Analysis of Open Requests in the WPRDC's 311 Data Set

Abstract

This document provides an analysis of the Open requests in the Western Pennsylvania Regional Data Center (WPRDC) 311 service request database.

Author	Lisa Nydick
Email	lisa.nydick@gmail.com
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Introduction

The Western Pennsylvania Regional Data Center (WPRC) includes a variety of data sets, including one called the "311" data set. It is located at website https://data.wprdc.org. This data set includes information about service requests to the 311 program in the city of Pittsburgh from 2015-2019. Among other information, service requests are categorized by request type and status, which can be coded as "NEW", "CLOSED", or "OPEN". The primary goal of this project was to determine which types of requests tended to be left open, and for each of the most frequent types of requests, offer a possible explanation for why they might remain open. Possibilities include:

- High-volume type of request (so it takes longer to get to all of them)
- Low-priority type of request
- A resource-intensive type of request to resolve
- A type of request that requires red-tape (e.g., court action) to resolve

To get the best understanding of open requests, all requests, and requests in the "CLOSED" and "NEW" statuses were also examined. Specifically, the following questions were addressed:

- Which types of requests (in any status) represent the highest volumes of 311 requests?
- Which departments are assigned to the highest volumes of service requests?
- Which types of requests represent the highest volumes of OPEN requests?
- Which departments are assigned to the highest volumes of OPEN requests?
- How long on average have different types of requests remained OPEN?
- Which departments have the longest standing OPEN requests?
- Which types of requests represent the highest volumes of CLOSED requests?
- Which departments are assigned to the highest volumes of CLOSED requests?
- What is the ratio of open to closed requests for a given request type or department? (This ratio might help identify requests that are relatively difficult to close.)
- Which types of requests represent the highest volumes of NEW requests?
- How long on average have different types of requests remained in the NEW status?
- Which departments have the longest standing NEW requests?

In addition to providing some possible insights into the nature of 311 requests, this document provides some recommendations for how the 311 data could possibly be optimized in the future. It also includes a map showing how many requests per capita were made by neighborhood, and raw data related to OPEN requests.
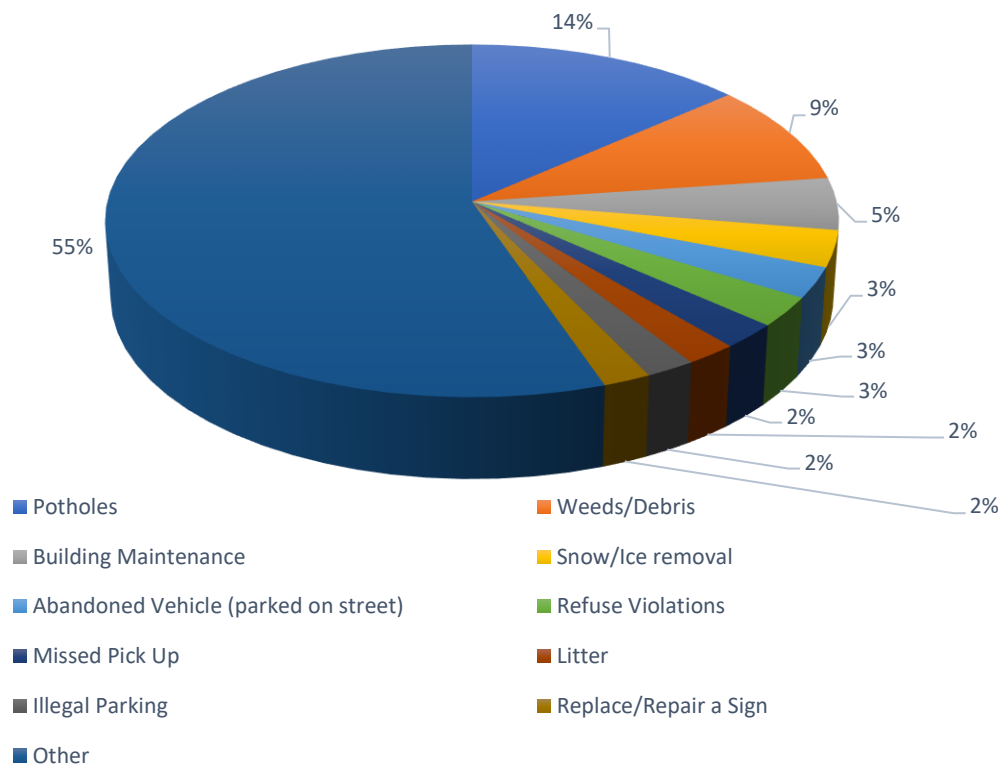
This analysis was performed with data collected October 21, 2019 using a combination of the 311.py, preprocessed.py, and neighborhoods.py programs, and MS Excel (for charting purposes). These programs, and Excel spreadsheets containing raw results and charting worksheets, are available in the "lan33-ccac" github repository.

Highest Volumes of Service Requests

As of October 21, 2019, the total number of requests in the 311 data set was: 375,483. There were 315 different types of requests represented in this data set. The top 10 highest volume types of service requests included:

Request Type	Assigned Department	Request Count	% Total Requests
Potholes	DPW - Street Maintenance	51,091	13.61
Weeds/Debris	Permits, Licenses and Inspections	34,542	9.20
Building Maintenance	Permits, Licenses and Inspections	17,937	4.78
Snow/Ice removal	DPW - Street Maintenance	12,488	3.33
Abandoned Vehicle (parked on street)	Police - AVU	10,580	2.82
Refuse Violations	DPW - Refuse	10,252	2.73
Missed Pick Up	DPW - Refuse	8,637	2.30
Litter	DPW - Street Maintenance	7,713	2.05
Illegal Parking	Police - Zones 1-6	7,448	1.98
Replace/Repair a Sign	DOMI - TrafficShop	7,189	1.91
Other		207,606	55.29

Highest Volumes of Service Requests, by Request Type

Legend: Potholes, Weeds/Debris, Building Maintenance, Snow/Ice removal, Abandoned Vehicle (parked on street), Refuse Violations, Missed Pick Up, Litter, Illegal Parking, Replace/Repair a Sign, Other

Departments Assigned to the Highest Volumes of Service Requests

The following table shows the 10 departments assigned to the handle the highest volume of service requests:

Assigned Department	Request Count	% of Total Requests
DPW - Street Maintenance	98,987	26.36
Permits, Licenses and Inspections	86,031	22.91
DPW - Refuse	26,708	7.11
Police - Zones 1-6	20,770	5.53
DOMI - Permits	15,189	4.05
Pittsburgh Water and Sewer Authority	14,603	3.89
DOMI - TrafficShop	13,552	3.61
311	12,845	3.42
Police - AVU	11,276	3.00
Other	75,522	20.11

Highest Volumes of Service Requests, by Department
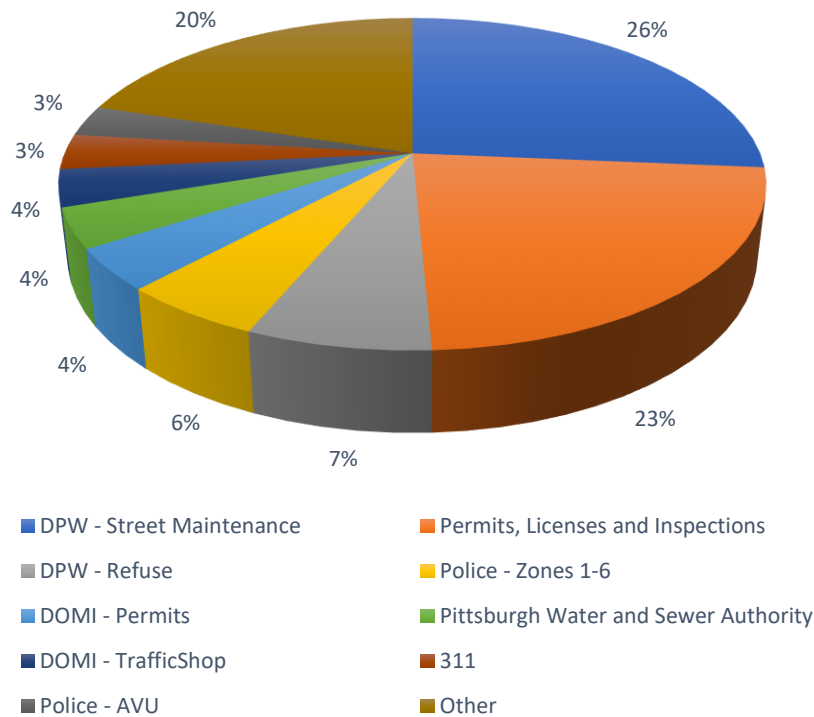
Highest Volumes of Open Requests

The total number of requests in an "Open" status was: 42,335. This represents 11.27% of all requests. The city closed 82.46% of all requests, which indicates that the city closed most requests. It is unclear, however, how long it takes the city on average to close requests because the dates on which requests were closed is not available in the 311 data set. The following service request types have the highest numbers of Open requests:
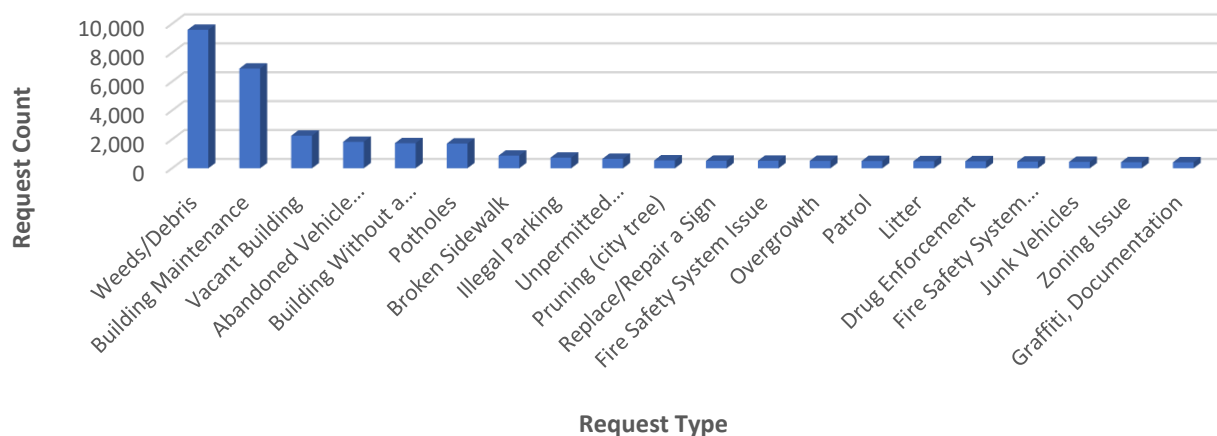
Request Type	Assigned Department	Open Req Count	% Total Open Reqs
Weeds/Debris	Permits, Licenses and Inspections	9,586	22.64
Building Maintenance	Permits, Licenses and Inspections	6,903	16.31
Vacant Building	Permits, Licenses and Inspections	2,257	5.33
Abandoned Vehicle (parked on street)	Police - AVU	1,831	4.33
Building Without a Permit	Permits, Licenses and Inspections	1,737	4.10
Potholes	DPW - Street Maintenance	1,714	4.05
Broken Sidewalk	Permits, Licenses and Inspections	877	2.07
Illegal Parking	Police - Zones 1-6	738	1.74
Unpermitted Electrical Work	Permits, Licenses and Inspections	650	1.54
Pruning (city tree)	DPW - Forestry Division	546	1.29
Replace/Repair a Sign	DOMI - TrafficShop	520	1.23
Fire Safety System Issue	Unknown	519	1.23
Overgrowth	DPW - Street Maintenance	517	1.22
Patrol	Police - Zones 1-6	504	1.19
Litter	DPW - Street Maintenance	490	1.16
Drug Enforcement	Police - Zones 1-6	487	1.15
Fire Safety System Not Working	Permits, Licenses and Inspections	460	1.09
Junk Vehicles	Permits, Licenses and Inspections	446	1.05
Zoning Issue	Permits, Licenses and Inspections	424	1.00
Graffiti, Documentation	Police - Zones 1-6	412	0.97

Highest Volumes of Open Requests, by Request Type

Because the top 10 request types represent the largest share of the open requests, the breakdown of the top 10 is shown below:

