.875	1.25	0.75	Concrete
09/29/11	14L-32R	Concrete chunk	1.093494	1.75	1.25	1	Concrete
09/29/11	14L-32R	Tar strip	0.458562	3.5	1	0.25	Tar
09/29/11	14L-32R	Tar strip	0.846576	2.125	1	0.625	Tar
09/29/11	14L-32R	Black metal pin	0.070548	2.75	0.25	0.125	Metal
09/29/11	14L-32R	Curled metal pin	0.070548	2.125	0.25	0.125	Metal
09/29/11	14L-32R	Metal luggage tag	0.141096	1.5	0.375	0.125	Metal
09/29/11	14L-32R	Metal luggage tag	0.599658	1.75	0.625	0.25	Metal
09/29/11	14L-32R	Metal luggage tag	0.070548	1.375	0.375	0.125	Metal
09/29/11	14L-32R	Metal luggage tag	0.070548	1.375	0.375	0.125	Metal
09/29/11	14L-32R	Metal luggage tag	0.070548	1	0.375	0.125	Metal
09/29/11	14L-32R	Metal luggage tag	0.246918	1.25	0.5	0.25	Metal
09/29/11	14L-32R	Metal luggage tag	0.17637	1.25	0.5	0.125	Metal
09/29/11	14L-32R	Metal luggage tag	0.070548	1.125	0.25	0.125	Metal
09/29/11	14L-32R	Metal luggage tag	0.246918	1.75	0.625	0.125	Metal
09/29/11	14L-32R	Metal luggage tag	0.141096	1.25	0.625	0.125	Metal
09/29/11	14L-32R	Metal luggage tag	0.105822	1.5	0.375	0.125	Metal
09/29/11	14L-32R	Metal luggage tag	0.246918	1.5	0.5	0.125	Metal
09/29/11	14L-32R	Metal luggage tag	0.317466	1.5	0.625	0.25	Metal
09/29/11	14L-32R	Metal luggage tag	0.17637	1.5	0.625	0.25	Metal
09/29/11	14L-32R	Broken metal luggage tag	0.070548	0.5	0.375	0.125	Metal
09/29/11	14L-32R	Broken metal luggage tag	0.070548	0.625	0.5	0.125	Metal
09/29/11	14L-32R	Broken metal luggage tag	0.035274	0.375	0.375	0.125	Metal
09/29/11	14L-32R	Broken metal luggage tag	0.035274	0.5	0.375	0.125	Metal
09/29/11	14L-32R	Broken metal luggage tag	0.070548	0.5	0.375	0.125	Metal
09/29/11	14L-32R	Broken metal luggage tag	0.070548	0.75	0.5	0.125	Metal
09/29/11	14L-32R	Metal luggage tag	0.17637	1	0.625	0.125	Metal
09/29/11	14L-32R	Broken zipper housing	0.070548	0.75	0.5	0.25	Metal
09/29/11	14L-32R	Broken zipper housing	0.035274	0.375	0.375	0.125	Metal
09/29/11	14L-32R	Plastic zipper tag	0.035274	0.625	0.375	0.125	Plastic
09/29/11	14L-32R	Luggage lock shackle	0.070548	1.125	0.625	0.125	Metal
09/29/11	14L-32R	Small plastic wheel	0.035274	0.5	0.5	0.25	Plastic
09/29/11	14L-32R	Broken luggage lock	0.17637	0.875	0.75	0.375	Metal
09/29/11	14L-32R	Metal luggage tag	0.17637	1	0.5	0.125	Metal
09/29/11	14L-32R	Metal locket	0.070548	0.625	0.625	0.125	Metal
09/29/11	14L-32R	Metal luggage key	0.035274	0.875	0.5	0.125	Metal
09/29/11	14L-32R	Small metal disk	0.035274	0.625	0.625	0.125	Metal
09/29/11	14L-32R	Small grey disk	0.035274	0.5	0.5	0.125	Metal
09/29/11	14L-32R	Bb	0.070548	0.25	0.25	0.25	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
09/29/11	14L-32R	Bb	0.070548	0.25	0.25	0.25	Metal
09/29/11	14L-32R	Bb	0.035274	0.25	0.25	0.25	Metal
09/29/11	14L-32R	Bb	0.035274	0.25	0.25	0.25	Metal
09/29/11	14L-32R	Bb	0.035274	0.125	0.125	0.125	Metal
09/29/11	14L-32R	Plastic wire cover	0.070548	1	0.5	0.375	Plastic
09/29/11	14L-32R	Plastic wire connector	0.070548	1.5	0.5	0.25	Plastic
09/29/11	14L-32R	Metallic plastic shard	0.035274	0.75	0.625	0.125	Other
09/29/11	14L-32R	Broken red reflector	0.035274	1	0.625	0.25	Glass
09/29/11	14L-32R	Orange strap	0.035274	0.25	0.5	0.125	Cloth
09/29/11	14L-32R	Plastic button	0.035274	0.625	0.625	0.125	Plastic
09/29/11	14L-32R	Penny	0.070548	0.75	0.75	0.125	Metal
09/29/11	14L-32R	Dime	0.070548	0.625	0.625	0.125	Metal
09/29/11	14L-32R	Worn bearing wheel	0.952398	2	2	0.375	Metal
09/29/11	14L-32R	Broken bearing wheel	0.458562	2.125	2	0.25	Metal
09/29/11	14L-32R	Large rusted staple	0.246918	4.25	1.75	0.125	Metal
09/29/11	14L-32R	Broken half inch socket	0.811302	1.25	0.75	0.75	Metal
09/29/11	14L-32R	Metal pin hold	0.282192	1.375	0.375	0.375	Metal
09/29/11	14L-32R	Rusted metal shard	0.52911	1.25	0.875	0.25	Metal
09/29/11	14L-32R	Broken metal shard	0.388014	1.25	0.5	0.25	Metal
09/29/11	14L-32R	Broken metal shard	0.105822	1.125	0.25	0.125	Metal
09/29/11	14L-32R	Broken metal shard	0.141096	0.875	0.25	0.25	Metal
09/29/11	14L-32R	Rusted metal wire	0.035274	1	0.5	0.125	Metal
09/29/11	14L-32R	Broken luggage tag	0.035274	0.5	0.375	0.125	Metal
09/29/11	14L-32R	Broken luggage tag	0.035274	0.375	0.375	0.125	Metal
09/29/11	14L-32R	Broken luggage tag	0.035274	0.875	0.375	0.125	Metal
09/29/11	14L-32R	Broken luggage key	0.035274	0.625	0.375	0.125	Metal
09/29/11	14L-32R	Metal wire connector	0.035274	0.625	0.25	0.125	Metal
09/29/11	14L-32R	Small roller bearing casing	0.035274	1.125	0.625	0.125	Metal
09/29/11	14L-32R	Broken wire jack	0.035274	2	0.375	0.125	Metal
09/29/11	14L-32R	Small metal chain	0.105822	2.375	0.25	0.125	Metal
09/29/11	14L-32R	Tiny metal chain	0.035274	0.75	0.125	0.125	Metal
09/29/11	14L-32R	Small metal fragment	0.035274	0.5	0.25	0.125	Metal
09/29/11	14L-32R	Small metal wheel	0.035274	0.5	0.5	0.125	Metal
09/29/11	14L-32R	Small metal wheel	0.035274	0.375	0.375	0.125	Metal
09/29/11	14L-32R	Small rubber gasket	0.035274	0.375	0.375	0.125	Rubber
09/29/11	14L-32R	Small rubber gasket	0.035274	0.25	0.25	0.125	Rubber
09/29/11	14L-32R	Washer	0.17637	0.875	0.875	0.125	Metal
09/29/11	14L-32R	Rusted washer	0.141096	0.75	0.75	0.125	Metal
09/29/11	14L-32R	Bent washer	0.070548	0.875	0.5	0.125	Metal
09/29/11	14L-32R	Small washer	0.035274	0.5	0.5	0.125	Metal
09/29/11	14L-32R	Small washer	0.035274	0.5	0.5	0.125	Metal
09/29/11	14L-32R	Small thin washer	0.035274	0.5	0.5	0.125	Metal
09/29/11	14L-32R	Small convex washer	0.035274	0.375	0.375	0.125	Metal
09/29/11	14L-32R	Tiny washer	0.035274	0.25	0.25	0.125	Metal
09/29/11	14L-32R	Tiny washer	0.035274	0.375	0.375	0.375	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
09/29/11	14L-32R	Nut	0.246918	0.5	0.5	0.25	Metal
09/29/11	14L-32R	Nut	0.141096	0.375	0.375	0.25	Metal
09/29/11	14L-32R	Nut	0.070548	0.375	0.375	0.125	Metal
09/29/11	14L-32R	Nut	0.070548	0.375	0.375	0.125	Metal
09/29/11	14L-32R	Nut	0.035274	0.375	0.375	0.125	Metal
09/29/11	14L-32R	Nut	0.035274	0.375	0.375	0.125	Metal
09/29/11	14L-32R	Nut	0.035274	0.375	0.375	0.125	Metal
09/29/11	14L-32R	Nut	0.035274	0.25	0.25	0.125	Metal
09/29/11	14L-32R	Nut	0.035274	0.25	0.25	0.125	Metal
09/29/11	14L-32R	Broken rotator	0.070548	0.375	0.25	0.25	Metal
09/29/11	14L-32R	Broken rotator	0.070548	0.375	0.25	0.25	Metal
09/29/11	14L-32R	Broken rotator	0.035274	0.25	0.25	0.25	Metal
09/29/11	14L-32R	Screw	0.141096	1.25	0.375	0.375	Metal
09/29/11	14L-32R	Bent screw	0.070548	0.75	0.375	0.25	Metal
09/29/11	14L-32R	Tiny bolt	0.035274	0.375	0.25	0.25	Metal
09/29/11	14L-32R	Broken rivet	0.035274	0.375	0.375	0.25	Metal
09/29/11	14L-32R	Broken rivet	0.035274	0.375	0.375	0.375	Metal
09/29/11	14L-32R	Broken rivet	0.035274	0.375	0.25	0.25	Metal
09/29/11	14L-32R	Rivet cap	0.035274	0.375	0.375	0.125	Metal
09/29/11	14L-32R	Metal fragment	0.070548	0.75	0.375	0.125	Metal
09/29/11	14L-32R	Metal fragment	0.070548	1.125	0.25	0.125	Metal
