

# **Alexandria Police Department**

## **Basis Analysis of Traffic Citation Data for Years 2011-2016**

*Influenced by the basic analysis completed by Dr. Cynthia Lum and Xiaoyun Wu of George Mason University in April of 2017.*

*Dr. Lum's report is published on the Alexandria Police Department's website at [www.alexandriava.gov/police](http://www.alexandriava.gov/police) under Community Advisory Team & Traffic Citation Analysis.*

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## Introduction

In April of 2017, Dr. Cynthia Lum of George Mason University, Director & Associate Professor with the Center for Evidence-Based Crime Policy and the Department of Criminology, Law & Society, with the help of Xiaoyun Wu, presented her results of a basic analysis on the traffic citation data provided by the Alexandria Police Department. Dr. Lum's report is published on the APD Website under the Community Advisory Team and Traffic Citation Analysis page for review. This report is a modified continuation of that initial basic analysis, with the addition of the 2016 traffic citation data. Although there are many similarities in the methods used to analyze the data, this basic analysis looks less at the finite details of ethnicity, and adds a basic look at the data from a temporal analysis. One other difference between the studies is the charge data format. As explained in further detail in the next section of the report, an extensive effort was made to combine similar violations to make Figure 2, the top charge table, simplified.

## Data for Analysis

The traffic citation data used in this analysis includes all records for the years 2011-2016, except for two charge categories removed prior to this analysis and described further below. The complete dataset includes a total of 105,137 traffic citations. However, the number of traffic citations does not directly reflect the number of traffic stops made by officers. If an individual is stopped and given two tickets, this will result in two separate entries in the dataset, one for each violation.

Following the methodology of the April 2017 study completed by Cynthia Lum and Xiaoyun WU of George Mason University (GMU), the traffic citation data will use eleven fields collected in the traffic citation database.

1. The Incident Number (INCINMBR) which identifies each unique traffic stop. If more than one citation is given during the traffic stop, this number will be repeated.
2. The date (DTCITA) the citation(s) was/were issued.
3. The time (TMCITA) the citation(s) was/were issued.
4. The address of the location (LOCATION) at which the traffic stop was made.
5. The method used to observe the violation (METHODUSEDLIT).
6. The description of the violation (CHARGELIT) in which the citation(s) was/were issued.
7. The specific Local or State Code (CODE) under which the citation(s) was/were issued.
8. The race of the individual (RACELIT). Options in this column will include the following: American Indian/Alaskan, Asian/Pacific Islander, Black, Unknown, White, or not filled out.
9. The gender of the individual (SEXLIT). Options in this column will include the following: Female, Male, Unknown or not filled out.

10. The ethnicity of the individual (ETHNICLIT). Options in this column will include the following: Hispanic, Non-Hispanic, Unknown, or not filled out.

11. The individuals age, which was calculated using the individuals date of birth and the date of the citation.

**It should be noted that race and ethnicity (#8 and #10) are not required fields.** This information is either offered voluntarily by the individual or it may be the best guess of the officer issuing the citation. The officer will not directly ask for this information, and it is not listed on the Virginia issued driver's license.