Request Type	Assigned Department	Open Req Count	% Total Open Reqs
Weeds/Debris	Permits, Licenses and Inspections	9,594	22.66
Building Maintenance	Permits, Licenses and Inspections	6,887	16.27
Vacant Building	Permits, Licenses and Inspections	2,245	5.30
Abandoned Vehicle (parked on street)	Police - AVU	1,826	4.31
Building Without a Permit	Permits, Licenses and Inspections	1,738	4.11
Potholes	DPW - Street Maintenance	1,732	4.09
Broken Sidewalk	Permits, Licenses and Inspections	874	2.06
Illegal Parking	Police - Zones 1-6	764	1.80
Unpermitted Electrical Work	Permits, Licenses and Inspections	651	1.54
Pruning (city tree)	DPW - Forestry Division	557	1.32
Other		15,467	36.53

Highest Volumes of Open Requests, by Request Type
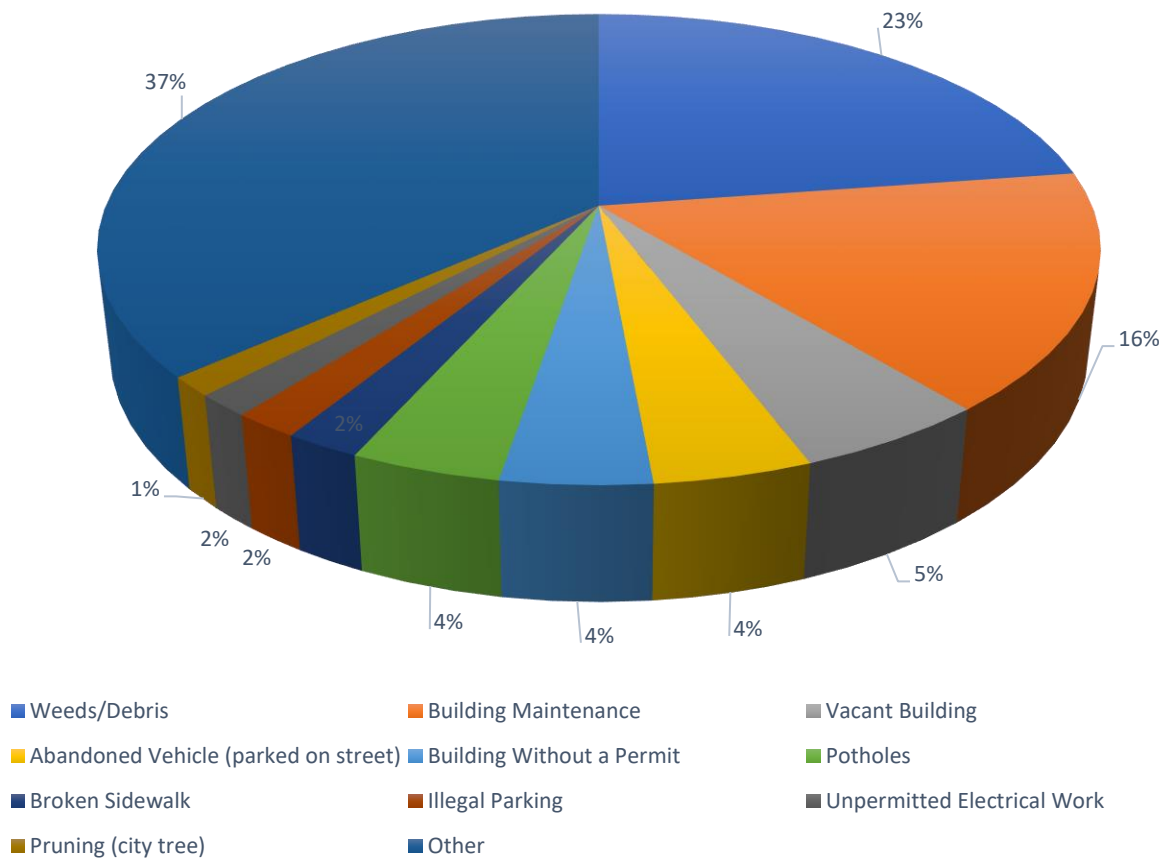
Departments with the Highest Volumes of Open Requests

The Department of Permits, Licenses and Inspections has been assigned to handle approximately 60% of all open service requests:

Assigned Department	Open Request Count	% of Open Requests
Permits, Licenses and Inspections	25,535	60.32
DPW - Street Maintenance	3,885	9.18
Police - Zones 1-6	3,058	7.22
Police - AVU	1,862	4.40
DOMI - TrafficShop	1,325	3.13
DPW - Forestry Division	898	2.12
DOMI - Traffic	892	2.11
DOMI - Permits	852	2.01
Unknown	645	1.52
DPW - Construction Division	591	1.40
Other	2,792	6.60

Highest Volumes of Open Requests, by Department

Legend:
- Permits, Licenses and Inspections
- DPW - Street Maintenance
- Police - Zones 1-6
- Police - AVU
- DOMI - TrafficShop
- DPW - Forestry Division
- DOMI - Traffic
- DOMI - Permits
- Unknown
- DPW - Construction Division
- Other
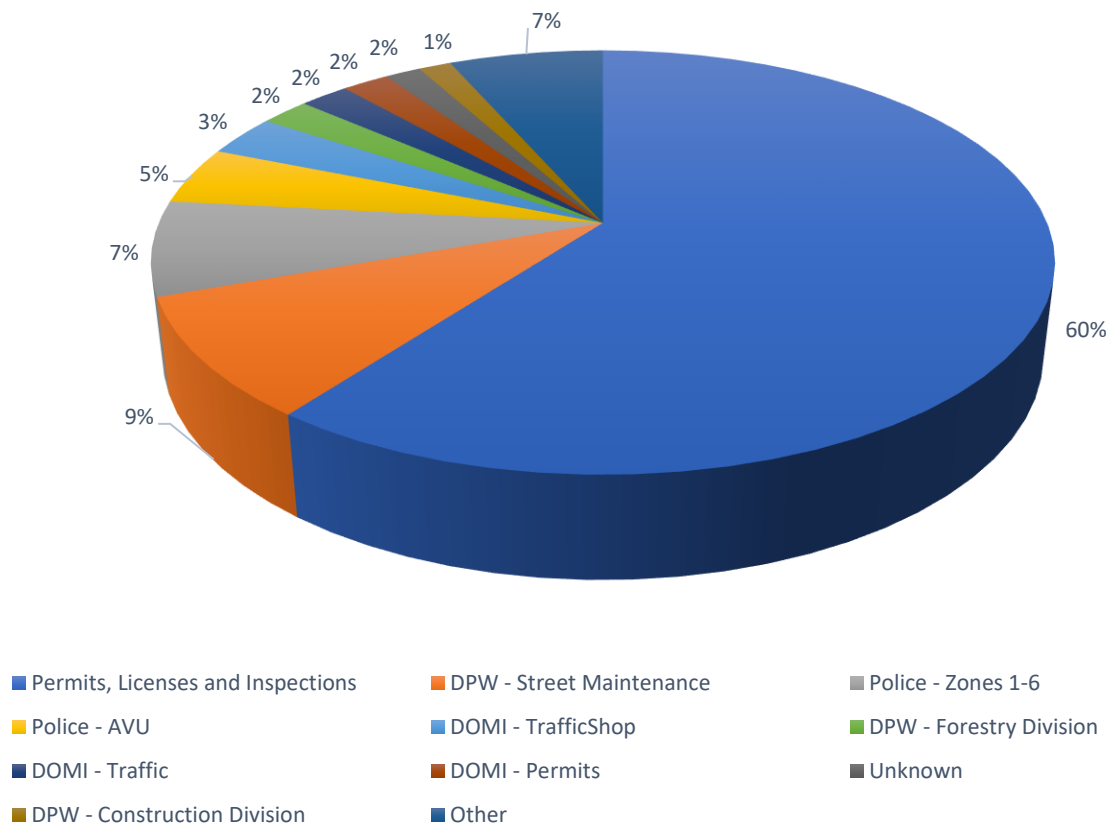
Length of Time Open Requests Have Remained Open

Although it is impossible to tell from the data how quickly different types of requests get closed (because there is no closure date in the 311 database), it is possible to look at how long different types of open requests have remained open by comparing records' creation dates with the current date. The average time requests that are currently open have remained opened is 517 days, or 1.42 years. Looking specifically at the top 10 highest volumes of open requests, the mean time they have remained opened is 615 days, or 1.69 years. (Note that requests may have been in a New status for part of the time.):

Top 10 Open Requests	Assigned Department	Count of Open Requests	Mean Elapsed Days Open	Mean Elapsed Years Open
Abandoned Vehicle (parked on street)	Police - AVU	1,831	995	2.72
Building Maintenance	Permits, Licenses and Inspections	6,903	772	2.10
Building Without a Permit	Permits, Licenses and Inspections	1,737	771	2.10
Vacant Building	Permits, Licenses and Inspections	2,257	680	1.86
Weeds/Debris	Permits, Licenses and Inspections	9,586	617	1.67
Potholes	DOMI - Streets/DPW - Street Maintenance	1,714	397	0.86
Broken Sidewalk	Permits, Licenses and Inspections	877	636	1.73
Illegal Parking	Police - Zones 1-6	738	513	1.35
Unpermitted Electrical Work	Permits, Licenses and Inspections	650	498	1.35
Pruning (city tree)	DPW - Forestry Division	546	276	0.76

Mean Days Highest Volume Requests Have Remained Open
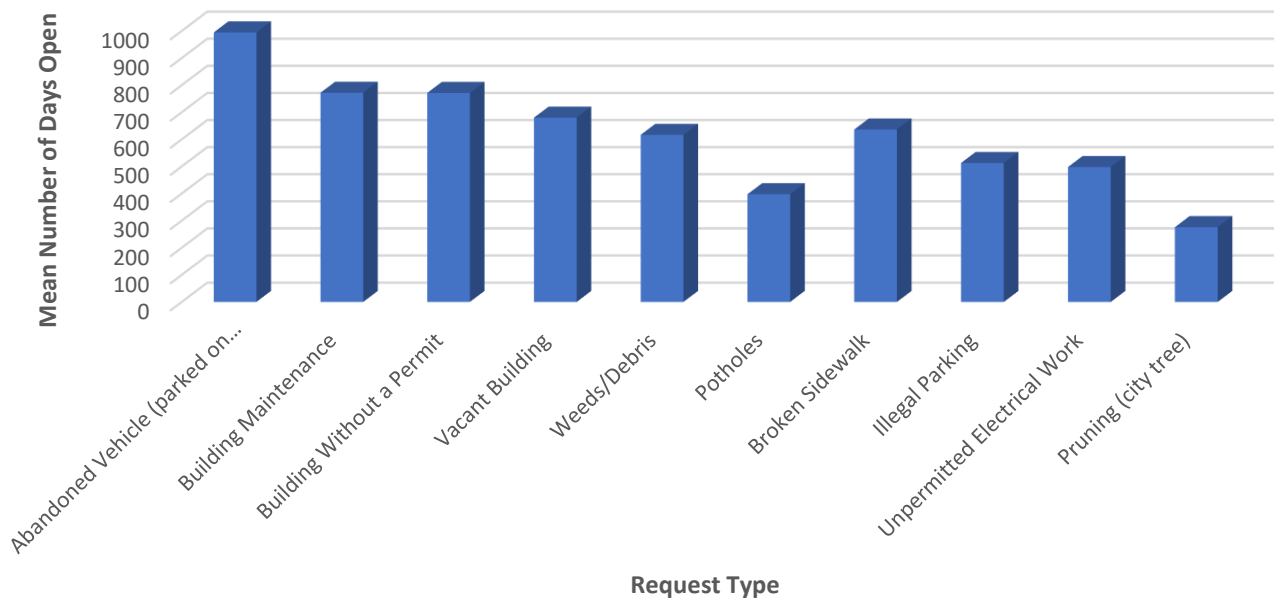
The types of requests that have stayed open the longest are shown below. Note the low numbers of requests involved. Also note that four types of requests remaining open the longest are filed under a "DO NOT USE" category.