09/29/11	14L-32R	Metal fragment	0.035274	0.625	0.375	0.125	Metal
09/29/11	14L-32R	Metal fragment	0.035274	0.375	0.375	0.125	Metal
09/29/11	14L-32R	Metal fragment	0.035274	0.375	0.125	0.125	Metal
09/29/11	14R-32L	Small convex washer	0.035274	0.375	0.375	0.125	Metal
10/05/11	9R-27L	Paint chips	4.444524	–	–	–	Paint
10/05/11	9R-27L	Trash	0.317466	–	–	–	Other
10/05/11	9R-27L	Concrete chunk	1.622604	1.625	1.5	0.875	Concrete
10/05/11	9R-27L	Thin metal strips	0.211644	–	–	–	Metal
10/05/11	9R-27L	Asphalt chunk	0.917124	1.5	1	0.875	Asphalt
10/05/11	9R-27L	Tar strip	0.564384	3.5	0.875	0.25	Tar
10/05/11	9R-27L	Rubber piece	0.035274	1.75	0.375	0.25	Rubber
10/05/11	9R-27L	Wood piece	0.458562	6.25	0.5	0.5	Wood
10/05/11	9R-27L	Metal fragment	0.035274	0.375	0.25	0.25	Metal
10/05/11	9R-27L	Small metal cylinder	0.070548	0.375	0.25	0.25	Metal
10/05/11	9R-27L	3/8″ diameter plastic wire covering	0.423288	–	–	–	Plastic
10/05/11	9R-27L	BB	0.070548	0.25	0.25	0.25	Metal
10/05/11	9R-27L	BB	0.035274	0.25	0.25	0.25	Metal
10/05/11	9R-27L	Ribbed washer	0.035274	0.625	0.625	0.125	Metal
10/05/11	9R-27L	Ribbed washer	0.035274	0.625	0.625	0.125	Metal
10/05/11	9R-27L	Ribbed washer	0.035274	0.625	0.625	0.125	Metal
10/05/11	9R-27L	Ribbed washer	0.035274	0.625	0.625	0.125	Metal
10/05/11	9R-27L	Bolt assembly	0.599658	0.875	0.5	0.5	Metal
10/05/11	9R-27L	Bolt	1.375686	2.75	0.5	0.5	Metal
10/05/11	9R-27L	Screw	0.17637	1.375	0.375	0.375	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
10/05/11	9R-27L	Screw	0.105822	1	0.375	0.375	Metal
10/05/11	9R-27L	Screw	0.141096	0.625	0.5	0.5	Metal
10/05/11	9R-27L	Screw	0.105822	0.75	0.375	0.375	Metal
10/05/11	9R-27L	Screw	0.070548	0.625	0.375	0.375	Metal
10/05/11	9R-27L	Screw	0.070548	0.625	0.25	0.25	Metal
10/05/11	9R-27L	Screw	0.070548	0.5	0.375	0.375	Metal
10/05/11	9R-27L	Screw	0.070548	0.5	0.25	0.25	Metal
10/12/11	9L-27R	Paint chips	1.269864	–	–	–	Paint
10/12/11	9L-27R	Broken glass	0.317466	–	–	–	Glass
10/12/11	9L-27R	Trash	0.035274	–	–	–	Other
10/12/11	9L-27R	Metal bristles	0.388014	–	–	–	Metal
10/12/11	9L-27R	Corrugated metal strips	0.035274	–	–	–	Metal
10/12/11	9L-27R	Knife fragment	0.17637	1.125	0.875	0.125	Metal
10/12/11	9L-27R	Concrete chunk	4.550346	2	1.875	1.25	Concrete
10/12/11	9L-27R	Concrete chunk	3.562674	2	1.625	1.375	Concrete
10/12/11	9L-27R	Concrete chunk	3.315756	2	1.75	1.375	Concrete
10/12/11	9L-27R	Concrete chunk	1.199316	1.625	1.25	0.75	Concrete
10/12/11	9L-27R	Concrete chunk	1.022946	1.5	1.25	0.875	Concrete
10/12/11	9L-27R	Flat metal fragment	0.458562	3	1.625	0.125	Metal
10/12/11	9L-27R	Small pin	0.035274	1.25	0.25	0.125	Metal
10/12/11	9L-27R	Ribbed washer	0.035274	0.625	0.625	0.125	Metal
10/12/11	9L-27R	Washer	0.035274	0.375	0.375	0.125	Metal
10/12/11	9L-27R	Nut	0.035274	0.375	0.375	0.125	Metal
10/12/11	9L-27R	Lock washer	0.035274	0.25	0.25	0.125	Metal
10/12/11	9L-27R	Screw	0.070548	0.625	0.25	0.25	Metal
10/12/11	9L-27R	BB	0.035274	0.125	0.125	0.125	Metal
10/12/11	9L-27R	BB	0.035274	0.125	0.125	0.125	Metal
10/12/11	9L-27R	Broken wire connector	0.070548	1.5	0.25	0.25	Metal
11/01/11	10-28	Trash	0.070548	–	–	–	Other
11/01/11	10-28	Metal bristles	0.035274	–	–	–	Metal
11/01/11	10-28	Concrete chunk	3.456852	2.5	1.75	0.875	Concrete
11/01/11	10-28	Asphalt chunk	1.657878	1	1	0.875	Asphalt
11/01/11	10-28	Metal wire	0.035274	9	0.125	0.125	Metal
11/01/11	10-28	Metal zipper tag	0.17637	1.25	0.5	0.25	Metal
11/01/11	10-28	Metal zipper tag	0.070548	1.25	0.5	0.125	Metal
11/01/11	10-28	Metal zipper tag	0.070548	0.625	0.5	0.25	Metal
11/01/11	10-28	Broken rivet head	0.035274	0.25	0.25	0.25	Metal
11/01/11	10-28	Smashed metal piece	0.035274	0.375	0.375	0.125	Metal
11/01/11	10-28	Metal tag	0.141096	1.25	0.875	0.125	Metal
11/01/11	10-28	Metal disk	0.211644	0.75	0.75	0.125	Metal
11/01/11	10-28	Yellow metal valve cap	0.141096	1	1	0.5	Metal
11/01/11	10-28	Metal valve cap	0.141096	1	0.375	0.375	Metal
11/01/11	10-28	Small screw	0.070548	0.625	0.375	0.375	Metal
11/01/11	10-28	Cap screw	0.105822	0.875	0.375	0.375	Metal
11/01/11	10-28	Broken rotator part	0.070548	0.625	0.25	0.25	Metal
11/01/11	10-28	Washer	0.035274	1	1	0.125	Metal
11/01/11	10-28	Washer	0.035274	0.625	0.625	0.125	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
11/01/11	10-28	Washer	0.070548	0.625	0.625	0.125	Metal
11/15/11	14R-32L	Paint chips	0.493836	–	–	–	Paint
11/15/11	14R-32L	Asphalt chunk	1.022946	1.5	1	0.75	Asphalt
11/15/11	14R-32L	Tar strip	0.776028	5.5	0.625	0.25	Tar
11/15/11	14R-32L	Nail shaft	0.070548	1.625	0.125	0.125	Metal
11/15/11	14R-32L	Screw	0.141096	0.75	0.375	0.375	Metal
11/15/11	14R-32L	Screw	0.070548	0.5	0.25	0.25	Metal
11/15/11	14R-32L	Washer	0.105822	0.625	0.625	0.125	Metal
12/01/11	14L-32R	Paint chips	3.280482	–	–	–	Paint
12/01/11	14L-32R	Trash	0.035274	–	–	–	Other
12/01/11	14L-32R	Plastic fragment	0.070548	1.875	0.675	0.125	Plastic
12/01/11	14L-32R	Tar strip	0.105822	2	0.375	0.25	Tar
12/01/11	14L-32R	Buckle	0.070548	0.875	0.625	0.125	Metal
12/01/11	14L-32R	Rubber tag end	0.105822	0.75	0.375	0.25	Rubber
12/01/11	14L-32R	Bolt	0.52911	1.25	0.5	0.5	Metal
12/01/11	14L-32R	Washer	0.070548	0.625	0.625	0.125	Metal
12/01/11	14L-32R	Washer	0.070548	0.625	0.625	0.125	Metal
12/01/11	14L-32R	Metal spring	0.035274	0.5	0.25	0.125	Metal
12/01/11	14L-32R	Metal cap	0.035274	0.375	0.375	0.125	Metal
12/01/11	14L-32R	Metal fragment	0.035274	0.75	0.25	0.125	Metal
12/01/11	14L-32R	Rubber cap	0.035274	0.5	0.25	0.25	Rubber
12/07/11	4L-22R	Trash	0.282192	–	–	–	Other
12/07/11	4L-22R	Paint chips	2.11644	–	–	–	Paint
12/07/11	4L-22R	Metal banding	1.693152	27	5.5	0.25	Metal
12/07/11	4L-22R	Concrete chunk	12.486996	4.5	2.5	1.75	Concrete
12/07/11	4L-22R	Concrete chunk	2.257536	2.75	1.875	0.875	Concrete
12/07/11	4L-22R	Asphalt chunk	1.834248	2.125	1.875	1	Asphalt
12/07/11	4L-22R	Asphalt chunk	1.05822	1.25	1.125	1	Asphalt
12/07/11	4L-22R	Tire shred	0.070548	4.75	0.5	0.125	Rubber
12/07/11	4L-22R	Plastic fragment	0.070548	3.5	0.75	0.125	Plastic
12/07/11	4L-22R	Plastic fragment	0.070548	2.25	0.25	0.25	Plastic
12/07/11	4L-22R	Plastic fragment	0.035274	1.625	0.5	0.125	Plastic
12/07/11	4L-22R	Plastic fragment	0.070548	1.125	0.625	0.375	Plastic
12/07/11	4L-22R	Rubber cap	0.070548	1.125	0.75	0.75	Rubber
12/07/11	4L-22R	Rubber coil	0.035274	0.5	0.25	0.25	Rubber
12/07/11	4L-22R	Rubber tag end	0.035274	0.375	0.125	0.125	Rubber
12/07/11	4L-22R	Metal fragment	0.105822	0.875	0.75	0.25	Metal
12/07/11	4L-22R	Bolt	0.070548	0.5	0.5	0.5	Metal
12/07/11	4L-22R	Lock washer	0.105822	0.625	0.625	0.125	Metal
12/07/11	4L-22R	Washer	0.035274	0.625	0.625	0.125	Metal
12/07/11	4L-22R	Metal rotator	0.070548	0.5	0.25	0.25	Metal
12/07/11	4L-22R	Small screw bracket	0.070548	0.625	0.375	0.25	Metal
12/07/11	4L-22R	Bb	0.141096	0.375	0.375	0.375	Metal