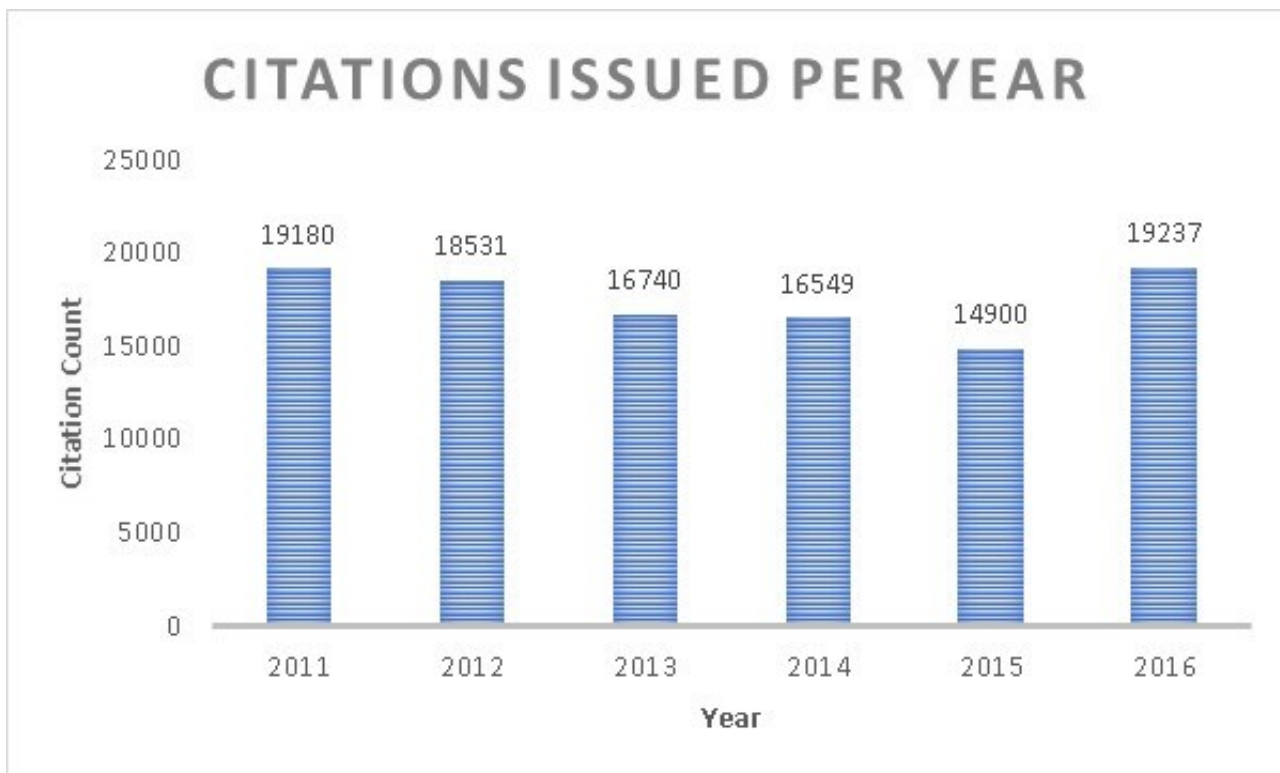
As indicated above, there were two charge categories removed from the dataset prior to this analysis. The charge category of "Criminal C--" is not a traffic violation, but rather a misdemeanor criminal arrest. The second charge category removed is "No Charge". The "No Charge" description is entered when the citation is voided. In the dataset used by GMU for the 2011-2015 study, there were 5,265 "Criminal C--" and 594 "No Charge" citations removed. In the dataset for 2016, 709 "Criminal C--" and 80 "No Charge" were removed.

As described previously, there is a difference between traffic citations and traffic stops. In this dataset, there were 105,137 citations issued and 92,993 unique traffic stops completed, which resulted in at least one citation. As with the GMU study, this analysis will look at traffic citations and traffic stops separately. It should also be noted that unlike the GMU study, which referenced the sequence value ("SEQ=1" or the person who received the first citation), this dataset was queried by the primary individual. The overall values obtained in the GMU with the use of the sequence value were matched when the data was queried by the primary individual; therefore, the sequence value was not included in this analysis.

For this analysis, an extensive effort was given to cleaning the charge data. Citations can be issued referencing the local municipal traffic code or the state traffic code. This decision is at the discretion of the issuing officer. In the dataset used for this report, the same charge description (CHARGELIT) was used for both the municipal and state violations. In order to distinguish the difference, the specific code (CODE) is now listed in a separate column. For example, a "Counterfeit Inspection Sticker" in the charge description column can be associated with either Municipal Code 10-3-1173 or State Code 46.2-1173. One additional observation in the dataset was the use of a letter at the end of the charge code. This letter designator is used to identify the method used to aid the officer in determining the violation (METHODUSEDLIT). However, it was noticed that this designator was not used in every instance.

## Results for All Citations (N = 105,137)

Figure 1: Total traffic citations issued from 2011 to 2016



The dataset includes 251 different charge descriptions. Many of these charges are entered using either the Municipal Code (MC) or the State Codes (SC). There were 297 unique codes utilized; however, some of the codes (the numeric portion) are repeated due to the use of the “Method Used” indicator of “R” for Radar or “P” for Pace. For example: the “Speeding 35 Zone” charge could be coded with 10-3-875 (Municipal Code), 46.2-875 (State Code), 10-3-875P (MC), 46.2-875P (SC), 10-3-875R (MC), or 46.2-875R (SC). Approximately 90% (94,786) of the citations were issued using 34 different charges (Table 1).