Request Type	Assigned Department	Count of Open Requests	Mean Elapsed Days Open	Mean Elapsed Years Open
Building (Residential)/DO NOT USE	311	2	1,612	4.42
KNOWLEDGE BASE ARTICLES	Unknown	1	1,544	4.23
Building Violation (Residential)/DO NOT USE	Permits, Licenses and Inspections	1	1,498	4.10
Sidewalk, Damaged/DO NOT USE	311	6	1,477	4.05
Barking Dog	Animal Care & Control	1	1,448	3.97
Business Accessibility	Permits, Licenses and Inspections	3	1,425	3.91
Sidewalk, Lack of Snow/Ice Removal	DOMI - Permits	1	1,389	3.81
Sidewalk, Lack of Snow/Ice Removal	311	1	1,369	3.75
Demolition - DO NOT USE	Permits, Licenses and Inspections	1	1,358	3.72
Hydrant - Fire Admin	Fire Bureau	2	1,355	3.71
Traffic or Pedestrian Signal, Request	DPW - Transportation & Engineering	1	1,348	3.69

Types of Requests Remaining Open the Longest
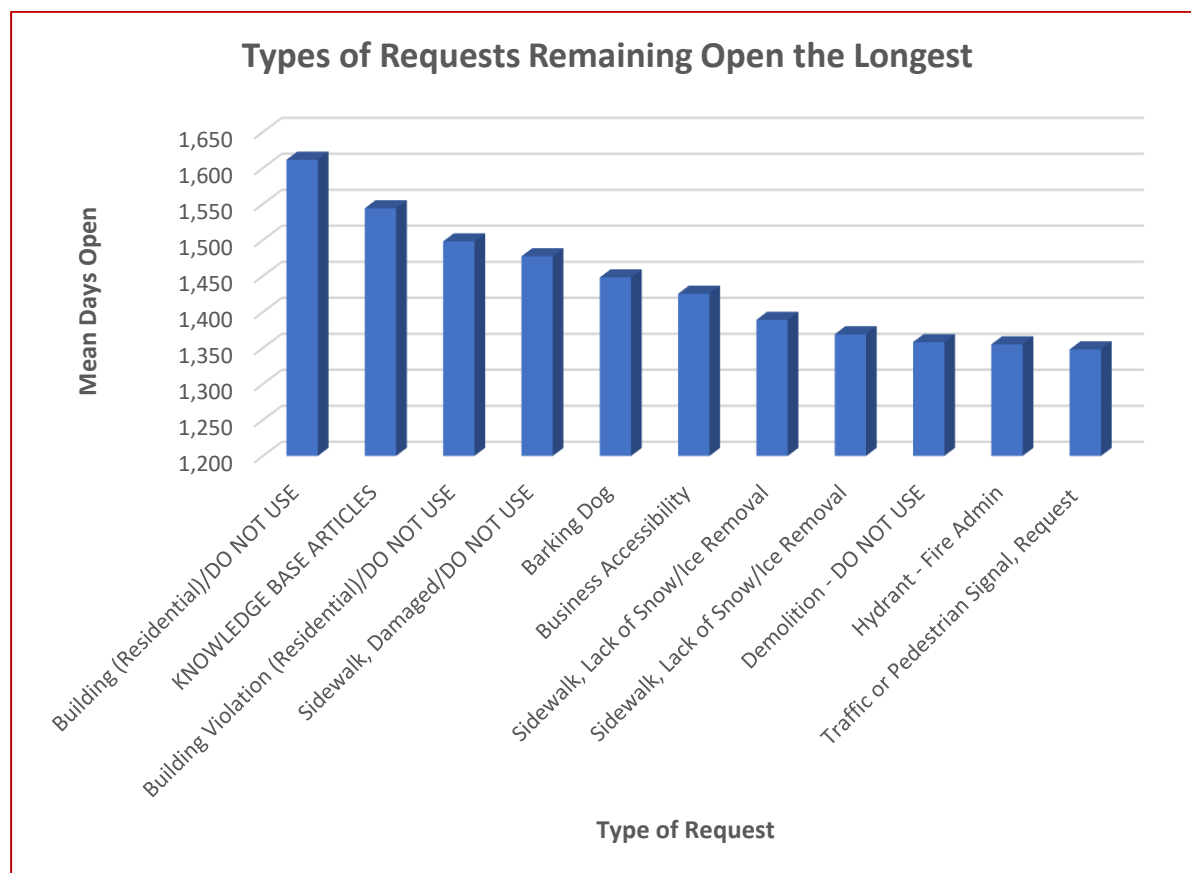
The following table shows how long requests have stayed open by assigned department. Note the low number of requests involved for most of the departments.

Department	Count of Open Requests	Mean Days Open	Mean Years Open
DPW - Traffic	2	1,263	3.46
PCSC	1	1,088	2.98
DPW - Transportation & Engineering	2	1,024	2.80
Police - AVU	1,862	985	2.70
DOMI - Streets	366	949	2.60
DOMI - Structures	99	901	2.47
DPW - Permits	2	872	2.39
City Planning - Bicycles/Pedestrian traffic	1	851	2.33
DPW - Administration	69	813	2.23
EMS - Administration	1	802	2.20

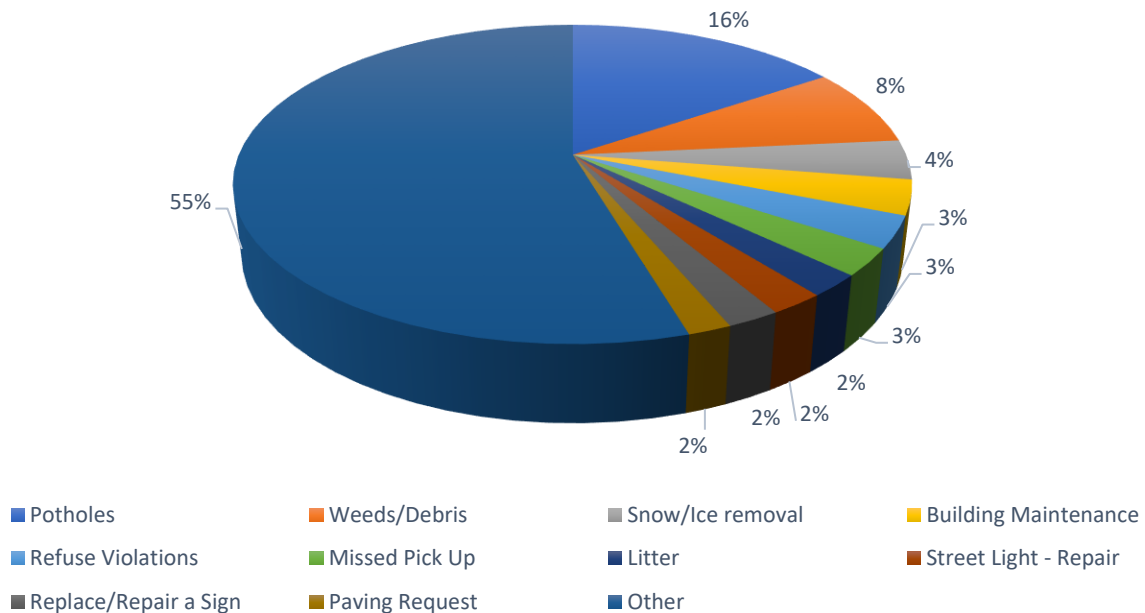Departments with Requests That Have Been Open The Longest
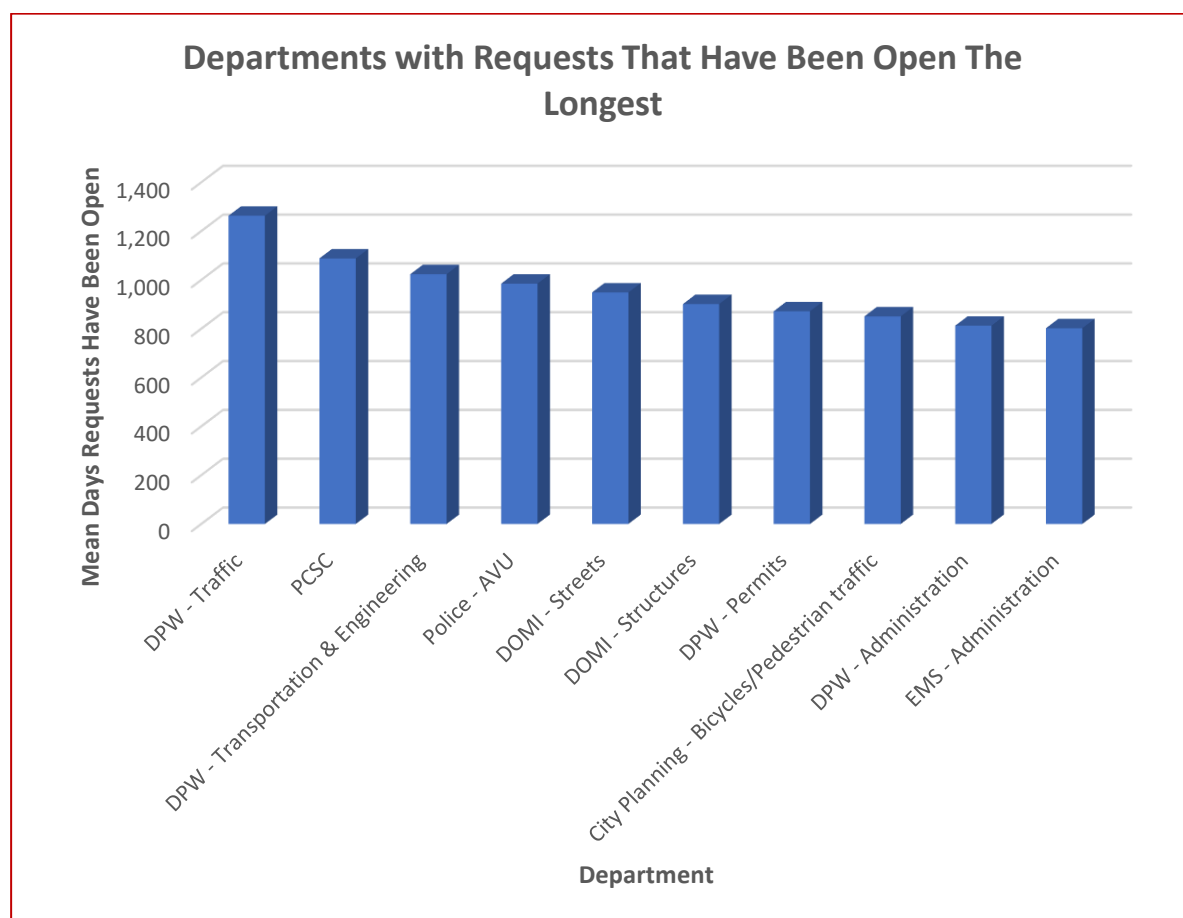
Highest Volumes of Closed Requests

There were 309,612 requests in a Closed status, which represents 82% of all requests. The volume of closed requests reflects the overall volume of service requests and possibly indicates how successful the city is at closing specific types of requests. Note that approximately 54% of all service requests are NOT included in this top 10 list, which implies that the Closed requests are distributed widely across request types (i.e., not concentrated in the top 10).