12/07/11	4L-22R	Luggage tag	0.141096	1.5	0.375	0.25	Metal
12/07/11	4L-22R	Screw	0.141096	1	0.25	0.25	Metal
12/07/11	4L-22R	Screw	0.070548	0.875	0.375	0.375	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
12/07/11	4L-22R	Screw	0.070548	0.625	0.375	0.375	Metal
12/07/11	4L-22R	Screw	0.035274	0.375	0.25	0.25	Metal
12/13/11	9R-27L	Trash	0.317466	–	–	–	Other
12/13/11	9R-27L	Paint chips	0.423288	–	–	–	Paint
12/13/11	9R-27L	Metal bristles	0.317466	–	–	–	Metal
12/13/11	9R-27L	Broken glass	0.070548	–	–	–	Glass
12/13/11	9R-27L	Concrete chunk	1.375686	1.625	1.25	0.625	Concrete
12/13/11	9R-27L	Plastic fragment	0.070548	2.625	0.375	0.125	Plastic
12/13/11	9R-27L	Foam sealant	0.035274	7.5	0.625	0.625	Rubber
12/13/11	9R-27L	Metal fragment	0.035274	3.25	0.25	0.125	Metal
12/13/11	9R-27L	Metal fragment	0.035274	0.625	0.375	0.125	Metal
12/13/11	9R-27L	Dime	0.070548	0.75	0.75	0.125	Metal
12/13/11	9R-27L	Paper clip	0.035274	1	0.375	0.125	Metal
12/13/11	9R-27L	Threaded socket	0.035274	0.375	0.375	0.25	Metal
12/13/11	9R-27L	Lock washer	0.035274	0.5	0.5	0.125	Metal
12/13/11	9R-27L	Bb	0.141096	0.375	0.375	0.375	Metal
12/13/11	9R-27L	Bb	0.035274	0.25	0.25	0.25	Metal
12/13/11	9R-27L	Bb	0.035274	0.25	0.25	0.25	Metal
12/13/11	9R-27L	Bb	0.035274	0.25	0.25	0.25	Metal
12/13/11	9R-27L	Bb	0.035274	0.25	0.25	0.25	Metal
12/13/11	9R-27L	Bb	0.035274	0.25	0.25	0.25	Metal
12/13/11	9R-27L	Screw	0.141096	1.125	0.375	0.375	Metal
12/13/11	9R-27L	Screw	0.070548	0.875	0.375	0.375	Metal
12/13/11	9R-27L	Screw	0.070548	0.625	0.375	0.375	Metal
12/13/11	9R-27L	Screw	0.070548	0.625	0.375	0.375	Metal
12/22/11	4R-22L	Paint chips	4.373976	–	–	–	Paint
12/22/11	4R-22L	Trash	0.211644	–	–	–	Other
12/22/11	4R-22L	Metal bristles	0.35274	–	–	–	Metal
12/22/11	4R-22L	Asphalt chunk	3.950688	2.875	1.75	1.25	Asphalt
12/22/11	4R-22L	Asphalt chunk	3.950688	2.5	1.75	1.375	Asphalt
12/22/11	4R-22L	Asphalt chunk	3.209934	2.5	1.75	1.25	Asphalt
12/22/11	4R-22L	Asphalt chunk	2.857194	2.375	1.5	1.75	Asphalt
12/22/11	4R-22L	Asphalt chunk	2.11644	2	1.5	1.5	Asphalt
12/22/11	4R-22L	Asphalt chunk	2.151714	2	1.375	1.375	Asphalt
12/22/11	4R-22L	Asphalt chunk	1.23459	2.25	1.375	1.125	Asphalt
12/22/11	4R-22L	Asphalt chunk	1.128768	1.625	1.375	1	Asphalt
12/22/11	4R-22L	Asphalt chunk	1.446234	2	1.75	1.25	Asphalt
12/22/11	4R-22L	Asphalt chunk	1.269864	2	1.25	1.125	Asphalt
12/22/11	4R-22L	Asphalt chunk	1.022946	1.625	1.25	1	Asphalt
12/22/11	4R-22L	Asphalt chunk	0.670206	1.375	1.125	1	Asphalt
12/22/11	4R-22L	Asphalt chunk	0.776028	1.375	1.125	1	Asphalt
12/22/11	4R-22L	Asphalt chunk	0.776028	1.375	1.125	1	Asphalt
12/22/11	4R-22L	Asphalt chunk	0.776028	1.375	1.125	1	Asphalt
12/22/11	4R-22L	Asphalt chunk	0.493836	1.875	1	0.75	Asphalt
12/22/11	4R-22L	Asphalt chunk	0.423288	1.125	0.875	0.75	Asphalt
12/22/11	4R-22L	Asphalt chunk	0.634932	1.5	0.875	0.25	Asphalt

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
12/22/11	4R-22L	Asphalt chunk	0.388014	1.5	1	0.625	Asphalt
12/22/11	4R-22L	Rock	1.05822	1.875	1.375	0.75	Other
12/22/11	4R-22L	Plastic buckle	0.282192	2.375	2	0.5	Plastic
12/22/11	4R-22L	Rubber piece	0.105822	4	0.25	0.25	Rubber
12/22/11	4R-22L	Cloth strap	0.070548	6.25	0.375	0.125	Cloth
12/22/11	4R-22L	Copper wire piece	0.105822	1.25	0.25	0.25	Metal
12/22/11	4R-22L	Zipper housing	0.035274	0.5	0.375	0.125	Metal
12/22/11	4R-22L	Zipper housing	0.070548	0.5	0.5	0.125	Metal
12/22/11	4R-22L	Safety pin	0.035274	1	0.75	0.125	Metal
01/04/12	10-28	Paint chips	6.70206	–	–	–	Paint
01/04/12	10-28	Trash	0.458562	–	–	–	Other
01/04/12	10-28	Metal bristles	0.070548	–	–	–	Metal
01/04/12	10-28	Asphalt chunk	5.044182	3.25	2	2	Asphalt
01/04/12	10-28	Asphalt chunk	1.657878	2.75	1.5	1.125	Asphalt
01/04/12	10-28	Asphalt chunk	0.987672	2.25	1.25	1	Asphalt
01/04/12	10-28	Concrete chunk	1.269864	2.25	1.25	1	Concrete
01/04/12	10-28	Concrete chunk	0.776028	1.625	1.5	0.5	Concrete
01/04/12	10-28	Tar chunk	1.022946	3	1.25	1.125	Tar
01/04/12	10-28	Tar chunk	0.282192	2.75	0.75	0.375	Tar
01/04/12	10-28	Tar strip	0.634932	3.375	0.5	0.5	Tar
01/04/12	10-28	Cloth strap	1.164042	32	1	0.125	Cloth
01/04/12	10-28	Round rubber fragment	0.317466	2.625	2.125	0.375	Rubber
01/04/12	10-28	Plastic fragment	0.035274	1.75	1.25	0.125	Plastic
01/04/12	10-28	Plastic fragment	0.070548	2.125	0.5	0.25	Plastic
01/04/12	10-28	Plastic fragment	0.070548	1.375	0.625	0.25	Plastic
01/04/12	10-28	Hub cap top	3.492126	2.5	2.5	1.25	Metal
01/04/12	10-28	Metal zipper tag	0.141096	1.625	0.5	0.125	Metal
01/04/12	10-28	Metal zipper tag	0.141096	1.25	0.5	0.125	Metal
01/04/12	10-28	Luggage key	0.035274	0.875	0.5	0.125	Metal
01/04/12	10-28	Bobby pin	0.035274	2	0.125	0.125	Metal
01/04/12	10-28	Metal eyelet	0.035274	0.25	0.25	0.125	Metal
01/04/12	10-28	Pencil eraser	0.035274	0.625	0.375	0.125	Rubber
01/04/12	10-28	Screw	0.105822	1.5	0.25	0.25	Metal
01/04/12	10-28	Screw	0.070548	0.75	0.25	0.25	Metal
01/04/12	10-28	Screw	0.035274	0.625	0.25	0.25	Metal
01/04/12	10-28	Screw	0.070548	0.625	0.25	0.25	Metal
01/04/12	10-28	Screw	0.070548	0.625	0.25	0.25	Metal
01/04/12	10-28	Screw	0.070548	0.625	0.25	0.25	Metal
01/04/12	10-28	Screw	0.070548	0.5	0.25	0.25	Metal
01/04/12	10-28	Elbow joint	0.246918	0.875	0.5	0.375	Metal
01/04/12	10-28	Penny	0.105822	0.75	0.75	0.125	Metal
01/04/12	10-28	Antenna	0.246918	6.25	0.25	0.25	Metal
01/10/12	4L-22R	Trash	0.493836	–	–	–	Other
01/10/12	4L-22R	Metal bristles	0.317466	–	–	–	Metal
01/10/12	4L-22R	Paint chips	1.728426	–	–	–	Paint
01/10/12	4L-22R	Tar strip	0.388014	3.75	0.75	0.25	Tar

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
01/10/12	4L-22R	Tar strip	0.105822	1.875	0.5	0.25	Tar
01/10/12	4L-22R	Tar chunk	0.105822	1.5	1.125	0.25	Tar
01/10/12	4L-22R	Rubber piece	0.070548	2.625	0.625	0.625	Rubber
01/10/12	4L-22R	Broken luggage lock	0.141096	0.875	0.5	0.125	Metal
01/10/12	4L-22R	Bent paperclip	0.035274	2.75	0.5	0.125	Metal
01/10/12	4L-22R	Broken safety pin	0.035274	0.75	0.375	0.125	Metal
01/10/12	4L-22R	Spring	0.035274	0.75	0.25	0.25	Metal
01/10/12	4L-22R	Metal fragment	0.246918	0.75	0.25	0.25	Metal
01/10/12	4L-22R	Screw	0.070548	0.625	0.25	0.25	Metal
01/10/12	4L-22R	Washer	0.035274	0.625	0.625	0.125	Metal
01/10/12	4L-22R	Broken washer	0.035274	0.625	0.375	0.125	Metal
01/18/12	9L-27R	Metal bristles	0.564384	–	–	–	Metal
01/24/12	14L-32R	Paint chips	3.033564	–	–	–	Paint
01/24/12	14L-32R	Trash	0.035274	–	–	–	Other
01/24/12	14L-32R	Metal bristles	1.022946	–	–	–	Metal
01/24/12	14L-32R	Washer	0.035274	0.625	0.625	0.125	Metal
02/01/12	9R-27L	Metal bristles	4.373976	–	–	–	Metal
02/01/12	9R-27L	Plastic bristles	0.070548	–	–	–	Plastic
02/01/12	9R-27L	Trash	0.070548	–	–	–	Other
02/01/12	9R-27L	Paint chips	5.855484	–	–	–	Paint
02/01/12	9R-27L	Asphalt chunk	1.022946	1.625	1.125	1	Asphalt
02/01/12	9R-27L	Concrete chunk	1.164042	2.625	1	0.875	Concrete
