In [122]:
```
import pandas as pd
import numpy as np
import seaborn as sn
import warnings
import matplotlib.pyplot as plt
%matplotlib inline
import datetime
import os
```

In [123]:
```
#Q1: Import a 311 NYC service request.
#Q2 : Read or convert the columns 'Created Date' and Closed Date' to datetime datatype and c
reate a new column 'Request_Closing_Time' as the time elapsed between request creation and r
equest closing.

col_names =['Created Date','Closed Date','Complaint Type','Location Type']

NYC = pd.read_csv('C:/Users/Gautham/Datasets/NYC.csv',usecols=col_names,low_memory=False)
```

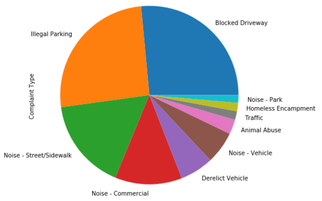
In [124]:
```
NYC['Created Date'] = pd.to_datetime(NYC['Created Date'])
NYC['Closed Date'] = pd.to_datetime(NYC['Closed Date'])
```

In [139]:
```
NYC.isna().sum().sum()
NYC.replace(['None','nan','NaN'], np.nan, inplace=True)
NYC = NYC.dropna()
NYC.isna().sum().sum()
```

Out[139]:
```
0
```

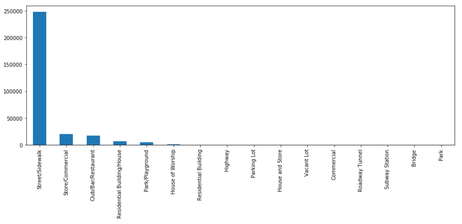
In [ ]:
```
#Provide major insights/patterns that you can offer in a visual format (graphs or tables); a
t least 4 major conclusions that you can come up with after generic data mining.
```

In [98]:
```
NYC['Complaint Type'].value_counts().head(10).plot(kind='pie',figsize=(15,7))
plt.show()

# Most commom complaits types are Illegal parking, Blocked Drivewat and Noise- Stree/Sidewal
k
```



In [235]:
```
NYC['Location Type'].value_counts().plot(kind='bar',figsize=(15,5))

# Most common Location type the complaints have come from is Strret sidewalk and the complai
nt count is 247503
```

Out[235]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x28b8d3d2788>
```



In [10]:
```
NYC['Location Type'].value_counts() # Complaints number based on loction type
```

Out[10]:
```
Street/Sidewalk                247503
Store/Commercial                20183
Club/Bar/Restaurant             17227
Residential Building/House       6953
Park/Playground                  4751
House of Worship                  927
Residential Building              227
Highway                           214
Parking Lot                       117
House and Store                    93
Vacant Lot                         77
Commercial                         62
Roadway Tunnel                     35
Subway Station                     34
Bridge                              2
Park                                1
Name: Location Type, dtype: int64
```

In [165]:
```
NYC['Request_Closing_Time']= NYC['Closed Date']-NYC['Created Date']
```

In [141]:
```
max(NYC['Request_Closing_Time']) # Highest waiting time by a complaint is 24 days and 16 hou
rs
```

Out[141]:
```
Timedelta('24 days 16:52:22')
```

In [142]:
```
#Q4 Order the complaint types based on the average 'Request_Closing_Time', grouping them for
different locations.
```

In [219]:
```
agg_values = NYC.groupby(['Location Type','Complaint Type'])['Request_Closing_Time'].mean(nu
meric_only=False)
agg_values =agg_values.to_frame()
agg_values = agg_values.add_prefix('Average_').reset_index()
```

In [220]:
```
agg_values.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 69 entries, 0 to 68
Data columns (total 3 columns):
 #   Column                        Non-Null Count  Dtype
---  ------                        --------------  -----
 0   Location Type                 69 non-null     object
 1   Complaint Type                69 non-null     object
 2   Average_Request_Closing_Time  69 non-null     timedelta64[ns]
dtypes: object(2), timedelta64[ns](1)
memory usage: 1.7+ KB
```

In [223]:
```
agg_values['Average_Request_Closing_Time'] = agg_values['Average_Request_Closing_Time'].asty
pe('timedelta64[h]')
agg_values['Average_Request_Closing_Time']
```

Out[223]:
```
0     3.0
1     4.0
2     3.0
3     7.0
4     5.0
     ...
64    3.0
65    4.0
66    3.0
67    1.0
68    7.0
Name: Average_Request_Closing_Time, Length: 69, dtype: float64
```

In [236]:
```
#Delta_time_hrs = NYC['Request_Closing_Time'].astype('timedelta64[h]')
#pop_mean = round(Delta_time_hrs.mean(),2) # mean of delta time is 3.82 hours
pop_mean =  NYC['Request_Closing_Time'].mean()
pop_mean = pop_mean.total_seconds()
pop_mean = pop_mean/3600
pop_mean
```

Out[236]:
```
4.3142515203
```

In [224]:
```
agg_values['Average_Request_Closing_Time'] = agg_values['Average_Request_Closing_Time'].asty
pe(int)
```

In [226]:
```
#Whether the average response time across complaint types is similar or not (overall)