Request Type	Assigned Department	Closed Request Count	% Total Closed Reqs
Potholes	DPW - Street Maintenance	48,297.00	15.60
Weeds/Debris	Permits, Licenses and Inspections	24,418.00	7.89
Snow/Ice removal	DPW - Street Maintenance	12,396.00	4.00
Building Maintenance	Permits, Licenses and Inspections	10,869.00	3.51
Refuse Violations	DPW - Refuse	9,976.00	3.22
Missed Pick Up	DPW - Refuse	8,549.00	2.76
Litter	DPW - Street Maintenance	6,958.00	2.25
Street Light - Repair	Allegheny City Electric	6,914.00	2.23
Replace/Repair a Sign	DOMI - TrafficShop	6,666.00	2.15
Paving Request	DOMI - Asphalt	5,455.00	1.76
Other		169,115.00	54.62

Highest Percentages of Closed Requests, by Request Type

Legend: Potholes, Weeds/Debris, Snow/Ice removal, Building Maintenance, Refuse Violations, Missed Pick Up, Litter, Street Light - Repair, Replace/Repair a Sign, Paving Request, Other

Departments with the Highest Volumes of Closed Requests

The combination of the DPW – Street Maintenance department and the Permits, Licenses and Inspections department closed nearly 50% of all service requests:

Assigned Department	Closed Req Count	% of Total Closed Reqs
DPW - Street Maintenance	92,622	29.92
Permits, Licenses and Inspections	58,857	19.01
DPW - Refuse	26,163	8.45
Pittsburgh Water and Sewer Authority	13,184	4.26
Police - Zones 1-6	12,523	4.04
311	12,195	3.94
DOMI - TrafficShop	12,194	3.94
DOMI - Permits	11,306	3.65
Animal Care & Control	10,381	3.35
DPW - Forestry Division	9,604	3.10
Other	50,583	16.34

Highest Percentage of Closed Requests, by Department
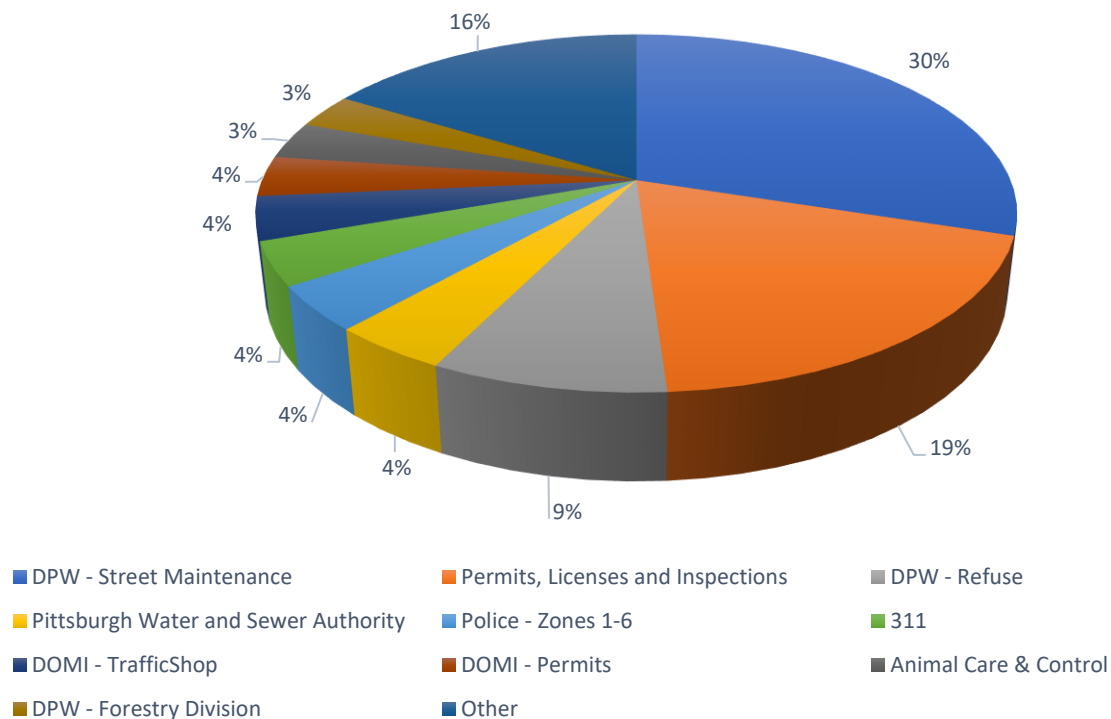
Ratio of Open-to-Closed Requests

For each of the top 10 open requests, it's possible to determine how many of the same types of requests it closes. This information helps to clarify whether a type of open request is staying open because of the shear volume of that type of request. Higher ratios for a given request type mean that the city ha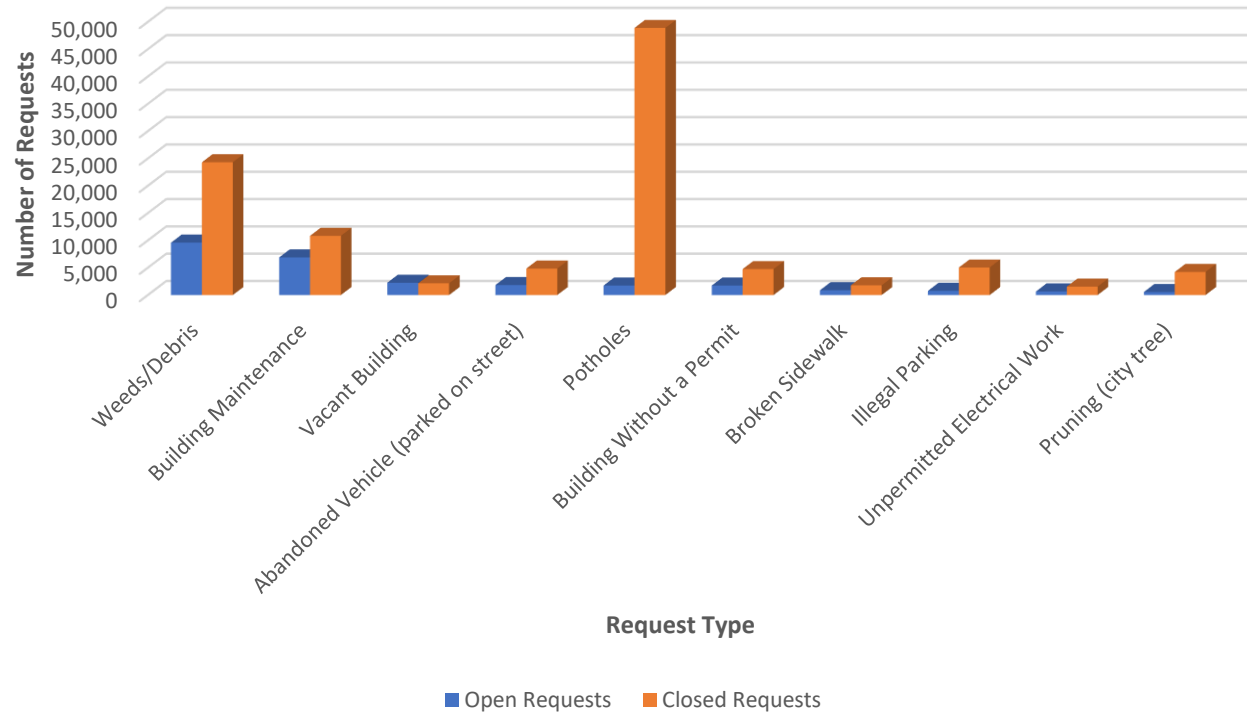s a higher proportion of open requests compared with closed requests, implying that those requests are harder to close, or that they have lower priority.

Request Type	Assigned Department	Open Req Count	Closed Requests	Ratio Open to Closed
Weeds/Debris	Permits, Licenses and Inspections	9,594	24,418	0.39
Building Maintenance	Permits, Licenses and Inspections	6,887	10,869	0.63
Vacant Building	Permits, Licenses and Inspections	2,245	2,161	1.04
Abandoned Vehicle (parked on street)	Police - AVU	1,826	4,850	0.38
Building Without a Permit	Permits, Licenses and Inspections	1,738	4,759	0.37
Potholes	DPW - Street Maintenance	1,732	48,297	0.04
Broken Sidewalk	Permits, Licenses and Inspections	874	1,788	0.49
Illegal Parking	Police - Zones 1-6	764	5,089	0.15
Unpermitted Electrical Work	Permits, Licenses and Inspections	651	1,549	0.42
Pruning (city tree)	DPW - Forestry Division	557	4,239	0.13

Lowest Ratios (<0.30)	Moderate Ratios (<0.50)	High Ratios (=> 0.50)
Potholes	Building without a Permit	Vacant Building
Illegal Parking	Abandoned Vehicle	Building maintenance
Pruning (city tree)	Weeds/Debris	
	Unpermitted Electrical Work	
	Broken Sidewalk	

Open vs. Closed Requests, by Request Type

Bar chart titled "Open vs. Closed Requests, by Request Type". Y-axis labeled "Number of Requests" ranging from 0 to 50,000 in increments of 5,000. X-axis labeled "Request Type" with categories: Weeds/Debris, Building Maintenance, Vacant Building, Abandoned Vehicle (parked on street), Potholes, Building Without a Permit, Broken Sidewalk, Illegal Parking, Unpermitted Electrical Work, Pruning (city tree). Legend: Open Requests (blue), Closed Requests (orange).

The same type of analysis can be applied to departments. The following table shows the open-to-closed rations of departments having the highest volumes of Open and Closed requests. Low ratios might mean that the department is able to close requests at a faster rate, possibly due to an inherent efficiency or to requests of a more discrete or simpler nature. For example, it probably takes more time and resources for the Permits, Licenses, and Inspections department to complete requests such as Building Maintenance than it takes Animal Control to handle a barking dog.

Assigned Department	Count of Open Requests	Count of Closed Requests	Ratio Open-to-Closed
Permits, Licenses and Inspections	25,535	58,857	0.43
DPW - Street Maintenance	3,885	92,622	0.04
Police - Zones 1-6	3,058	12,523	0.24
Police - AVU	1,862	5,146	0.36
DOMI - TrafficShop	1,325	12,196	0.11
DPW - Forestry Division	898	9,604	0.09
DOMI - Traffic	892	8,165	0.11
DOMI - Permits	852	11,306	0.08
DPW - Construction Division	591	2,184	0.27
Pittsburgh Water and Sewer Authority	565	13,184	0.04
DPW - Refuse	238	26,163	0.01
311	146	12,195	0.01
Animal Care and Control	7	10,381	0.00

Lowest Ratios (<0.30)	Moderate Ratios (<0.50)	High Ratios (=> 0.50)
Animal Care and Control	Police - AVU	N/A
DPW – Refuse	Permits, Licenses and Inspections	
311		
DPW – Street Maintenance		
PWSA		
DOMI - Permits		
DPW – Forestry Division		
DOMI – TrafficShop		
Police – Zones 1-6		
DPW - Construction Division		