Table 1: The Top 34 charges (approximately 90% of the citations issued)

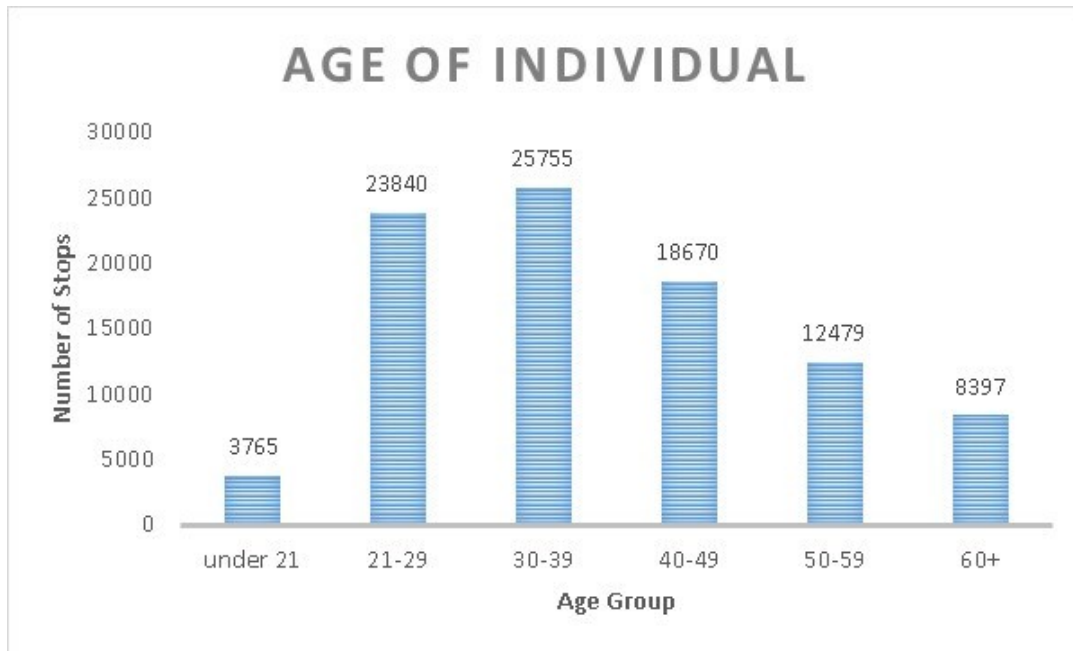
| Charge Description                      | Count | % of Total | Cumulative % |
|---|-------|------------|--------------|
| OFFICIAL SIGN                           | 17656 | 16.79      | 16.79        |
| SPEEDING 25 ZONE RADAR                  | 15303 | 14.56      | 31.35        |
| SPEEDING 35 ZONE RADAR                  | 7711  | 7.33       | 38.68        |
| OFF. SIGN - STOP SIGN                   | 7002  | 6.66       | 45.34        |
| REG./LIC/TITLE/NAME/ADDR.               | 6071  | 5.77       | 51.11        |
| FAIL TO PAY FULL TIME/ATTN              | 5142  | 4.89       | 56.00        |
| NO INSPECTION                           | 5109  | 4.86       | 60.86        |
| HOV                                     | 4060  | 3.86       | 64.73        |
| NO OPERATOR LICENSE                     | 3738  | 3.56       | 68.28        |
| SUSPENDED/REVOKED LICENSE               | 3543  | 3.37       | 71.65        |
| DUI/DWI OF DRUGS/ALCOHOL                | 1953  | 1.86       | 73.51        |
| IMPROPER LANE VIOLATION                 | 1301  | 1.24       | 74.75        |
| NO U TURN                               | 1226  | 1.17       | 75.91        |
| DEFECTIVE EQUIPMENT                     | 1048  | 1.00       | 76.91        |
| FOLLOWING TOO CLOSE                     | 1033  | 0.98       | 77.89        |
| OFF. SIGN - RED/YELLOW/FLASHING LIGHT   | 1007  | 0.96       | 78.85        |
| FAILURE TO CARRY LICENSE/REGISTR.       | 1006  | 0.96       | 79.81        |
| LEFT-TURN / YIELD RIGHT OF WAY          | 984   | 0.94       | 80.74        |
| SPEEDING 35 ZONE                        | 915   | 0.87       | 81.61        |
| RECKLESS/DRIVE DANGEROUS IN P/LOT RADAR | 907   | 0.86       | 82.47        |
| RECKLESS/EXCEEDING SPEED LIMIT RADAR    | 907   | 0.86       | 83.34        |
| HEADLIGHTS NOT TURNED ON                | 822   | 0.78       | 84.12        |
| CROSS DOUBLE YELLOW LINE                | 814   | 0.77       | 84.89        |
| IMPROPER LEFT/RIGHT TURN                | 669   | 0.64       | 85.53        |
| SPEEDING 25 ZONE                        | 635   | 0.60       | 86.13        |
| RECKLESS/EXCEEDING SPEED LIMIT          | 573   | 0.55       | 86.68        |
| SPEEDING 25 ZONE PACE                   | 533   | 0.51       | 87.19        |
| RECKLESS/SPEED LIMIT                    | 512   | 0.49       | 87.67        |
| NO CITY/EXPIRED TAG                     | 478   | 0.45       | 88.13        |
| NO BRAKE LIGHTS                         | 466   | 0.44       | 88.57        |
| STOPPING /YIELDING /RIGHT-WAY           | 450   | 0.43       | 89.00        |
| NO SIGNAL /BACKING/STOPPING             | 427   | 0.41       | 89.40        |
| F/T PAY UNINSURED INS.FEE               | 419   | 0.40       | 89.80        |
| 1-WAY ROADWAY/HIGHWAY                   | 366   | 0.35       | 90.15        |