02/01/12	9R-27L	Tar chunk	0.423288	2.5	1.875	0.5	Tar
02/01/12	9R-27L	Tar strip	0.246918	2.875	0.75	0.325	Tar
02/01/12	9R-27L	Yellow Plastic Fragment x3	0.141096	–	–	–	Plastic
02/01/12	9R-27L	Plastic fragment	0.070548	0.75	0.375	0.25	Plastic
02/01/12	9R-27L	Bolt	0.493836	0.625	0.625	0.325	Metal
02/01/12	9R-27L	Screw with Washer	0.070548	0.5	0.625	0.625	Metal
02/01/12	9R-27L	Screw	0.070548	0.625	0.25	0.25	Metal
02/01/12	9R-27L	Screw	0.070548	0.675	0.25	0.25	Metal
02/01/12	9R-27L	Screw	0.070548	0.625	0.25	0.25	Metal
02/09/12	14R-32L	Metal bristles	0.917124	–	–	–	Metal
02/09/12	14R-32L	Plastic bristles	0.141096	–	–	–	Plastic
02/09/12	14R-32L	Paint chips	4.479798	–	–	–	Paint
02/09/12	14R-32L	Blue plastic strip	0.035274	6.5	0.125	0.125	Plastic
02/09/12	14R-32L	Yellow plastic fragment	0.035274	1.625	0.5	0.125	Plastic
02/09/12	14R-32L	Rubber piece	0.17637	3	1.625	0.125	Rubber
02/09/12	14R-32L	Rubber grommet	0.070548	1.375	1.375	0.25	Rubber
02/09/12	14R-32L	Spring	0.035274	0.25	0.25	0.125	Metal
02/09/12	14R-32L	Metal fragment	0.035274	0.5	0.25	0.125	Metal
02/09/12	14R-32L	Screw	0.035274	0.625	0.25	0.25	Metal
02/09/12	14R-32L	Metal rotator	0.070548	0.5	0.25	0.25	Metal
02/09/12	14R-32L	Phillips head bit	0.17637	1	0.25	0.25	Metal
02/15/12	10-28	Metal bristles	1.05822	–	–	–	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
02/15/12	10-28	Paint chips	1.869522	–	–	–	Paint
02/15/12	10-28	Trash	0.070548	–	–	–	Other
02/15/12	10-28	Asphalt chunk	1.693152	2	1.325	1	Asphalt
02/15/12	10-28	Tire fragment	0.17637	2.875	1.625	0.25	Rubber
02/15/12	10-28	Rubber piece	0.35274	2.875	2	0.125	Rubber
02/15/12	10-28	Tire strip	0.17637	1.25	0.325	0.325	Rubber
02/15/12	10-28	Plastic fragment	0.070548	1.25	0.625	0.325	Plastic
02/15/12	10-28	Plastic fragment	0.105822	1.5	0.5	0.5	Plastic
02/15/12	10-28	Plastic fragment	0.035274	1.125	0.5	0.125	Plastic
02/15/12	10-28	Glass fragment	0.105822	0.75	0.625	0.25	Glass
02/15/12	10-28	Rivet	0.070548	0.325	0.325	0.325	Metal
02/15/12	10-28	Broken rivet	0.035274	0.325	0.325	0.125	Metal
02/15/12	10-28	Lock washer	0.105822	0.625	0.625	0.125	Metal
02/15/12	10-28	Screw	0.070548	0.5	0.325	0.325	Metal
02/15/12	10-28	Convex washer	0.035274	0.25	0.25	0.125	Metal
02/15/12	10-28	Broken zipper tag	0.035274	0.325	0.325	0.325	Metal
02/15/12	10-28	Bb	0.070548	0.25	0.25	0.25	Metal
02/23/12	4R-22L	Metal bristles	1.622604	–	–	–	Metal
02/23/12	4R-22L	Trash	0.035274	–	–	–	Other
02/23/12	4R-22L	Concrete chunk	1.728426	2	1.5	0.75	Concrete
02/23/12	4R-22L	Concrete chunk	1.164042	2.25	1.625	0.625	Concrete
02/23/12	4R-22L	Concrete chunk	1.199316	2	1	0.875	Concrete
02/23/12	4R-22L	Plastic fragments	0.141096	–	–	–	Plastic
02/23/12	4R-22L	Metal fragments	0.070548	–	–	–	Metal
02/23/12	4R-22L	Metal wire	0.035274	1.625	0.5	0.125	Metal
02/23/12	4R-22L	Metal lug	2.610276	1.875	0.75	0.75	Metal
02/23/12	4R-22L	Luggage lock shank	0.105822	1	0.5	0.125	Metal
02/23/12	4R-22L	Wire connector	0.141096	4.625	0.75	0.25	Metal
02/23/12	4R-22L	Broken luggage tag	0.035274	0.25	0.25	0.125	Metal
02/23/12	4R-22L	Tiny screw	0.035274	0.25	0.25	0.25	Metal
02/28/12	4L-22R	Metal bristles	3.17466	–	–	–	Metal
02/28/12	4L-22R	Plastic bristles	0	–	–	–	Plastic
02/28/12	4L-22R	Paint chips	2.892468	–	–	–	Paint
02/28/12	4L-22R	Glass pieces	0.388014	–	–	–	Glass
02/28/12	4L-22R	Trash	0.246918	–	–	–	Other
02/28/12	4L-22R	Tar chunk	4.127058	6	2.375	1.125	Tar
02/28/12	4L-22R	Tar chunk	0.52911	1.25	1.5	0.75	Tar
02/28/12	4L-22R	Rubber fragment	0.141096	1.5	1.125	0.25	Rubber
02/28/12	4L-22R	Metal fragment	0.211644	1.5	1.25	0.375	Metal
02/28/12	4L-22R	Metal fragment	0.035274	0.625	0.25	0.125	Metal
02/28/12	4L-22R	Luggage key	0.035274	1	0.625	0.125	Metal
02/28/12	4L-22R	Bolt	1.375686	2.25	0.75	0.75	Metal
02/28/12	4L-22R	Wire connector	0.070548	2.375	0.375	0.25	Metal
02/28/12	4L-22R	Wire	0.035274	1.625	0.125	0.125	Metal
03/07/12	9L-27R	Metal bristles	1.093494	–	–	–	Metal
03/07/12	9L-27R	Paint chips	4.338702	–	–	–	Paint

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
03/07/12	9L-27R	Rubber shavings	0.917124	–	–	–	Rubber
03/07/12	9L-27R	Trash	0	–	–	–	Other
03/07/12	9L-27R	Joint material	0.88185	–	–	–	Rubber
03/07/12	9L-27R	Rubber pieces	0.17637	–	–	–	Rubber
03/07/12	9L-27R	Glass	0.317466	–	–	–	Glass
03/07/12	9L-27R	Paper clip	0.035274	3.25	1	0.125	Metal
03/07/12	9L-27R	Paper clip	0.035274	2	0.75	0.125	Metal
03/07/12	9L-27R	Luggage tag	0.211644	1.5	0.625	0.125	Metal
03/07/12	9L-27R	Metal fragment	0.070548	0.625	0.25	0.125	Metal
03/07/12	9L-27R	Metal rotator	0.035274	0.375	0.25	0.25	Metal
03/07/12	9L-27R	Metal rotator	0.035274	0.25	0.25	0.25	Metal
03/13/12	14L-32R	Metal bristles	0.846576	–	–	–	Metal
03/13/12	14L-32R	Paint chips	5.502744	–	–	–	Paint
03/13/12	14L-32R	Trash	0.035274	–	–	–	Other
03/13/12	14L-32R	Tar chunk	1.128768	3.125	2	1.5	Tar
03/13/12	14L-32R	Tar chunk	0.211644	2	1	0.75	Tar
03/13/12	14L-32R	Asphalt chunk	2.045892	2.125	1.75	1	Asphalt
03/13/12	14L-32R	Rubber chunk	0.282192	1.75	0.875	0.75	Rubber
04/05/12	10-28	Metal bristles	0.17637	–	–	–	Metal
04/05/12	10-28	Paint chips	1.269864	–	–	–	Paint
04/05/12	10-28	Asphalt chunk	2.257536	2.375	2	1	Asphalt
04/05/12	10-28	Asphalt chunk	1.199316	1.5	1.25	1	Asphalt
04/05/12	10-28	Asphalt chunk	0.317466	2	1.25	0.5	Asphalt
04/05/12	10-28	Plastic luggage wheel	0.317466	1.875	1.875	0.75	Plastic
04/05/12	10-28	Plastic zip tie	0	0.875	0.75	0.25	Plastic
04/05/12	10-28	Screw	0.070548	0.875	0.25	0.25	Metal
04/05/12	10-28	Nail	0.070548	1.375	0.125	0.125	Metal
04/05/12	10-28	Broken zipper tag	0.070548	0.5	0.375	0.125	Metal
04/05/12	10-28	Bb	0.070548	0.25	0.25	0.25	Metal
04/05/12	10-28	Bb	0.070548	0.25	0.25	0.25	Metal
04/10/12	4R-22L	Metal bristles	0.317466	–	–	–	Metal
04/10/12	4R-22L	Paint chips	2.963016	–	–	–	Paint
04/10/12	4R-22L	Concrete chunk	1.904796	1.625	1.5	1	Concrete
04/10/12	4R-22L	Screw	0.070548	0.625	0.125	0.125	Metal
04/10/12	4R-22L	Screw	0.070548	0.75	0.25	0.25	Metal
04/10/12	4R-22L	Screw	0.070548	0.625	0.25	0.25	Metal
04/10/12	4R-22L	Screw	0.070548	0.5	0.25	0.25	Metal
04/19/12	9L-27R	Metal bristles	0.035274	–	–	–	Metal
04/19/12	9L-27R	Paint chips	7.795554	–	–	–	Paint
04/19/12	9L-27R	Trash	0	–	–	–	Other
04/19/12	9L-27R	Expansion joint material	0.52911	5.25	0.75	0.25	Rubber
04/19/12	9L-27R	Expansion joint material	0.52911	5	0.625	0.25	Rubber
04/19/12	9L-27R	Expansion joint material	0.317466	4.875	0.5	0.25	Rubber

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
04/19/12	9L-27R	Cotter pin	0.141096	2	0.625	0.125	Metal
04/19/12	9L-27R	Screw	0.035274	0.375	0.375	0.375	Metal
04/24/12	4L-22R	Metal bristles	0.070548	–	–	–	Metal
04/24/12	4L-22R	Trash	0	–	–	–	Other
04/24/12	4L-22R	Asphalt chunk	1.128768	1.75	1.25	0.75	Asphalt
04/24/12	4L-22R	Concrete chunk	0.670206	1.5	1	0.625	Concrete