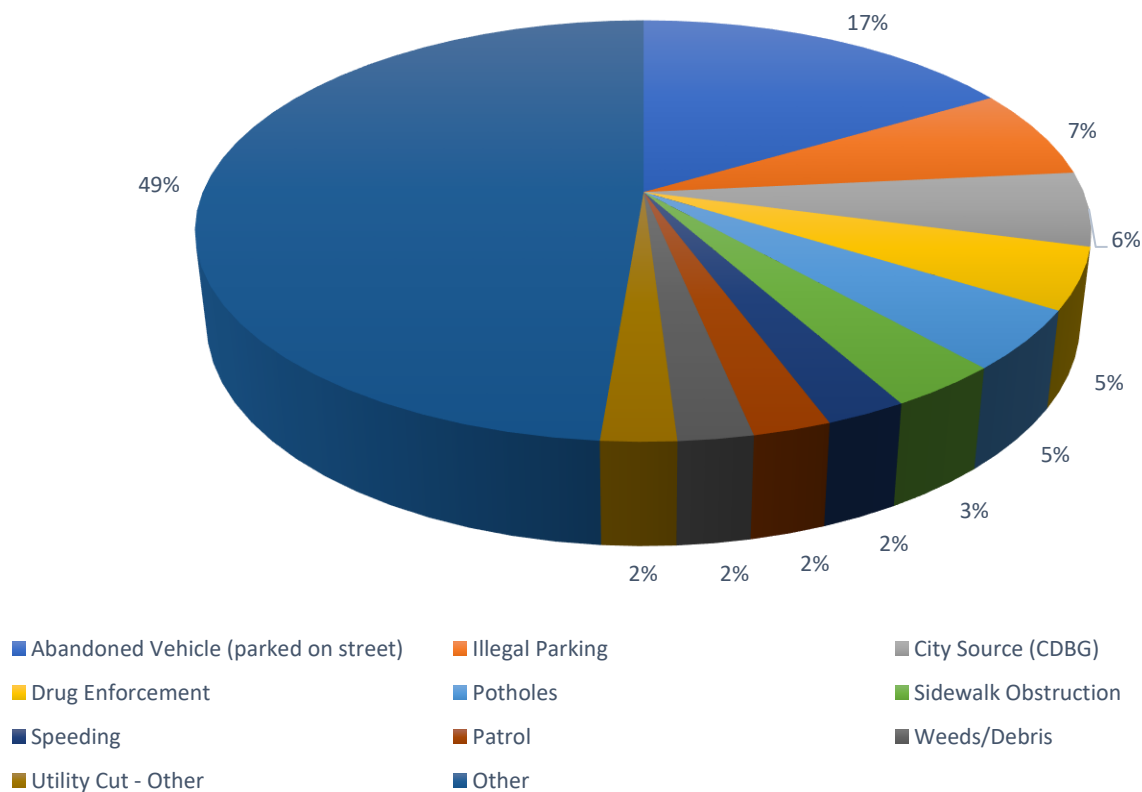**Open vs Closed Requests, by Department**
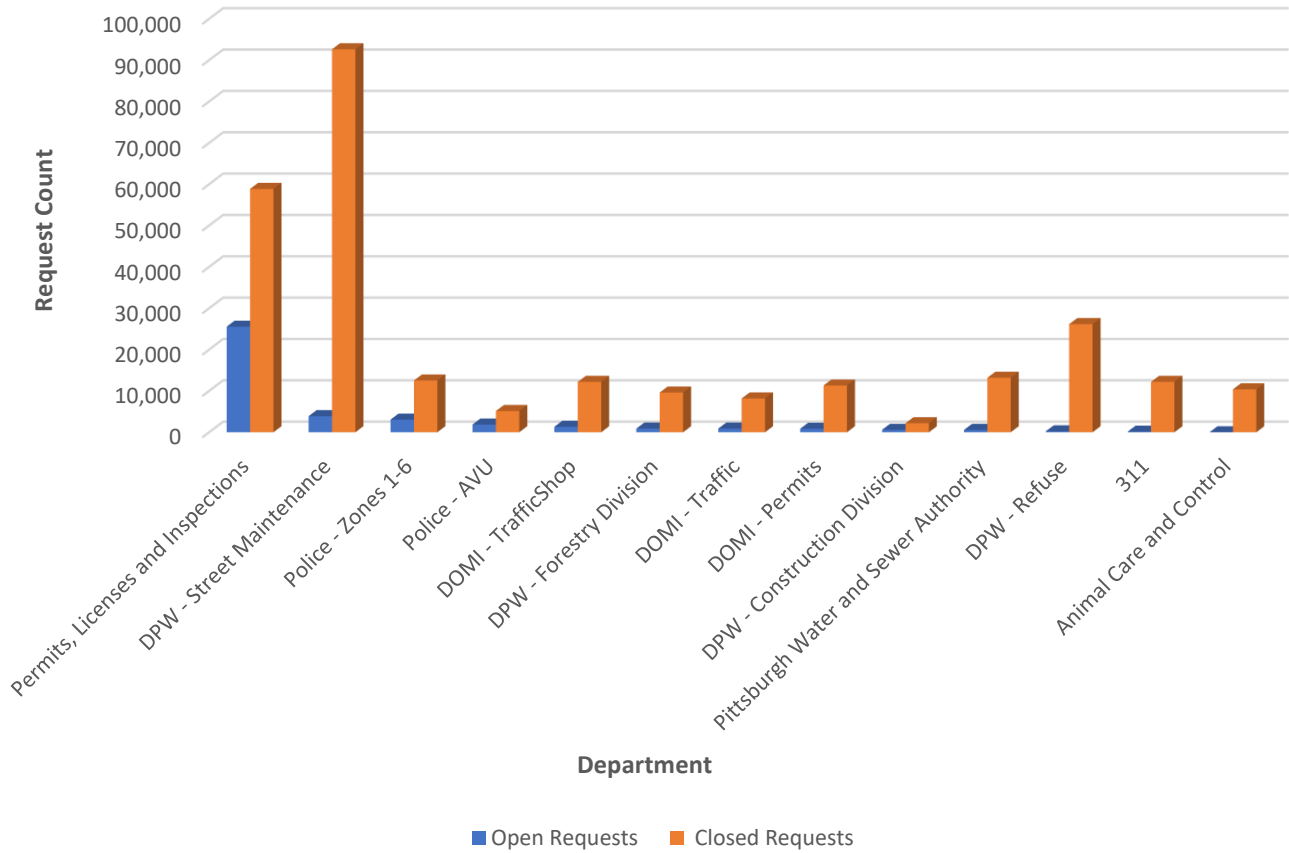
Highest Volumes of New Requests

23,536 requests were assigned the "New" status, which represents 6% of all requests. The top types of requests assigned the New status were:

Request Type	Assigned Department	Count of Requests	% of New Reqs
Abandoned Vehicle (parked on street)	Police - AVU	3899	16.57
Illegal Parking	Police - Zones 1-6	1621	6.89
City Source (CDBG)	City Source Associates, Inc.	1335	5.67
Drug Enforcement	Police - Zones 1-6	1103	4.69
Potholes	DPW - Street Maintenance	1080	4.59
Sidewalk Obstruction	DOMI - Permits	811	3.45
Speeding	Police - Zones 1-6	586	2.49
Patrol	Police - Zones 1-6	561	2.38
Weeds/Debris	Permits, Licenses and Inspections	538	2.29
Utility Cut - Other	DOMI - Permits	538	2.29
Other		11,464	48.71

Highest Volumes of New Requests, by Request Type

17%
7%
6%
5%
5%
3%
2%
2%
2%
2%
49%

- Abandoned Vehicle (parked on street)
- Illegal Parking
- City Source (CDBG)
- Drug Enforcement
- Potholes
- Sidewalk Obstruction
- Speeding
- Patrol
- Weeds/Debris
- Utility Cut - Other
- Other

Departments with the Highest Volumes of New Requests

The following table shows the departments with the highest volumes of New requests. The Police – Zones 1-6, Police – AVU, DOMI – Permits, and DPW – Street Maintenance departments are assigned to 63.3% of all New requests.

Assigned Department	Request Count	% of New Requests
Police - Zones 1-6	5,189	22.05
Police - AVU	4,268	18.13
DOMI - Permits	3,031	12.88
DPW - Street Maintenance	2,480	10.54
Permits, Licenses and Inspections	1,639	6.96
City Source Associates, Inc.	1,335	5.67
Pittsburgh Water and Sewer Authority	854	3.63
DPW - Construction Division	789	3.35
311	504	2.14
Unknown	484	2.06
Other	2,963	12.59
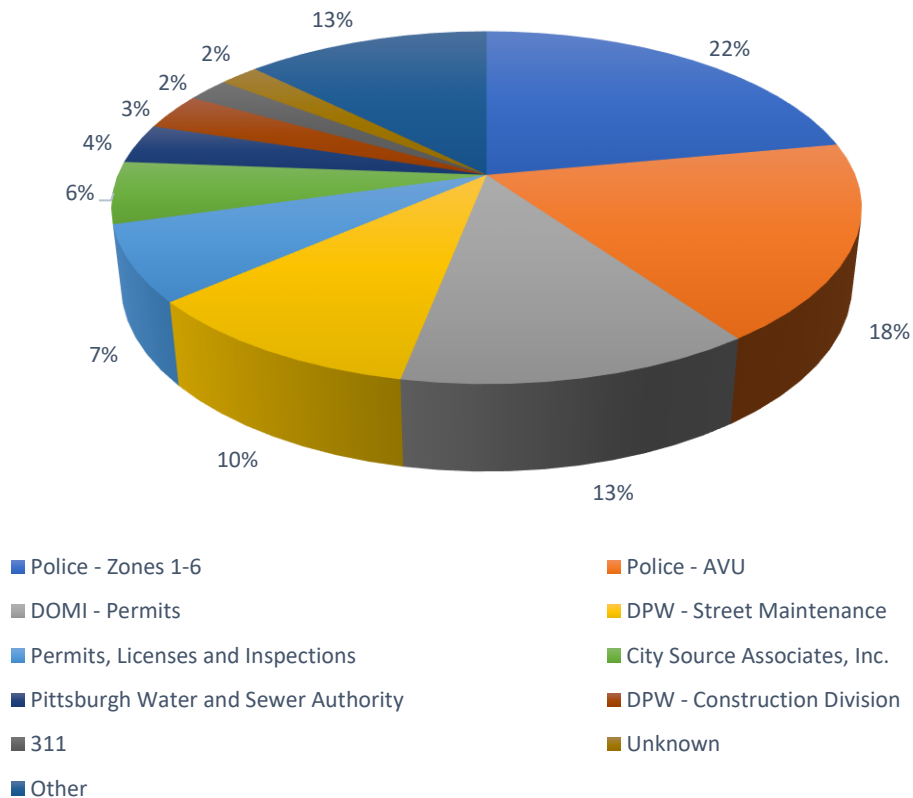
Length of Time Requests Have Remained in the New Status

The following table shows the request types that have been in the New status for the longest time. Note, however, the low numbers of requests that are involved.

Request Type	Assigned Department	Count of New Requests	Mean Days in New Status	Mean Years
City Clerk	City Clerks Office	1	1,441	3.95
Hydrant - Fire Admin	Fire Bureau	40	1,259	3.45
Thank You - EMS	EMS - Administration	1	1,191	3.26
No Parking Variance	DPW - Permits	12	1,106	3.03
City Website	Innovation & Performance	1	1,094	3.00
Traffic or Pedestrian Signal, Repair	DOMI - TrafficShop	16	974	2.67
No Parking Variance	DOMI - Permits	39	971	2.66
Fire Department	Fire Bureau	4	956	2.62
PWSA Billing or Shut Off	Pittsburgh Water and Sewer Authority	84	898	2.46
Field	DOMI - Permits	19	881	2.41

Types of Requests Staying in New Status the Longest
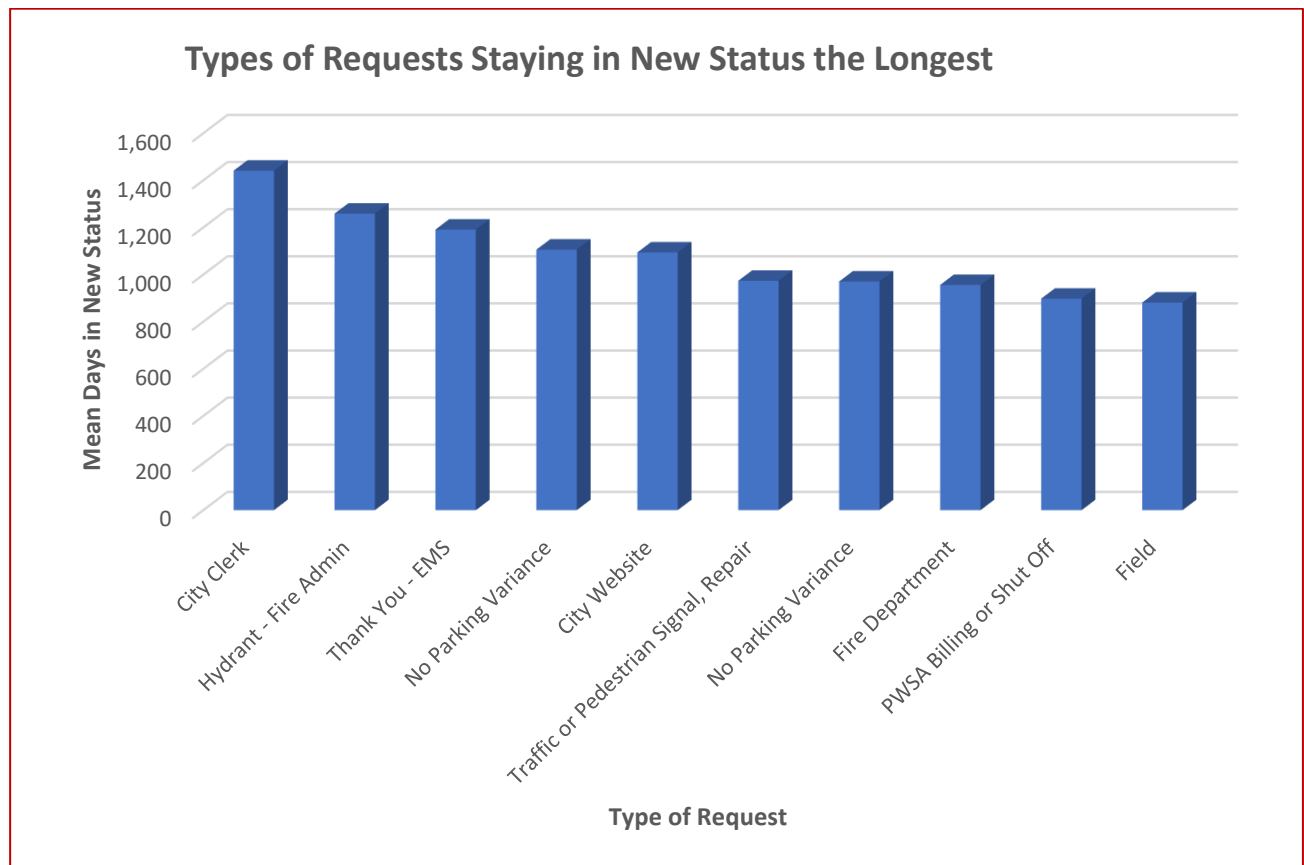
The following table shows the departments with requests in the New status the longest:

Department	Count of New Requests	Mean Days in New Status	Mean Years
City Clerks Office	1	1,441	3.95
Innovation & Performance	1	1,094	3.00
DPW - Permits	31	967	2.65
Fire Bureau	19	745	2.04
DPW - 2nd Division	2	732	2.00
EMS - Administration	3	705	1.93
DPW - Transportation & Engineering	3	651	1.78
DOMI - TrafficShop	33	615	1.69
DOMIStructures	2	613	1.68
DOMI - Streets	190	548	1.50

Conclusions

- The city of Pittsburgh was able to close 82% of all 311 service requests from 2015- October 21, 2019. The total number of these service requests was 375,483 on October 21, 2019. Only 11% (n=42,335) remained in an "Open" status. (The remaining 6% requests were classified as "New".) This indicates that the city is successful in closing most requests.