#Ho : average response time across complaint types is similar.
#H1 : average response time across complaint types is not similar

#inference:
#H1 is significant because mean of Request_Closing_Time are not same and also not same  as p
opmean which is ~4
#mean of delat time(ie: Request_Closing_Time) are as below, Their values are different

agg_values['Average_Request_Closing_Time'].unique()
```

Out[226]:
```
array([  3,   4,   7,   5,   8, 336,   1,   2,  17,  12])
```

In [214]:
```
 #agg_values =   agg_values[agg_values['Average_Request_Closing_Time']!=336]
```

In [ ]:
```
#5b  Are the type of complaint or service requested and location related?

#H0:  type of complaint requested and location are  related
#H1: Type of complaint and location are not related

#COnclusion: P value are greater than 0.05. Null hypothsis is significant at 5%. Type of com
plaint and location are related
```

In [217]:
```
crosstab_nyc = pd.crosstab(x,y)
crosstab_nyc
```

Out[217]:

Location Type	Bridge	Club/Bar/Restaurant	Commercial	Highway	House and Store	House of Worship	Park	Park/Playground	Parking Lot	Residential Bui
Complaint Type										
Animal Abuse	0	0	1	0	1	0	0	1	1	
Animal in a Park	0	0	0	0	0	0	1	0	0	
Bike/Roller/Skate Chronic	0	0	0	0	0	0	0	0	0	
Blocked Driveway	0	0	0	0	0	0	0	0	0	
Derelict Vehicle	0	0	0	1	0	0	0	0	0	
Disorderly Youth	0	0	0	0	0	0	0	0	0	
Drinking	0	1	0	0	0	0	0	1	0	
Graffiti	0	0	0	0	0	0	0	0	0	
Homeless Encampment	1	0	0	1	0	0	0	1	0	
Illegal Fireworks	0	0	0	0	0	0	0	1	0	
Illegal Parking	0	0	0	0	0	0	0	0	0	
Noise - Commercial	0	1	0	0	0	0	0	0	0	
Noise - House of Worship	0	0	0	0	0	1	0	0	0	
Noise - Park	0	0	0	0	0	0	0	1	0	
Noise - Street/Sidewalk	0	0	0	0	0	0	0	0	0	
Noise - Vehicle	0	0	0	0	0	0	0	0	0	
Panhandling	0	0	0	0	0	0	0	1	0	
Posting Advertisement	0	0	0	0	0	0	0	0	1	
Squeegee	0	0	0	0	0	0	0	0	0	
Traffic	0	0	0	1	0	0	0	0	0	
Urinating in Public	0	1	0	0	0	0	0	1	0	
Vending	0	0	0	0	0	0	0	1	0	

In [218]:
```
from scipy.stats import chisquare
stat,p = chisquare(crosstab_nyc)
print(stat)
```

```
[21. 19. 21. 19. 21. 21. 21. 14. 20. 21. 11. 19. 10.  4. 20. 21.]
```