04/24/12	4L-22R	Tar piece	0.388014	1.5	1	0.625	Tar
05/03/12	14L-32R	Metal bristles	0.282192	–	–	–	Metal
05/03/12	14L-32R	Paint chips	0.811302	–	–	–	Paint
05/03/12	14L-32R	Trash	0.141096	–	–	–	Other
05/03/12	14L-32R	Concrete chunk	2.11644	1.625	1.5	1	Concrete
05/03/12	14L-32R	Concrete chunk	2.11644	1.375	1.25	1.25	Concrete
05/03/12	14L-32R	Concrete chunk	1.41096	1.875	1.25	1	Concrete
05/03/12	14L-32R	Concrete chunk	1.199316	1.5	1.375	1	Concrete
05/03/12	14L-32R	Asphalt chunk	0.846576	1.375	1.25	0.75	Asphalt
05/03/12	14L-32R	Broken plastic bottle	0.599658	4.25	2.375	0.75	Plastic
05/03/12	14L-32R	Plastic strip	0.388014	4.75	0.75	0.25	Plastic
05/03/12	14L-32R	Foam sealant	0	2.75	0.75	0.75	Rubber
05/03/12	14L-32R	Plastic piece	0	1.125	0.5	0.25	Plastic
05/03/12	14L-32R	Rubber gasket	0	0.625	0.625	0.125	Rubber
05/03/12	14L-32R	Plastic cog	0	0.625	0.375	0.125	Plastic
05/03/12	14L-32R	Screw cap	0.070548	0.5	0.5	0.375	Metal
05/03/12	14L-32R	Metal shard	0.17637	0.625	0.375	0.25	Metal
05/03/12	14L-32R	Metal shard	0	0.75	0.25	0.125	Metal
05/03/12	14L-32R	Bb	0.070548	0.25	0.25	0.25	Metal
05/03/12	14L-32R	Screw	0.070548	0.625	0.25	0.25	Metal
05/03/12	14L-32R	Crushed valve	0	0.75	0.125	0.125	Metal
05/03/12	14L-32R	Washer	0	0.25	0.25	0.125	Metal
05/03/12	14L-32R	Screw	0.246918	1.875	0.375	0.375	Metal
05/03/12	14L-32R	Twisted wire	0.070548	6	0.5	0.125	Metal
05/10/12	9R-27L	Metal bristles	0.035274	–	–	–	Metal
05/10/12	9R-27L	Paint chips	3.280482	–	–	–	Paint
05/10/12	9R-27L	Concrete chunk	1.128768	1.5	1.25	1.125	Concrete
05/10/12	9R-27L	Concrete strip	0.493836	2	0.75	0.375	Concrete
05/10/12	9R-27L	Asphalt chunk	1.199316	1.25	1.25	0.375	Asphalt
05/10/12	9R-27L	Tar strip	0.17637	3.125	0.625	0.375	Tar
05/10/12	9R-27L	Antenna	0.246918	6.25	0.25	0.25	Metal
05/10/12	9R-27L	Trash	0	–	–	–	Other
05/10/12	9R-27L	Luggage badge	0.423288	2.25	1.625	0.125	Metal
05/10/12	9R-27L	Broken luggage tag	0.070548	1.125	0.625	0.125	Metal
05/10/12	9R-27L	Broken luggage tag	0.105822	1.125	0.375	0.125	Metal
05/10/12	9R-27L	Broken luggage tag	0.070548	0.5	0.375	0.125	Metal
05/10/12	9R-27L	Metal wire	0.035274	1.375	0.625	0.125	Metal
05/10/12	9R-27L	Metal wire	0.070548	1	0.75	0.125	Metal
05/10/12	9R-27L	Screw	0.141096	0.625	0.375	0.375	Metal
05/10/12	9R-27L	Screw	0.035274	0.5	0.25	0.25	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
05/10/12	9R-27L	Screw	0.070548	0.5	0.375	0.375	Metal
05/10/12	9R-27L	Screw	0	0.5	0.25	0.25	Metal
05/10/12	9R-27L	Roller bearing	0.17637	0.5	0.25	0.25	Metal
05/10/12	9R-27L	Broken socket	0	0.25	0.25	0.25	Metal
05/10/12	9R-27L	BB	0.070548	0.25	0.25	0.25	Metal
05/10/12	9R-27L	BB	0.070548	0.25	0.25	0.25	Metal
05/10/12	9R-27L	BB	0.070548	0.25	0.25	0.25	Metal
05/10/12	9R-27L	BB	0.070548	0.25	0.25	0.25	Metal
05/10/12	9R-27L	BB	0	0.25	0.25	0.25	Metal
05/10/12	9R-27L	Washer	0	0.375	0.375	0.125	Metal
05/10/12	9R-27L	Washer	0	0.375	0.375	0.125	Metal
05/15/12	10-28	Metal bristles	0.17637	–	–	–	Metal
05/15/12	10-28	Paint chips	2.222262	–	–	–	Paint
05/15/12	10-28	Concrete chunk	2.82192	2.375	1.5	1.375	Concrete
05/15/12	10-28	Tar strip	1.657878	10	1	0.5	Tar
05/15/12	10-28	Tar strip	0.634932	3	1.25	0.5	Tar
05/15/12	10-28	Tar strip	0.52911	3.75	0.875	0.625	Tar
05/15/12	10-28	Tar strip	0.246918	4.25	0.25	0.25	Tar
05/15/12	10-28	Screw	0.070548	0.625	0.375	0.375	Metal
05/15/12	10-28	Crushed socket	0	0.25	0.25	0.25	Metal
05/15/12	10-28	Broken luggage tag	0.105822	1.5	0.375	0.125	Metal
05/15/12	10-28	Key ring	0.141096	1	1	0.125	Metal
05/15/12	10-28	Ribbed washer	0	0.625	0.625	0.125	Metal
05/24/12	14R-32L	Rubber Sealant	0.599658	5.375	0.5	0.375	Rubber
05/24/12	14R-32L	Rubber sealant	0.35274	1.625	1.25	0.625	Rubber
05/24/12	14R-32L	Rubber sealant	0.211644	2.25	0.875	0.375	Rubber
05/24/12	14R-32L	Yellow valve cap	0.141096	0.5	0.375	0.375	Metal
05/24/12	14R-32L	Paper clip	0.035274	1.875	0.5	0	Metal
06/07/12	9L-27R	Concrete chunk	0.35274	1.5	1.25	0.188	Concrete
06/07/12	9L-27R	Concrete chunk	0.740754	1.75	1.25	0.5	Concrete
06/07/12	9L-27R	Concrete chunk	0.52911	1.25	1.125	0.5	Concrete
06/07/12	9L-27R	Concrete chunk	0.388014	1.25	1.125	0.5	Concrete
06/07/12	9L-27R	Concrete chunk	0.282192	1.5	1	0.25	Concrete
06/07/12	9L-27R	Concrete chunk	0.317466	1.75	1	0.375	Concrete
06/07/12	9L-27R	Rubber sealant	0.17637	2.5	0.5	0.25	Rubber
06/07/12	9L-27R	Paint chips	0.246918	–	–	–	Paint
06/07/12	9L-27R	Metal bristles	0.070548	–	–	–	Metal
06/07/12	9L-27R	Glass pieces	0	–	–	–	Glass
06/14/12	4R-22L	Concrete chunk	1.093494	2	1	1	Concrete
06/14/12	4R-22L	Concrete chunk	0.776028	1.5	0.75	0.5	Concrete
06/14/12	4R-22L	Rubber sealant	0.35274	3	0.75	0.375	Rubber
06/14/12	4R-22L	Paint chips	0.493836	–	–	–	Paint
06/14/12	4R-22L	Metal strips	0.17637	–	–	–	Metal
06/14/12	4R-22L	Wood chunk	0.141096	1.25	0.5	0.375	Wood
06/14/12	4R-22L	O-ring	0.211644	2.5	2.5	0.25	Rubber
06/14/12	4R-22L	Bolt	0.317466	1.25	0.5	0.5	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
06/14/12	4R-22L	Bolt	0.317466	1.25	0.5	0.5	Metal
06/14/12	4R-22L	Twisted metal	0.035274	3.75	2	0.063	Metal
06/14/12	4R-22L	Nail	0.282192	3.25	0.25	0.25	Metal
06/14/12	4R-22L	Metal staples	0.035274	–	–	–	Metal
06/14/12	4R-22L	Screw	0.035274	0.5	0.25	0.25	Metal
06/14/12	4R-22L	Bolt	0.035274	0.75	0.25	0.25	Metal
06/14/12	4R-22L	Metal cap	0.105822	0.375	0.25	0.25	Metal
06/14/12	4R-22L	Metal washer	0	0.625	0.625	0.063	Metal
06/14/12	4R-22L	Ball bearing	0	0.125	0.125	0.125	Metal
06/14/12	4R-22L	Metal bristles	0	–	–	–	Metal
06/20/12	14R-32L	Asphalt chunk	0.70548	1.5	1.25	0.75	Asphalt
06/27/12	4L-22R	Concrete chunk	0.88185	1.25	1	0.75	Concrete
06/27/12	4L-22R	Paint chips	0.88185	–	–	–	Paint
06/27/12	4L-22R	Metal bristles	0	–	–	–	Metal
06/27/12	4L-22R	Wood chunk	0	1.5	0.5	0.375	Wood
06/27/12	4L-22R	Bolt	0.035274	0.5	0.25	0.25	Metal
06/27/12	4L-22R	Ball bearings	0	–	–	–	Metal
07/05/12	4L-22R	Piece of paper	0	2.75	2	0.063	Paper
07/05/12	4L-22R	Piece of paper	0	3.25	2.5	0.063	Paper
07/05/12	4L-22R	Concrete chunk	1.05822	2	1.5	0.75	Concrete
07/05/12	4L-22R	Concrete chunk	0.52911	1.5	1.25	0.75	Concrete
07/05/12	4L-22R	Concrete chunk	0.88185	1.5	1	1	Concrete
07/05/12	4L-22R	Concrete chunk	0.35274	1.5	1.125	0.5	Concrete
07/05/12	4L-22R	Metal bristles	0	–	–	–	Metal
07/05/12	4L-22R	Plastic zip tie	0	7.25	0.125	0.063	Plastic
07/05/12	4L-22R	Paint chips	0	–	–	–	Paint
07/05/12	4L-22R	Wood chunk	2.11644	5.25	1.75	0.75	Wood
07/05/12	4L-22R	Wood chunk	0	3	1.25	0.25	Wood
07/05/12	4L-22R	Wood chunk	0	2.25	1	0.125	Wood
07/05/12	4L-22R	Rubber sealant	0.70548	–	–	–	Rubber
07/05/12	4L-22R	Tar strip	0.740754	4.5	1.25	0.125	Tar
07/05/12	4L-22R	Tar strip	0.246918	5.25	0.5	0.25	Tar
07/05/12	4L-22R	Tar strip	0.423288	3	1	0.5	Tar
07/05/12	4L-22R	Plastic strip	0.105822	7	0.375	0.125	Plastic
07/05/12	4L-22R	Metal strip	0.035274	3	1.5	0.063	Metal