- The 10 types of requests in any status are:

  1. Potholes
  2. Weeds/Debris
  3. Building Maintenance
  4. Snow/Ice removal
  5. Abandoned Vehicle (parked on street)
  6. Refuse Violations
  7. Missed Pick Up
  8. Litter
  9. Illegal Parking
  10. Replace/Repair a Sign

- The departments assigned to handle the highest volumes of service requests are:

Department	Highest Volume Request Types
DPW – Street Maintenance	Potholes, Snow/Ice Removal, Litter
Permits, Licenses and Inspections	Weeds/Debris, Building Maintenance
DPW – Refuse	Refuse Violations, Missed Pick Up
Police Zone 1-6	Illegal Parking
DOMI - Permits	Illegal Dumping, Sidewalk Obstruction
Pittsburgh Water and Sewer Authority	Catch Basin, Clogged, and Leak
DOMI - TrafficShop	Replace/Repair a Sign, Pedestrian or Traffic Signal Repair
311	Referral, Question
Police – AVU	Abandoned Vehicle

- The 10 types of requests with the highest numbers of requests in the "open status" (i.e., the "top 10") are:

  1. Weeds/Debris
  2. Building maintenance
  3. Vacant Building
  4. Abandoned Vehicles (parked on street)
  5. Potholes
  6. Building without a Permit
  7. Broken Sidewalk
  8. Illegal Parking
  9. Unpermitted Electrical Work
  10. Pruning (city tree)

Most of the top 10 open requests are also in the top 10 of all requests (in any status), which implies that the main reason they are in an open status is due to the sheer volume of requests rather than due to something inherently difficult about closing these requests. For example, there are probably many open requests for "Weeds/Debris" because there is a high number of requests for "Weeds/Debris", rather than because the city is not very successful at closing them.

- The department of Permits, Licenses, and Inspections is assigned to handle 6 of highest volume open requests, including:

  - Weeds/Debris
  - Building Maintenance
  - Vacant Building
  - Building without a Permit
  - Broken Sidewalk
  - Unpermitted Electrical work

Unsurprisingly, this department owns a majority of the open requests (60.32%), with DPW – Street Maintenance placing second, mainly for Potholes.

- Requests currently in an open status have remained open for an average of 1.37 years. Among the top 10 most common types of open requests, "Abandoned Vehicles" appears to remain open the longest, for an average of 2.72 years, but even the lowest mean time open is 0.74 years for Pruning. Again, this data does not suggest that it takes an average of 2.72 years to close an abandoned vehicle problem or 0.74 years to prune a city tree. Instead it means that if a request is in an open status, it is remaining open for a long time because it is:

  - Very low priority and might never be closed.
  - Very difficult to close for some reason, such as it requires more resources than are available.
  - Already closed, but not recorded as closed due to a procedural issue or due to the original issue resolving on its own (e.g., barking dog) without any city intervention being required.

- Of all open requests, four of the longest standing open requests are classified as "DO NOT USE" request. Others, such as the Barking Dog category, are probably no longer open. See the "Limitations of the Data/Recommendations" section for a more complete discussion of these issues.

- The following departments have been assigned to handle the longest standing open requests. Note however, that except for the Police –, DOMI – Streets, and DOMI – Structures departments, the listed departments have low Open request counts. This might mean that the long-standing open requests represent infrequent, isolated cases that do not point to any systematic problems with these departments completing requests and marking them as Closed.

    - DPW – Traffic (3.46 mean years open, 2 open requests)
    - PCSC (2.98 mean years open, 1 open request)
    - DPW – Transportation & Engineering (2.80 mean years open, 2 open requests)
    - Police – AVU (2.70 mean years open, 1,862 open requests)
    - DOMI – Streets (2.60 mean years open, 366 open requests)
    - DOMI – Structures (2.47 mean years open, 99 open requests)

    It's not clear whether the relatively high number of long-standing open requests assigned to the Police – AVU are due to the relative difficulty of the requests (handling Abandoned Vehicles), or due to some other unknown factor.

- The top 10 highest volume of Closed requests include:

    1. Potholes
    2. Weeds/Debris
    3. Snow/Ice removal
    4. Building Maintenance
    5. Refuse Violations
    6. Missed Pick Up
    7. Litter
    8. Street Light – Repair
    9. Replace/Repair a Sign
    10. Paving Request

    These top 10 Closed requests only represent 45% of all closed requests, which suggests that Closed requests are distributed widely among request types.

    Most of the top Open requests are also part of the top 10 Closed requests, which is further evidence that the volume of a specific type of request might predict the volume of Open status requests.

- The two departments with the highest volume of Closed requests are DPW – Street Maintenance (30%) and Permits, Licenses, and Inspections (19%). These are the same departments that have the highest volume of Open requests and service requests in general.

- Looking at the top 10 highest volume Open requests, the relative difficulty of closing each of the requests might be inferred by comparing the open-to-closed ratios. A low ratio mean that the city is relatively successful at closing that type of request, or that it prioritizes that type of request. Types of requests with low ratios include:

    - Potholes
    - Illegal Parking
    - Pruning (city trees)

  Types of requests with moderate ratios include:

    - Building without a Permit
    - Abandoned Vehicle (parked on the street)
    - Weeds/Debris
    - Unpermitted Electrical Work
    - Broken Sidewalk

  Types of requests with the highest ratios are:

    - Vacant Buildings
    - Building Maintenance

  The city is able to close issues involving Potholes, Illegal Parking, and Pruning (city trees) relatively easily. Building Maintenance might be more resource/time intensive to resolve than other types of requests, such as Potholes. And Vacant Buildings might involve legal red tape that prevents this type of request from being resolved quickly.

  When departments are compared by the same method, all departments have low ratios, with the exception of Permits, Licenses, and Inspections department and the Police – AVU department, which have moderate ratios. These moderate ratios do not suggest that the two departments are any less efficient or capable of closing requests. Instead, it suggests that the nature of the requests that get assigned to the departments are of a more complex or time-consuming nature.

- Although the overall percentage of requests assigned the New status is low (6%), some of them are considered "New" for seemingly unnatural lengths of time. For example, a "Thank You – EMS" request should not require 3.26 years to be marked as Open or Closed. Therefore, it is unclear what distinguishes a New request from an Open request, and it seems like the status of some New requests is not being updated to Open and/or Closed in all cases. See the "Limitations of the Data/Recommendations" section for a more complete discussion of these issues.

Limitations of the Data/Recommendations

- There is a field in the data that indicates the date on which a request was created, but there is no corresponding date indicating when it was closed, so it is not possible to determine how long it took to close a given request. This type of information could be useful for establishing accountability and for determining whether the city is improving their rate of closures with time. In any case, there appears to be a problem with at least a few requests not being closed when they are resolved (e.g., Sidewalk, Lack of Snow/Ice Removal requests, which could reasonably be expected to be resolved on their own). If the 311 department wants to keep a record of requests that were opened but that cannot/will not be closed for some reason, perhaps adding a status such as "ON HOLD," "ARCHIVED," or "SHELVED" would help separate them from requests that will be closed with time. This would prevent the requests from remaining in the Open (or New) status indefinitely.

- There are over 300 different types of requests, some of which appear to overlap. For example, there are two separate categories called, "Replace/Repair a Sign" vs. "Replace/Repair Sign", as well as, "Snow/Ice removal" vs. "Snow/Ice Removal". Others are so vague that it is not clear how an administrator would know when to use them. For example, there are categories called, "Concern," "Issue," and "Procedure." There are also categories with "DO NOT USE" in their labels, but administrators still use them to categorize a small number of requests, so it's not clear how these categories are being used. It is clear from the data, however, that these "DO NOT USE" types of requests remain in an open status for the longest time. Therefore, a recommendation would be to remove "DO NOT USE" categories, consolidate request types into a much smaller number, and control who can add new request types.

- Although only a small percentage of requests are involved, further complicating the issue of data integrity is the fact that requests are left in a "New" status for an average of 1.01 years (370 days). This fact raises a question about what distinguishes a "New" request from an "Open" request. The answer does not appear to be strictly based on a period of time, because there are requests in the Open status that have been open for less time than requests in the New status. Is there some unknown factor that determines whether a status is New or Open, or do administrators forget to update the status from New to Open after a certain period has elapsed? Confidence in the data would be improved if a rule was in place and followed consistently.

- There is a problem with a few department names where one might be miss-spelled, making the data show two separate departments when only one exists. For example, Bridge Maintenance is assigned to both "DOMI – Structures" and "DOMIStructures" when these are most likely the same department.

- In several cases, a request type might be assigned to multiple departments, which is not a problem if the assignments are correct. However, there are cases where most requests are assigned to one department and a much smaller number to another department, which raises suspicions that one of the assignments might not be correct. For example, 7,189 "Replace/Repair a Sign" requests were assigned to "DOMI – TrafficShop," while 2 were assigned to "DOMI – Traffic." This might be correct, but it may be the case that these two departments are the same department, or that the 2 requests assigned to DOMI – Traffic were incorrect.

- In conclusion, the integrity and usefulness of the data could be improved by:

  - Adding a Closed Date field to the 311 data set.

  - Adding a special status for requests that will never be closed, because they are too low priority, too hard to close, or because they were resolved without intervention (e.g., "Barking Dog" or weather-related requests).

  - Determining why some requests have stayed in an Open or New status for years to determine if there's a problem with the process by which these requests get closed or moved from a New to an Open status.

  - Scrubbing the Request Types and Departments to eliminate duplicate entries with similar names. Department assignments should also be verified as part of this process.

  - Controlling the process by which new Request Types and Department names get added to the database.

  - Updating the 311 Codebook of Request Types with the most recent dictionary of request types. (It hasn't been updated since 2016.)

Addendum: Reanalysis of Open Requests After Record Preprocessing

Purpose

The WPRDC publishes a codebook, which organizes request types into categories. To help overcome the problem of having too many types of requests, many of which overlapped, a supplemental preprocessing program was written to consolidate request types largely based on the categories defined in the WPRDC codebook, and to eliminate categories marked, "DO NOT USE." Some modifications to the categories were made to replace the "In database, but not on 311 Web Submission Form" category with categories that made sense for the individual request types organized under the category. Although an attempt was made to keep request types in categories that were consistent with similar types of requests, some errors might have been introduced during this manual process.

The benefit of this approach is that it allowed highly related categories to be grouped together for analysis. A disadvantage is that some granularity was lost. For example, "Dumpster" and "Demolition" were grouped under the "Construction Issues" category, even though the effort involved in resolving these types of requests might be quite different.

Similarly, removing "DO NOT USE" categories and their corresponding requests had both a positive and negative effect on the data. For example, removing these categories also removed request data that was assigned to a category that should not have been used. However, it also had the effect of eliminating data that belonged somewhere. Preprocessing eliminated 289 request records from the database.

Despite the potential loss of granularity in the data, this addendum reanalyzes the consolidated data.

Highest Volumes of Service Requests

Road/Street Issues, Neighborhood Issues, and Garbage and Litter Issues represent 50% of all service requests in the preprocessed database.

Request Categories	% of Total Requests
Road/Street Issues	29.81
Neighborhood Issues	12.50
Garbage and Litter Issues	8.07
Building Maintenance	6.28
Parking	5.33
Tree Issues	3.54
Construction Issues	3.48
Public Safety	2.95
Utility Issues	2.84
Refuse Violations	2.75
Other	22.45

The DPW – Street Maintenance, Permits, Licenses and Inspections, and DPW – Refuse departments were assigned to 54% of all service requests:

Assigned Department	% of Total Requests
DPW - Street Maintenance	26.38
Permits, Licenses and Inspections	22.90
DPW - Refuse	7.11
Police - Zones 1-6	5.53
DOMI - Permits	4.04
Pittsburgh Water and Sewer Authority	3.89
DOMI - TrafficShop	3.61
311	3.39
Police - AVU	3.00
DPW - Forestry Division	2.82
Other	17.27

Highest Volumes of Open Requests

Open requests represented 11.28% of all service requests in the preprocessed database. Neighborhood Issues, Building Maintenance, and Road/Street Issues represented 62% of all open requests.

Request Categories	Open Req Count	% Total Open Reqs
Neighborhood Issues	13,237	31.28
Building Maintenance	8,224	19.43
Road/Street Issues	4,862	11.49
Construction Issues	3,164	7.48
Parking	2,686	6.35
Public Safety	1,880	4.44
Tree Issues	1,180	2.79
Traffic and Street Sign Issues	1,049	2.48
Garbage and Litter Issues	860	2.03
Business Issues	684	1.62
Other	4,496	10.62

The department of Permits, Licenses and Inspections has been assigned to 60% of all Open service requests. Considering that it is assigned to 23% of all service requests, which includes Open, Closed, and New requests, it has a relatively high proportion of Open requests compared with its requests in the Closed or New status.

Assigned Department	Open Request Count	% of Open Requests
Permits, Licenses and Inspections	25,533	60.33
DPW - Street Maintenance	3,885	9.18
Police - Zones 1-6	3,058	7.23
Police - AVU	1,862	4.40
DOMI - TrafficShop	1,325	3.13
DPW - Forestry Division	898	2.12
DOMI - Traffic	892	2.11
DOMI - Permits	852	2.01
Unknown	636	1.50
DPW - Construction Division	591	1.40
Other	2,790	6.59

KNOWLEDGE BASED ARTICLES, which are assigned to an unknown department (a blank department value in the database), have remained open the longest, but this is misleading because only 1 Open request exists. Road/Street Issues and Parking are the categories of requests that have the largest number of Open requests open for the longest average time.

Request Category	Count of Requests	Mean Elapsed Days Open	Mean Elapsed Years
KNOWLEDGE BASE ARTICLES	1	1,544	4.23
Sidewalk Issues	475	1,462	4.01
Road/Street Issues	4,862	1,355	3.71
Traffic or Pedestrian Signal, Request	86	1,348	3.69
City Facilities and Infrastructure	406	1,126	3.08
Personnel (City)	17	1,088	2.98
Brick/Block or Concrete Slab Repair	118	1,014	2.78
Bollard Repair/Maintenance	20	1,013	2.78
Parking	2,686	995	2.72
Fire Safety System Not Working	460	900	2.46

The Police – AVU department has the largest number of Open requests (1,862) open for the longest time (2.7 mean years). It's not clear whether this fact is due to the resolution difficulty of this department's requests, due to a procedural problem that prevents the department from closing requests in the database, or from some other unknown factor.

Assigned Department	Request Count	Mean Elapsed Days Open	Mean Years
DPW - Traffic	2	1,263	3.46
PCSC	1	1,088	2.98
DPW - Transportation & Engineering	2	1,024	2.80
Police - AVU	1,862	985	2.70
DOMI - Streets	366	949	2.60
DOMI - Structures	99	901	2.47
DPW - Permits	2	872	2.39
City Planning - Bicycles/Pedestrian traffic	3	851	2.33
DPW - Administration	69	813	2.23
EMS - Administration	1	802	2.20

Highest Volumes of Closed Requests

Road/Street Issues and Neighborhood Issues represented the two highest volume categories of Closed requests. Note that 54% of Closed requests were not represented in the top 10, meaning that they were widely distributed across 86 request categories.

Request Category	Closed Req Count	% Total Closed Reqs
Road/Street Issues	102,802	16.01
Neighborhood Issues	32,106	7.82
Garbage and Litter Issues	28,395	4.10
Building Maintenance	14,829	3.50
Tree Issues	11,756	3.20
Parking	11,413	2.75
Refuse Violations	9,976	2.31
Utility Issues	9,789	2.23
Animal Issues	9,729	2.19
Construction Issues	9,395	1.77
Other	69,198	54.13

The DPW – Street Maintenance department, Permits, Licenses and Inspections department, and DPW – Refuse department closed 57% of all requests. Only a small percentage (16%) of closed requests are not represented in this table, meaning that the 10 departments listed below closed a large majority of all requests.

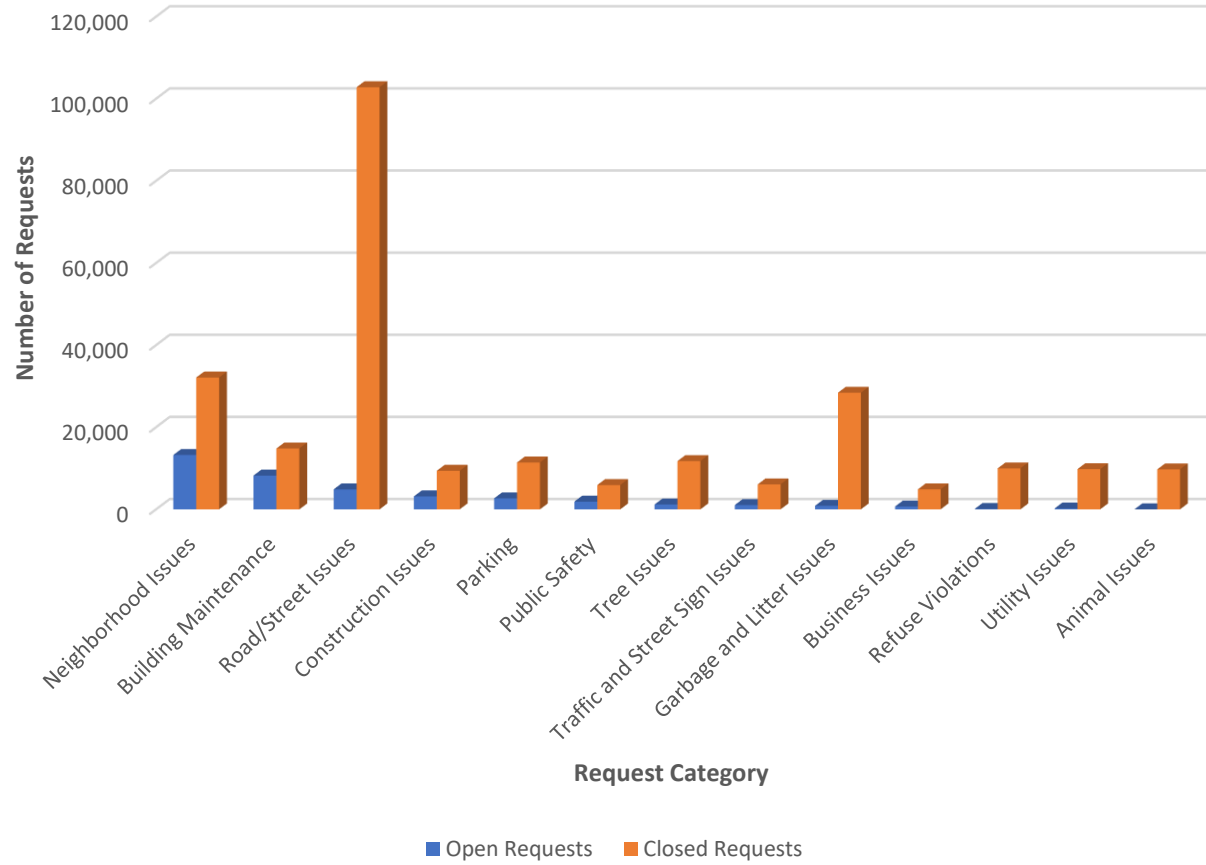| Assigned Department	Closed Request Count	% Total Closed Requests
DPW - Street Maintenance	92,622	29.94
Permits, Licenses and Inspections	58,767	18.99
DPW - Refuse	26,163	8.46
Pittsburgh Water and Sewer Authority	13,184	4.26
Police - Zones 1-6	12,523	4.05
DOMI - TrafficShop	12,194	3.94
311	12,089	3.91
DOMI - Permits	11,306	3.65
Animal Care & Control	10,381	3.36
DPW - Forestry Division	9,604	3.10
Other	50,555	16.34

Open-to-Closed Ratios

Measuring open-to-closed ratios might provide insight into how difficult it is to close requests in a given category. Low ratios imply that the category of request is easier to close, or that it is given higher priority.

Request Category	Open Requests	Closed Requests	Ratio Open to Closed
Neighborhood Issues	13,237	32,106	0.41
Building Maintenance	8,224	14,829	0.55
Road/Street Issues	4,862	102,802	0.05
Construction Issues	3,164	9,395	0.34
Parking	2,686	11,413	0.24
Public Safety	1,880	5,913	0.32
Tree Issues	1,180	11,756	0.10
Traffic and Street Sign Issues	1,049	6,084	0.17
Garbage and Litter Issues	860	28,395	0.03
Business Issues	684	4,878	0.14
Refuse Violations	115	9,976	0.01
Utility Issues	228	9,789	0.02
Animal Issues	7	9,729	0.00

| Lowest Ratios (<0.30)	Moderate Ratios (<0.50)	High Ratios (=> 0.50)
Animal Issues	Public Safety	Building Maintenance
Refuse Violations	Construction Issues	
Utility Issues	Neighborhood Issues	
Garbage and Litter Issues		
Road/Street Issues		
Tree Issues		
Business Issues		
Traffic and Street Sign Issues		
Parking		

Open vs. Closed Requests, by Request Category

The following table shows the same open-to-closed ratios analysis applied to departments:

Assigned Department	Count of Open Requests	Count of Closed Requests	Ratio Open-to-Closed
Permits, Licenses and Inspections	25,533	58,767	0.43
DPW - Street Maintenance	3,885	92,622	0.04
Police - Zones 1-6	3,058	12,523	0.24
Police - AVU	1,862	5,140	0.36
DOMI - TrafficShop	1,325	12,194	0.11
DPW - Forestry Division	898	9,604	0.09
DOMI - Traffic	892	8,165	0.11
DOMI - Permits	852	11,306	0.08
DPW - Construction Division	591	2,184	0.27
Pittsburgh Water and Sewer Authority	565	13,184	0.04

Lowest Ratios (<0.30)	Moderate Ratios (<0.50)	High Ratios (=> 0.50)
DPW – Street Maintenance	Police - AVU	N/A
Pittsburgh Water and Sewer Authority	Permits, Licenses and Inspections	
DOMI - Permits		
DPW - Forestry Division		
DOMI - TrafficShop		
DOMI - Traffic		
Police - Zones 1-6		
DPW - Construction Division		