07/05/12	4L-22R	Bottle cap	0.070548	1.375	1	0.5	Plastic
07/05/12	4L-22R	Bottle cap	0.035274	1.25	1.125	0.25	Plastic
07/05/12	4L-22R	Bottle cap	0.035274	1.125	1	0.125	Plastic
07/05/12	4L-22R	Cigarette wrapper	0.105822	2.875	2.25	1	Paper
07/05/12	4L-22R	Plastic sheet	0.035274	3.5	2.125	0.063	Plastic
07/05/12	4L-22R	Plastic nozzle	0.070548	2.25	0.75	0.375	Plastic
07/05/12	4L-22R	UAL tag	0.070548	2.5	2.25	0.125	Plastic
07/05/12	4L-22R	American tag	0.070548	4.75	1.5	0.25	Plastic
07/05/12	4L-22R	Ear plug	0	1.125	0.625	0.5	Other
07/05/12	4L-22R	Threaded metal rod	0.388014	2.75	0.25	0.25	Metal
07/05/12	4L-22R	Bolt	0.388014	0.875	0.5	0.5	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
07/05/12	4L-22R	Bolt	0.141096	1.25	0.25	0.25	Metal
07/05/12	4L-22R	Metal chunk	0.070548	0.5	0.5	0.5	Metal
07/05/12	4L-22R	Bolt	0.070548	0.5	0.25	0.25	Metal
07/05/12	4L-22R	Bolt	0.070548	0.5	0.375	0.375	Metal
07/05/12	4L-22R	Bolt	0.070548	0.5	0.375	0.375	Metal
07/05/12	4L-22R	Zipper handle	0.282192	1.25	0.5	0.125	Metal
07/05/12	4L-22R	Zipper handle	0.105822	1.25	0.375	0.125	Metal
07/05/12	4L-22R	Valve cap	0	0.5	0.5	0.375	Metal
07/05/12	4L-22R	Metal cap	0.141096	1.25	0.875	0.125	Metal
07/05/12	4L-22R	Glass pieces	0	–	–	–	Glass
07/05/12	4L-22R	Ball bearing	0	0.125	0.125	0.125	Metal
07/17/12	4R-22L	Concrete chunk	1.728426	2	1.75	1	Concrete
07/17/12	4R-22L	Concrete chunk	0.776028	1.75	1.25	0.5	Concrete
07/17/12	4R-22L	Concrete chunk	0.493836	1.25	1	0.75	Concrete
07/17/12	4R-22L	Concrete chunk	0.317466	1.25	1	0.25	Concrete
07/17/12	4R-22L	Paint chips	1.199316	–	–	–	Paint
07/17/12	4R-22L	Tar strip	0.35274	2.25	0.75	0.5	Tar
07/17/12	4R-22L	Tar strip	0.211644	1.5	1	0.5	Tar
07/17/12	4R-22L	Bolt	0.211644	0.75	0.5	0.5	Metal
07/17/12	4R-22L	Bolt	0.035274	0.875	0.375	0.375	Metal
07/17/12	4R-22L	Metal disc	0	0.375	0.375	0.125	Metal
07/17/12	4R-22L	Lock washer	0.035274	0.5	0.5	0.125	Metal
07/17/12	4R-22L	Washer_1	0.035274	0.625	0.625	0.125	Metal
07/17/12	4R-22L	Washer_2	0.035274	0.625	0.625	0.125	Metal
07/17/12	4R-22L	Washer_3	0.035274	0.625	0.625	0.125	Metal
07/17/12	4R-22L	Washer_4	0.035274	0.625	0.625	0.125	Metal
07/17/12	4R-22L	Washer_5	0.035274	0.625	0.625	0.125	Metal
07/17/12	4R-22L	Washer_6	0.035274	0.625	0.625	0.125	Metal
07/17/12	4R-22L	Metal bristles	0	–	–	–	Metal
07/17/12	4R-22L	Ball bearing	0	0.125	0.125	0.125	Metal
07/17/12	4R-22L	Metal clasp	0	0.375	0.125	0.125	Metal
08/07/12	9R-27L	Toothbrush wrapper	0.105822	8	1	0.25	Plastic
08/07/12	9R-27L	Asphalt chunk	0.811302	1.5	1	1	Asphalt
08/07/12	9R-27L	Asphalt chunk	0.52911	1.75	0.75	0.5	Asphalt
08/07/12	9R-27L	Paint chips	0.423288	–	–	–	Paint
08/07/12	9R-27L	Rubber sealant	0.211644	2.25	1	0.125	Rubber
08/07/12	9R-27L	Rubber sealant	0.105822	2.5	0.75	0.5	Rubber
08/07/12	9R-27L	Metal bristles	0	–	–	–	Metal
08/07/12	9R-27L	Metal strip	0.035274	4.25	0.125	0.063	Metal
08/07/12	9R-27L	Zipper	0.246918	1.5	0.5	0.125	Metal
08/07/12	9R-27L	Zipper	0.17637	1.25	0.5	0.125	Metal
08/07/12	9R-27L	Zipper	0.282192	1.5	0.5	0.125	Metal
08/07/12	9R-27L	Zipper	0.141096	1.5	0.375	0.125	Metal
08/07/12	9R-27L	Plastic piece	0.035274	0.75	0.625	0.125	Plastic
08/07/12	9R-27L	Safety pin	0	1.5	0.5	0.063	Metal
08/07/12	9R-27L	Bolt_1	0.070548	0.5	0.25	0.25	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
08/07/12	9R-27L	Bolt_2	0.035274	0.625	0.25	0.25	Metal
08/07/12	9R-27L	Bolt_3	0.035274	0.5	0.25	0.25	Metal
08/07/12	9R-27L	Bolt_4	0.035274	0.5	0.25	0.25	Metal
08/07/12	9R-27L	Bolt_5	0.035274	0.5	0.25	0.25	Metal
08/07/12	9R-27L	Bolt_6	0.070548	0.75	0.25	0.25	Metal
08/07/12	9R-27L	Bolt_7	0.070548	0.5	0.25	0.25	Metal
08/07/12	9R-27L	Bolt_8	0.070548	0.375	0.25	0.25	Metal
08/07/12	9R-27L	Metal cap	0.17637	0.5	0.375	0.375	Metal
08/07/12	9R-27L	Nut	0.211644	0.5	0.5	0.25	Metal
08/07/12	9R-27L	Metal shard	0	0.375	0.375	0.063	Metal
08/07/12	9R-27L	Metal clasp	0.035274	0.75	0.5	0.125	Metal
08/07/12	9R-27L	Metal clasp	0.070548	0.75	0.5	0.125	Metal
08/07/12	9R-27L	Broken zipper	0.035274	0.5	0.375	0.125	Metal
08/15/12	14R-32L	Wood chunk	0.246918	4.375	0.75	0.5	Wood
08/15/12	14R-32L	Paint chips	0.246918	–	–	–	Paint
08/15/12	14R-32L	Broken zipper handle	0.105822	1.25	0.5	0.125	Metal
08/15/12	14R-32L	Metal bristles	0.035274	–	–	–	Metal
08/23/12	4R-22L	Gatorade cap	0.105822	1.75	1.75	0.5	Plastic
08/23/12	4R-22L	Rubber sealant	0.423288	4	2	0.125	Rubber
08/23/12	4R-22L	Rubber sealant	0.35274	3	2.125	0.125	Rubber
08/23/12	4R-22L	Rubber sealant	0.246918	2.5	2	0.125	Rubber
08/23/12	4R-22L	Rubber sealant	0.211644	4	1.5	0.125	Rubber
08/23/12	4R-22L	Rubber sealant	0.105822	1.75	1.625	0.063	Rubber
08/23/12	4R-22L	Rubber sealant	0.070548	1.5	1.25	0.125	Rubber
08/23/12	4R-22L	Paint chips	0.35274	–	–	–	Paint
08/23/12	4R-22L	Asphalt chunk	1.481508	2	1.5	0.75	Asphalt
08/23/12	4R-22L	Wire	0.246918	10.5	0.25	0.125	Metal
08/23/12	4R-22L	Tar strip	0.141096	1.75	0.5	0.5	Tar
08/23/12	4R-22L	Tar strip	0.105822	1.75	0.625	0.25	Tar
08/23/12	4R-22L	Tar strip	0.17637	2	0.5	0.375	Tar
08/23/12	4R-22L	Tar strip	0.17637	2.5	0.5	0.375	Tar
08/23/12	4R-22L	Twig	0	4	0.25	0.25	Wood
08/23/12	4R-22L	Twig	0	3.5	0.25	0.25	Wood
08/23/12	4R-22L	Twig	0	3	0.25	0.25	Wood
08/23/12	4R-22L	Zipper handle	0.246918	1.75	0.625	0.125	Metal
08/23/12	4R-22L	Metal strip	0.105822	6.125	0.125	0.063	Metal
08/23/12	4R-22L	Metal strip	0.070548	5.25	0.125	0.063	Metal
08/23/12	4R-22L	Metal strip	0	1.75	0.125	0.063	Metal
08/23/12	4R-22L	Plastic tape	0.070548	2.125	2	0.063	Plastic
08/23/12	4R-22L	Glass pieces	0.141096	–	–	–	Glass
08/23/12	4R-22L	Metal chunk	0.211644	0.75	0.375	0.25	Metal
08/23/12	4R-22L	Washer	0.035274	0.5	0.5	0.125	Metal
08/23/12	4R-22L	Washer	0.035274	0.625	0.625	0.063	Metal
08/23/12	4R-22L	Gold foil	0	0.75	0.375	0.063	Metal
08/23/12	4R-22L	Ball bearing	0	0.125	0.125	0.125	Metal
08/23/12	4R-22L	Ball bearing	0	0.125	0.125	0.125	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
08/23/12	4R-22L	Metal bristles	0.17637	–	–	–	Metal
09/06/12	4L-22R	Dirt chunk	0.670206	2.25	2	0.5	Other
09/06/12	4L-22R	Dirt chunk	0.317466	1.5	1	0.75	Other
10/04/12	10-28	Asphalt chunk	6.137676	3.25	2	1.5	Asphalt
10/04/12	10-28	Asphalt chunk	1.516782	2	1.5	1	Asphalt
10/04/12	10-28	Foam chunk	0.070548	2.5	1.75	1.25	Rubber
10/04/12	10-28	Foam chunk	0.141096	2	1.25	0.5	Rubber
10/04/12	10-28	Tape strip	0.105822	9	2	0.063	Other
10/04/12	10-28	Brick chunk	0.317466	1.5	1	0.5	Concrete
10/04/12	10-28	Paint chips	0.282192	–	–	–	Paint
10/04/12	10-28	Metal spool	0.035274	0.625	0.625	0.25	Metal
10/04/12	10-28	Zipper handle	0.17637	1.25	0.375	0.125	Metal
10/04/12	10-28	Bolt	0.035274	0.75	0.25	0.25	Metal
10/04/12	10-28	Glass	0.141096	–	–	–	Glass
10/11/12	9L-27R	Asphalt chunk	1.093494	1.5	1.25	1	Asphalt
10/11/12	9L-27R	Tar strip	1.128768	8	1.5	0.5	Tar
10/11/12	9L-27R	Tar strip	0.317466	5.5	0.5	0.25	Tar
10/11/12	9L-27R	Tar strip	0.246918	4.5	0.5	0.25	Tar
10/11/12	9L-27R	Tar strip	0.246918	4.625	0.5	0.25	Tar
10/11/12	9L-27R	Tar strip	0.282192	5.25	0.5	0.25	Tar
10/11/12	9L-27R	Tar strip	0.282192	4	0.5	0.25	Tar
10/11/12	9L-27R	Tar strip	0.211644	3	0.5	0.25	Tar
10/11/12	9L-27R	Tar strip	0.17637	2.875	0.75	0.25	Tar
10/11/12	9L-27R	Tar strip	0.105822	2	0.5	0.25	Tar
10/11/12	9L-27R	Tar strip	0.317466	4.75	0.5	0.25	Tar
10/11/12	9L-27R	Tar strip	0.141096	2.5	0.5	0.25	Tar
10/11/12	9L-27R	Tar strip	0.246918	3.75	0.5	0.25	Tar
10/11/12	9L-27R	Tar strip	0.141096	2.25	0.5	0.25	Tar
10/11/12	9L-27R	Paint chips	0.599658	–	–	–	Paint
10/11/12	9L-27R	Rubber sealant	0.211644	2.5	1.5	0.125	Rubber
10/11/12	9L-27R	Concrete chunk	0.35274	1.5	1	0.375	Concrete
10/11/12	9L-27R	Zipper handle	0.105822	1.5	0.5	0.125	Metal
10/11/12	9L-27R	Zipper handle	0.211644	1.75	0.5	0.125	Metal
10/11/12	9L-27R	Zipper handle	0.246918	1.25	0.5	0.125	Metal
10/11/12	9L-27R	Cardboard tube	0.070548	2	0.5	0.5	Paper
10/11/12	9L-27R	Piece of Rubber	0.211644	2.25	0.625	0.25	Rubber
10/11/12	9L-27R	Balled up tape	0.141096	1.75	1.75	0.5	Other
10/11/12	9L-27R	Plastic strip	0	5.5	0.125	0.125	Plastic
10/11/12	9L-27R	Metal bristles	0	–	–	–	Metal
10/11/12	9L-27R	Nut	0.246918	0.5	0.25	0.25	Metal
10/11/12	9L-27R	Bolt_1	0.070548	0.75	0.25	0.25	Metal
10/11/12	9L-27R	Bolt_2	0.070548	0.5	0.25	0.25	Metal
10/11/12	9L-27R	Bolt_3	0.070548	0.625	0.25	0.25	Metal
10/11/12	9L-27R	Bolt_4	0.070548	0.5	0.375	0.375	Metal
10/11/12	9L-27R	Bolt_5	0.070548	0.5	0.375	0.375	Metal
10/11/12	9L-27R	Bolt_6	0.035274	0.5	0.25	0.25	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
10/11/12	9L-27R	Bolt_7	0.035274	0.5	0.25	0.25	Metal
10/11/12	9L-27R	Bolt_8	0.035274	0.375	0.25	0.25	Metal
10/11/12	9L-27R	Metal cap	0.035274	0.5	0.25	0.25	Metal
10/16/12	4R-22L	American tag	0.035274	1.75	0.875	0.375	Plastic
10/16/12	4R-22L	Rubber sealant	0.105822	2.5	1.25	0.125	Rubber
10/16/12	4R-22L	Rubber sealant	0.246918	1.25	1	0.75	Rubber
10/16/12	4R-22L	Rubber sealant	0.423288	4	0.5	0.5	Rubber
10/16/12	4R-22L	Paint chips	0.246918	–	–	–	Paint
10/16/12	4R-22L	Concrete chunk	0.458562	1.25	0.75	0.75	Concrete
10/16/12	4R-22L	Asphalt chunk	0.388014	1.5	1	0.5	Asphalt
10/16/12	4R-22L	Rubber part	0.634932	3.25	0.875	0.25	Rubber
10/16/12	4R-22L	Broken zip tie	0	2.5	0.5	0.5	Plastic
10/16/12	4R-22L	Zipper handle	0.211644	1.5	0.625	0.125	Metal
10/16/12	4R-22L	Nut	0.105822	0.375	0.375	0.25	Metal
10/16/12	4R-22L	Washer	0	0.625	0.625	0.063	Metal
10/16/12	4R-22L	Paper clip	0	1.25	0.375	0.063	Metal
10/16/12	4R-22L	Metal bristles	0	–	–	–	Metal
11/01/12	14R-32L	Foam strip	1.128768	11.5	0.75	0.5	Rubber
11/01/12	14R-32L	Paint chips	0.987672	–	–	–	Paint
11/01/12	14R-32L	Rubber sealant	0.388014	3	2.5	0.063	Rubber
11/01/12	14R-32L	Rubber sealant	0.35274	3	1.75	0.063	Rubber
11/01/12	14R-32L	Rubber sealant	0.246918	2.5	1.5	0.063	Rubber
11/01/12	14R-32L	Rubber sealant	0.17637	2.5	1.125	0.063	Rubber
11/01/12	14R-32L	Rubber sealant	0.105822	2.125	0.625	0.063	Rubber
11/01/12	14R-32L	Rubber sealant	0.141096	1.5	1.25	0.063	Rubber
11/01/12	14R-32L	Asphalt chunk	1.446234	1.875	1.25	1.125	Asphalt
11/01/12	14R-32L	Asphalt chunk	0.88185	1.5	1	0.75	Asphalt
11/01/12	14R-32L	Asphalt chunk	0.634932	1.75	0.875	0.75	Asphalt
11/08/12	9R-27L	Concrete chunk	2.010618	2.5	1.5	0.5	Concrete
11/08/12	9R-27L	Concrete chunk	1.516782	2.5	1.375	0.75	Concrete
11/08/12	9R-27L	Asphalt chunk	0.952398	1.5	1.25	1	Asphalt
11/08/12	9R-27L	Asphalt chunk	0.776028	2	1	0.625	Asphalt
11/08/12	9R-27L	Rubber sealant	0.811302	2.125	2	0.5	Rubber
11/08/12	9R-27L	Rubber sealant	0.246918	2.5	0.5	0.5	Rubber
11/08/12	9R-27L	Rubber sealant	0.141096	2.5	1.125	0.125	Rubber
11/08/12	9R-27L	Broken piece of plastic	0.493836	5	1.25	0.5	Plastic
11/08/12	9R-27L	Paint chips	1.693152	–	–	–	Paint
11/08/12	9R-27L	Rubber sealant	0.070548	2.25	1	0.125	Rubber
11/08/12	9R-27L	Bolt	1.305138	2.5	0.625	0.625	Metal
11/08/12	9R-27L	Bolt	0.105822	1.125	0.375	0.375	Metal
11/08/12	9R-27L	Bolt	0.458562	1	0.5	0.5	Metal
11/08/12	9R-27L	Bolt	0.070548	0.5	0.375	0.375	Metal
11/08/12	9R-27L	Bolt	0.035274	0.625	0.25	0.25	Metal
11/08/12	9R-27L	Bolt	0.282192	0.75	0.75	0.75	Metal
11/08/12	9R-27L	Zipper handle_1	0.282192	1.25	0.5	0.125	Metal
11/08/12	9R-27L	Zipper handle_2	0.35274	1.375	0.625	0.125	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
11/08/12	9R-27L	Zipper handle_3	0.141096	1.5	0.5	0.125	Metal
11/08/12	9R-27L	Zipper handle_4	0.17637	1.625	0.375	0.125	Metal
11/08/12	9R-27L	Zipper handle_5	0.070548	1.125	0.375	0.125	Metal
11/08/12	9R-27L	Zipper handle_6	0.17637	1.25	0.375	0.125	Metal
11/08/12	9R-27L	Zipper handle_7	0.141096	1.25	0.5	0.125	Metal
11/08/12	9R-27L	Zipper handle_8	0.246918	1.5	0.5	0.125	Metal
11/08/12	9R-27L	Metal strip	0.141096	4	4	0.125	Metal
11/08/12	9R-27L	Plastic strip	0.035274	4.5	2	0.063	Plastic
11/08/12	9R-27L	Metal chunk	0.246918	1.75	1.125	0.063	Metal
11/08/12	9R-27L	Glass chunk	0.105822	1	0.625	0.25	Glass
11/08/12	9R-27L	Zipper handle_9	0.17637	1.5	0.5	0.125	Metal
11/08/12	9R-27L	Screw	0.070548	0.75	0.375	0.375	Metal
11/08/12	9R-27L	Metal piece	0	0.875	0.25	0.25	Metal
11/08/12	9R-27L	Washer	0.35274	1	1	0.125	Metal
11/08/12	9R-27L	Washer	0	0.375	0.125	0.125	Metal
11/08/12	9R-27L	Lock washer	0.035274	0.625	0.125	0.125	Metal
11/08/12	9R-27L	Rusted penny	0.105822	0.75	0.063	0.063	Metal
11/08/12	9R-27L	Metal strip	0	1.75	0.125	0.063	Metal
11/08/12	9R-27L	Wire piece	0.070548	1.25	0.5	0.125	Metal
11/08/12	9R-27L	Broken zip tie	0	1.5	0.25	0.125	Plastic
11/08/12	9R-27L	Metal hook	0.070548	1.125	0.5	0.125	Metal
11/08/12	9R-27L	Metal ring	0	0.375	0.375	0.125	Metal
11/08/12	9R-27L	Metal clip	0.035274	1.125	0.75	0.125	Metal
11/08/12	9R-27L	Metal scrap	0.035274	0.625	0.375	0.125	Metal
11/08/12	9R-27L	Metal scrap	0	1	0.375	0.063	Metal
11/08/12	9R-27L	Gear component	0.035274	1.25	0.125	0.125	Metal
11/08/12	9R-27L	Screw	0.070548	1.25	0.25	0.25	Metal
11/08/12	9R-27L	Metal clasp	0	0.75	0.375	0.125	Metal
11/08/12	9R-27L	Metal bristles	0	–	–	–	Metal
11/08/12	9R-27L	Metal cap	0	0.375	0.375	0.25	Metal
11/13/12	9L-27R	Tar strip	0.211644	2.25	0.5	0.25	Tar
11/13/12	9L-27R	Bolt	0.070548	0.5	0.375	0.375	Metal
11/13/12	9L-27R	Metal hook	0.070548	1.25	0.75	0.125	Metal
11/13/12	9L-27R	Metal cylinder	0.070548	0.375	0.25	0.25	Metal
11/13/12	9L-27R	Paint chips	0.70548	–	–	–	Paint
11/13/12	9L-27R	Metal strip	0	1.5	0.125	0.063	Metal
11/13/12	9L-27R	Metal bristles	0	–	–	–	Metal
12/05/12	14L-32R	Asphalt chunk	2.927742	2.5	1.75	1	Asphalt
12/05/12	14L-32R	Rock	1.340412	1.75	1.5	0.75	Other
12/05/12	14L-32R	Rubber sealant	0.423288	2.75	1.5	0.5	Rubber
12/05/12	14L-32R	Piece of plastic	0.035274	1.5	0.75	0.125	Plastic
12/05/12	14L-32R	Metal strip	0.035274	2	0.125	0.063	Metal