Open vs Closed Requests, by Department
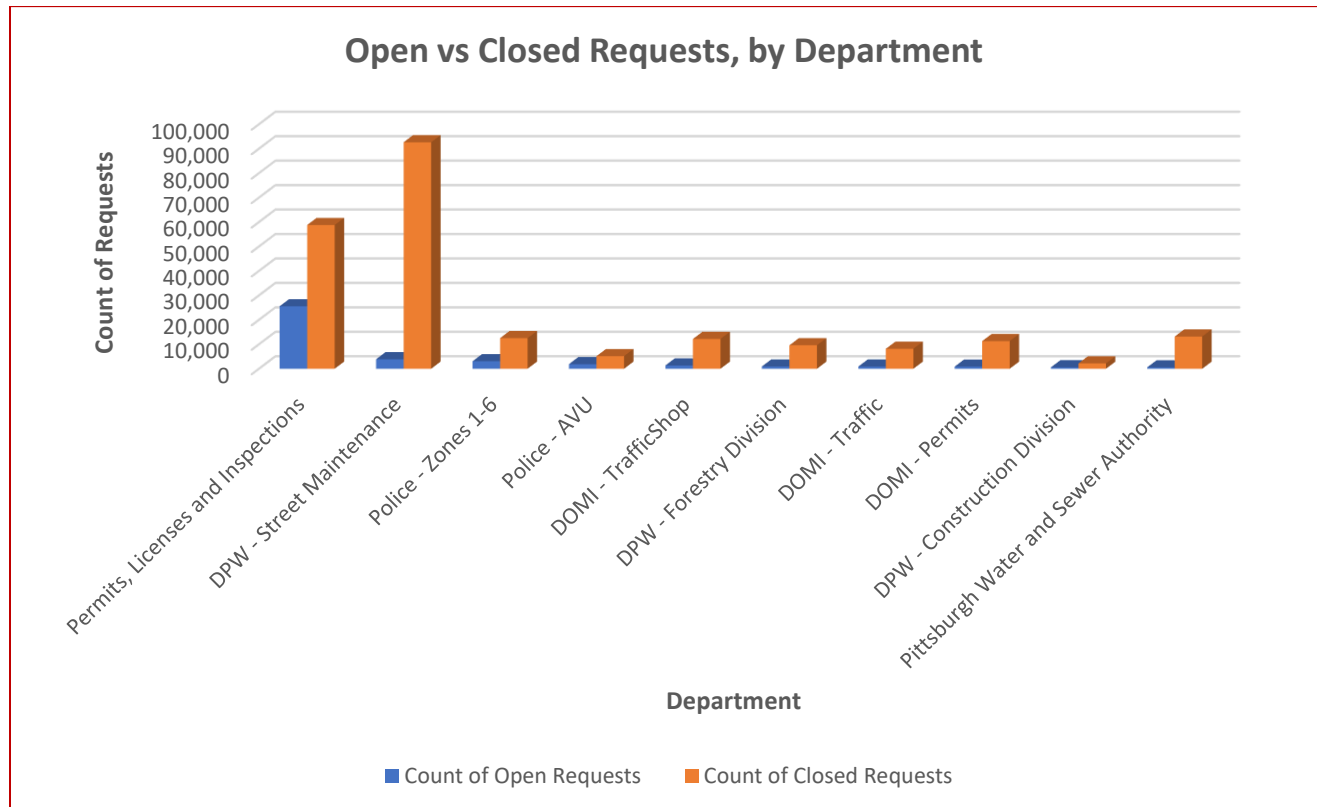
Highest Volumes of New Requests

There were 23,486 New requests in the preprocessed database, which represented 6.25% of all service requests. Parking, Road/Street Issues, and Public Safety request categories accounted for 53.63% of all New requests.

Request Type	Count of New Requests	% of Total New Requests
Parking	5,790	24.65
Road/Street Issues	3,580	15.24
Public Safety	3,226	13.74
City Source (CDBG)	1,335	5.68
Neighborhood Issues	1,324	5.64
Sidewalk Issues	1,283	5.46
Garbage and Litter Issues	877	3.73
Utility Issues	566	2.41
Traffic and Street Sign Issues	512	2.18
Construction Issues	421	1.79
Other		19.47

The departments assigned to the largest volumes of new requests are:

Assigned Department	Count of New Requests	% of Total New Requests
Police - Zones 1-6	5,189	22.09
Police - AVU	4,268	18.17
DOMI - Permits	3,031	12.91
DPW - Street Maintenance	2,480	10.56
Permits, Licenses and Inspections	1,639	6.98
City Source Associates, Inc.	1,335	5.68
Pittsburgh Water and Sewer Authority	854	3.64
DPW - Construction Division	789	3.36
311	504	2.15
ACHD - Housing	480	2.04
Other	2,917	12.42

Note that 63.73% of all New requests are currently assigned to the first four departments.

The Sidewalk Issues and Public Safety request categories had the highest number of New requests in that status for the longest time:

Request Category	Count of New Requests	Mean Days in New Status	Mean Years
Communications (Cable, Website)	3	890	2.44
Need Potable Water	5	665	1.82
Manhole Cover	161	650	1.78
Early Trash Set Out	7	597	1.63
Building Issues	3	547	1.50
Discrimination/Unfair Practices	34	533	1.46
Environmental Services - Refuse Accumulation	2	525	1.44
Paper street	10	513	1.41
Sidewalk Issues	1,283	480	1.31
Public Safety	3,226	477	1.31

The following table shows the departments having New requests in the New status for the longest. However, note the low numbers of requests involved:

Assigned Department	Count of New Requests	Mean Days in New Status	Mean Years
City Clerks Office	1	1,441	3.95
Innovation & Performance	1	1,094	3.00
DPW - Permits	31	967	2.65
Fire Bureau	19	745	2.04
DPW - 2nd Division	2	732	2.00
EMS - Administration	3	705	1.93
DPW - Transportation & Engineering	3	651	1.78
DOMI - TrafficShop	33	615	1.69
DOMIStructures	2	613	1.68
DOMI - Streets	190	548	1.50

Addendum: 311 Request Counts per Capita by Neighborhood

This section lists and maps 311 request counts per capita and by neighborhood. This data may help the 311 Department determine which neighborhoods make the most and least frequent use of the 311 system. Request counts by neighborhood were calculated from the 311 data set using a Python program. This data was then combined with neighborhood population figures from the 2010 U.S. Census to determine the number of 311 requests per capita within each Pittsburgh neighborhood. The data was then mapped using the QGIS software.

Neighborhoods with the Most Requests per Capita

Neighborhood	311 Counts	Pop. 2010	Count per Capita
Chateau	695	11	63.18
South Shore	702	19	36.95
Strip District	2,835	616	4.60
West End	1,125	254	4.43
North Shore	1,093	303	3.61
South Side Slopes	11,973	4,423	2.71
St. Clair	523	209	2.50
Mt. Oliver	1,231	509	2.42
Esplen	725	301	2.41
East Allegheny	5,117	2,136	2.40
Elliot	5,208	2,381	2.19
Middle Hill	3,613	1,707	2.12

Neighborhoods with the Fewest Requests per Capita

Neighborhood	311 Counts	Pop. 2010	Count per Capita
Banksville	2,797	4,144	0.67
Fairywood	671	1,002	0.67
Westwood	1,985	3,066	0.65
East Carnegie	358	570	0.63
Shadyside	7,867	13,915	0.57
Squirrel Hill North	6,096	11,363	0.54
Terrace Village	1,115	3,228	0.35
Bluff	2,252	6,600	0.34
North Oakland	3,608	10,551	0.34
Arlington Heights	79	244	0.32
Glen Hazel	224	716	0.31
Northview Heights	356	1,214	0.29

Pittsburgh 311 Requests Per Capita (2010 Census) by Neighborhood

311 Counts by Neighborhoods

- 0.29 - 0.72
- 0.72 - 0.93
- 0.93 - 1.17
- 1.17 - 1.43
- 1.43 - 1.63
- 1.63 - 2.1
- 2.1 - 63.18
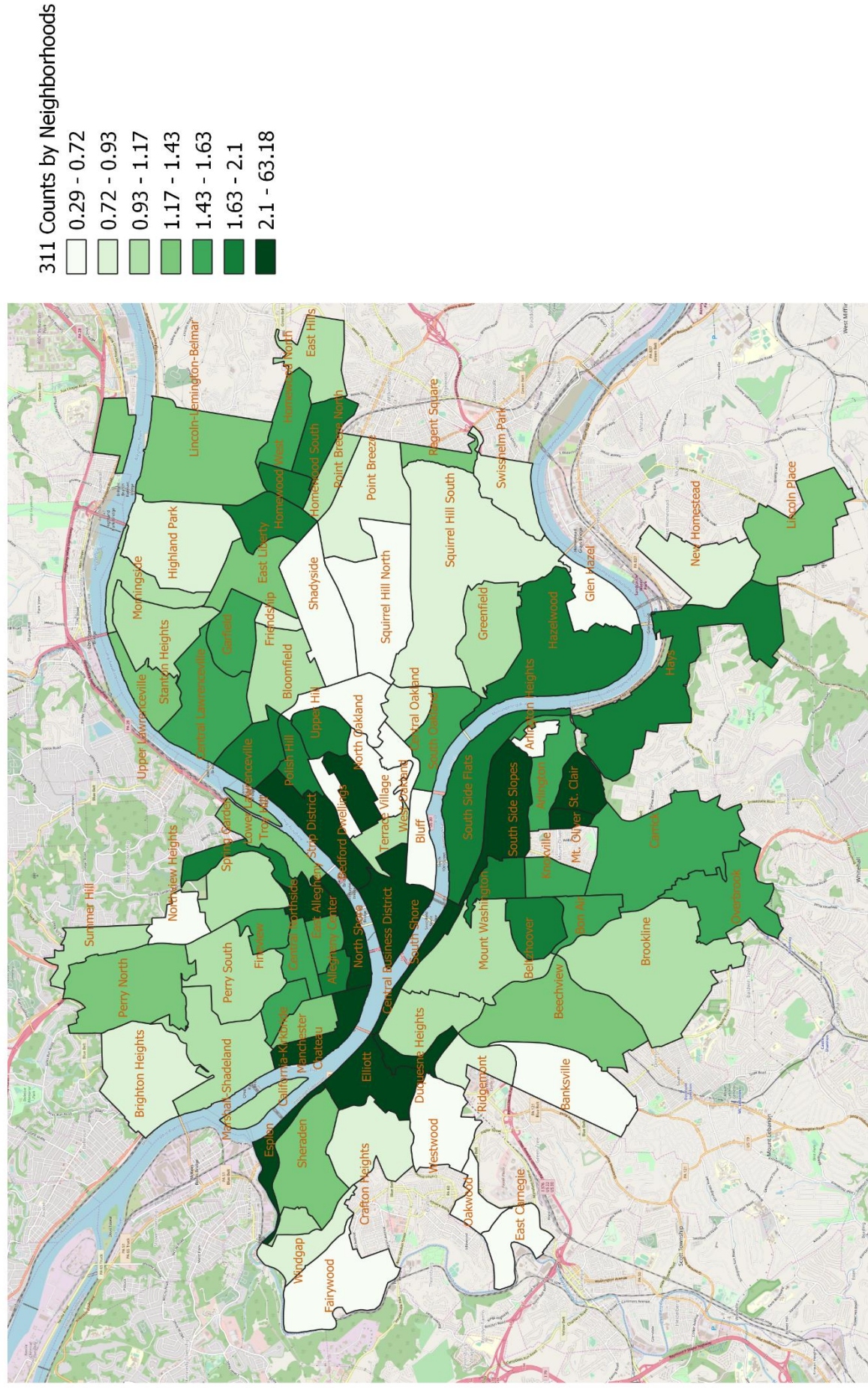
Appendix: Open Request Raw Data

This section provides the Excel spreadsheet raw data for open requests. The spreadsheets for open requests, in addition to other spreadsheets for all service requests, closed requests, and requests in the New status, are available in the "Raw_Data_Original_Database.xlsx" file. Also note that a parallel Excel file, called "Raw_Data_Preprocessed_Database.xlsx" includes spreadsheets based on pre-processed data. The spreadsheets included here in this section are:

1. Counts of Open Requests, Grouped and Sorted by Request Type

2. Counts of Open Requests, Grouped and Sorted by Department

3. Counts of Open Requests, Grouped and Sorted by Request Type and Department

4. Highest Volumes of Open Requests, Grouped by Request Type

5. Highest Volumes of Open Requests, Grouped by Department

6. Highest Volumes of Open Requests, Grouped by Request Type and Department

7. Mean Days Open, Grouped and Sorted by Request Type

8. Mean Days Open, Grouped and Sorted by Department

9. Mean Days Open, Grouped and Sorted by Request Type and Department

10. Longest Mean Days Open, Grouped by Request Type

11. Longest Mean Days Open, Grouped by Department

12. Longest Mean Days Open, Grouped by Request Type and Department