12/05/12	14L-32R	Metal strip	0	1.875	0.125	0.063	Metal
12/05/12	14L-32R	Metal strip	0	1.75	0.125	0.063	Metal
12/05/12	14L-32R	Metal bristle	0	–	–	–	Metal
12/19/12	14R-32L	Styrofoam	0	2.84	1.17	0.3	Plastic

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
12/19/12	14R-32L	Duct tape	0.070548	2.5	0.7	0.2	Other
12/19/12	14R-32L	Rubber sealant	0.388014	3.23	0.99	0.3	Rubber
12/19/12	14R-32L	Blistex wrapper	0.070548	2.21	0.72	0.12	Plastic
12/19/12	14R-32L	Paint chips	0.846576	–	–	–	Paint
12/19/12	14R-32L	Moisture absorbent	0.035274	1.55	0.73	0.14	Other
12/19/12	14R-32L	Coffee stirrer	0.035274	5.5	0.57	0.1	Plastic
12/19/12	14R-32L	Metal strip	0.105822	6.5	0.125	0.062	Metal
12/19/12	14R-32L	Bolt_1	0.070548	0.6	0.35	0.35	Metal
12/19/12	14R-32L	Bolt_2	0.070548	0.6	0.35	0.35	Metal
12/19/12	14R-32L	Bolt_3	0.070548	0.6	0.35	0.35	Metal
12/19/12	14R-32L	Bolt_4	0.035274	0.47	0.35	0.35	Metal
12/19/12	14R-32L	Metal bristles	0	–	–	–	Metal
12/19/12	14R-32L	Staple	0	0.5	0.15	0.02	Metal
12/19/12	14R-32L	Glass	0	–	–	–	Glass
01/09/13	4R-22L	Zipper handle_1	0.35274	1.74	0.5	0.14	Metal
01/09/13	4R-22L	Zipper handle_2	0.211644	1.45	0.43	0.13	Metal
01/09/13	4R-22L	Zipper handle_3	0.317466	1.63	0.5	0.13	Metal
01/09/13	4R-22L	Zipper handle_4	0.282192	1.2	0.54	0.15	Metal
01/09/13	4R-22L	Zipper handle_5	0.211644	1.42	0.45	0.14	Metal
01/09/13	4R-22L	Zipper handle_6	0.317466	1.71	0.48	0.12	Metal
01/09/13	4R-22L	Zipper handle_7	0.211644	1.76	0.64	0.17	Metal
01/09/13	4R-22L	Zipper handle_8	0.282192	1.5	0.56	0.16	Metal
01/09/13	4R-22L	Zipper handle_9	0.141096	1.53	0.46	0.1	Metal
01/09/13	4R-22L	Zipper handle_10	0.282192	1.19	0.47	0.14	Metal
01/09/13	4R-22L	Zipper handle_11	0.282192	1.55	0.47	0.13	Metal
01/09/13	4R-22L	Zipper handle_12	0.105822	0.95	0.5	0.08	Metal
01/09/13	4R-22L	Zipper handle_13	0.035274	1.27	0.41	0.06	Metal
01/09/13	4R-22L	Zipper handle_14	0.141096	0.64	0.64	0.21	Metal
01/09/13	4R-22L	Zipper handle_15	0.141096	0.96	0.52	0.09	Metal
01/09/13	4R-22L	Metal piece	0.599658	2.05	0.78	0.41	Metal
01/09/13	4R-22L	Paint chips	0.811302	–	–	–	Paint
01/09/13	4R-22L	Rubber sealant	0.52911	2.33	0.79	0.57	Rubber
01/09/13	4R-22L	Rubber sealant	0.317466	1.69	0.71	0.59	Rubber
01/09/13	4R-22L	Rubber sealant	0.141096	1.72	0.97	0.3	Rubber
01/09/13	4R-22L	Bolt	0	–	–	–	Metal
01/09/13	4R-22L	Bolt	0	–	–	–	Metal
01/09/13	4R-22L	Bolt	0.70548	1.18	0.58	0.58	Metal
01/09/13	4R-22L	Bolt	0.70548	1.18	0.58	0.58	Metal
01/09/13	4R-22L	Bolt	0.70548	1.18	0.58	0.58	Metal
01/09/13	4R-22L	Bolt	0.70548	1.18	0.58	0.58	Metal
01/09/13	4R-22L	Bolt	0.70548	1.18	0.58	0.58	Metal
01/09/13	4R-22L	Bolt	0.70548	1.18	0.58	0.58	Metal
01/09/13	4R-22L	Bolt	0.70548	1.18	0.58	0.58	Metal
01/09/13	4R-22L	Bolt	0.70548	1.18	0.58	0.58	Metal
01/09/13	4R-22L	Bolt	0.70548	1.18	0.58	0.58	Metal
01/09/13	4R-22L	Bolt	0.70548	1.18	0.58	0.58	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
01/09/13	4R-22L	Bolt	0.70548	1.18	0.58	0.58	Metal
01/09/13	4R-22L	Bolt	0.70548	1.18	0.58	0.58	Metal
01/09/13	4R-22L	Bolt	0.105822	0.77	0.31	0.31	Metal
01/09/13	4R-22L	Bolt	0.141096	0.78	0.31	0.31	Metal
01/09/13	4R-22L	Bolt	0.070548	0.61	0.31	0.31	Metal
01/09/13	4R-22L	Nail	0.105822	2.37	0.26	0.26	Metal
01/09/13	4R-22L	Rusted spike	0.493836	1.75	0.48	0.43	Metal
01/09/13	4R-22L	Metal cylinder	0.17637	0.82	0.27	0.27	Metal
01/09/13	4R-22L	Metal cylinder	0.070548	0.43	0.25	0.25	Metal
01/09/13	4R-22L	Screw in plastic	0.035274	0.69	0.4	0.3	Other
01/09/13	4R-22L	Metal cylinder	0.035274	0.67	0.13	0.13	Metal
01/09/13	4R-22L	Metal strip	0.035274	1.65	0.27	0.03	Metal
01/09/13	4R-22L	Magnet	0.141096	1.78	0.52	0.11	Metal
01/09/13	4R-22L	Metal coil	0	1.28	1.11	0.04	Metal
01/09/13	4R-22L	Metal gadget	0.493836	1.43	1.32	0.33	Metal
01/09/13	4R-22L	Metal cylinder	0.105822	0.93	0.13	0.13	Metal
01/09/13	4R-22L	Metal scrap	0.141096	0.91	0.72	0.09	Metal
01/09/13	4R-22L	Metal hook	0.035274	0.59	0.59	0.11	Metal
01/09/13	4R-22L	Metal scrap	0.070548	1.04	0.44	0.25	Metal
01/09/13	4R-22L	Metal scrap	0	1.03	0.16	0.07	Metal
01/09/13	4R-22L	Washer	0.070548	0.74	0.74	0.05	Metal
01/09/13	4R-22L	Washer	0.035274	0.63	0.63	0.07	Metal
01/09/13	4R-22L	Washer	0	0.5	0.5	0.03	Metal
01/09/13	4R-22L	Plastic strip	0	3.25	0.06	0.06	Plastic
01/09/13	4R-22L	Key_1	0.035274	0.98	0.62	0.04	Metal
01/09/13	4R-22L	Key_2	0.035274	0.98	0.62	0.04	Metal
01/09/13	4R-22L	Broken key	0.035274	0.61	0.45	0.04	Metal
01/09/13	4R-22L	Penny	0.105822	0.75	0.75	0.06	Metal
01/09/13	4R-22L	Metal disk	0.035274	0.49	0.49	0.08	Metal
01/09/13	4R-22L	Metal bristles	0.211644	–	–	–	Metal
02/13/13	14R-32L	Plastic strip	0	7	0.125	0.125	Plastic
02/13/13	14R-32L	Plastic strip	0	7	0.125	0.125	Plastic
02/13/13	14R-32L	Joint material	0.388014	3.375	0.5	0.5	Rubber
02/13/13	14R-32L	Joint material	0.423288	2.75	1.5	0.625	Rubber
02/13/13	14R-32L	Plastic chunk	0.035274	2.5	0.375	0.125	Plastic
02/13/13	14R-32L	Glass chunk	0	0.25	0.25	0.125	Glass
02/13/13	14R-32L	Screw	0.035274	0.625	0.375	0.375	Metal
02/13/13	14R-32L	Screw	0.070548	0.5	0.375	0.375	Metal
02/13/13	14R-32L	Nut	0.141096	0.5	0.5	0.25	Metal
02/13/13	14R-32L	Metal fragment	0.070548	0.625	0.5	0.5	Metal
02/13/13	14R-32L	Metal fragment	0.035274	0.5	0.375	0.375	Metal
02/13/13	14R-32L	Metal bristles	12.487	–	–	–	Metal
03/07/13	10-28	Metal bristles	0.070548	–	–	–	Metal
03/07/13	10-28	Weed eater string	0	4.5	0.125	0.125	Plastic
03/21/13	9L-27R	Metal bristles	0.141096	–	–	–	Metal
03/27/13	4R-22L	Metal bristles	3.386304	–	–	–	Metal

Date	Runway	Item Description	Weight (oz)	Length (in.)	Width (in.)	Height (in.)	Material Type
03/27/13	4R-22L	Metal strip	0.070548	5.25	0.125	0.125	Metal
03/27/13	4R-22L	Weed eater	0.246918	–	–	–	Plastic
03/27/13	4R-22L	Metal strip	0.070548	6	0.125	0.125	Metal
03/27/13	4R-22L	“Not Phillips” screw	0.035274	0.5	0.375	0.375	Metal
03/27/13	4R-22L	Blue screw	0.070548	0.625	0.375	0.375	Metal
03/27/13	4R-22L	Screw	0.070548	0.625	0.375	0.375	Metal
03/27/13	4R-22L	Metal washer	0	0.375	0.375	0.125	Metal
03/27/13	4R-22L	Weed eater bits	0	–	–	–	Plastic
03/27/13	4R-22L	Yellow tar sheet	1.269864	6	5	0.125	Tar
03/27/13	4R-22L	Yellow tar sheet	1.05822	4.5	3.5	0.125	Tar
03/27/13	4R-22L	Metal strips	0.246918	–	–	–	Metal
03/27/13	4R-22L	Hex bolt	0.599658	1	0.625	0.625	Metal
03/27/13	4R-22L	Tar chunk	0.282192	2.75	0.875	0.5	Tar
03/27/13	4R-22L	Concrete chunk	2.151714	2.125	1.5	1.625	Concrete
03/27/13	4R-22L	Concrete chunk	1.728426	1.75	1.5	1.25	Concrete
03/27/13	4R-22L	Concrete chunk	1.23459	2	1.5	0.875	Concrete
03/27/13	4R-22L	Concrete chunk	0.846576	1.875	1.125	0.75	Concrete
03/27/13	4R-22L	Concrete chunk	0.670206	1.75	1	0.75	Concrete
04/16/13	10-28	Tar	6.666786	4.5	4	1.5	Tar
04/30/13	10-28	Metal bristles	0.246918	–	–	–	Metal
04/30/13	10-28	Weed eater	0.317466	–	–	–	Plastic
05/08/13	9L-27R	Metal bristles	0.070548	–	–	–	Metal