## Demographic Results for Traffic Stops (N = 92,993)

The 105,137 citations issued in the data above were given during 92,993 unique traffic stops; therefore, in 88.4% of the traffic stops made by the Alexandria Police Department, the individual is cited for only one charge. Similar to the findings in the George Mason University (GMU) study (11.4%), only 11.5% of the traffic stops made resulted in multiple citations.

In the next section, the demographics of the traffic stops will be examined.

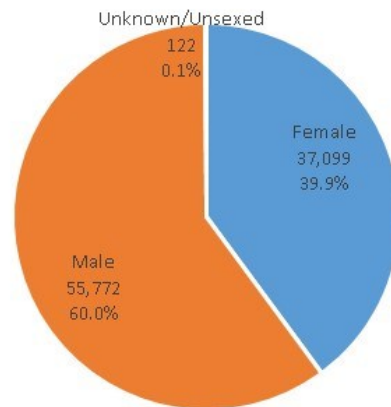
Figure 2: Age of the individuals at the time of the traffic stop (N = 92,906)



Note: The sample size in the chart is 92,906 verses the traffic stop value of 92,993 due to 87 entries missing the individual's age.

Figure 3: Gender of the individual (N = 92,993)

| Gender          | Count         | % of Total |
|-----------------|---------------|------------|
| Female          | 37,099        | 39.9       |
| Male            | 55,772        | 60.0       |
| Unknown/Unsexed | 122           | 0.1        |
| <b>Total</b>    | <b>92,993</b> | <b>100</b> |



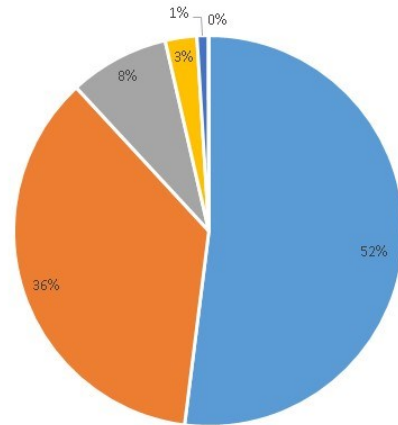
As indicated in Figure 2 and 3, the majority of traffic stops are performed on those between the age of 21-39 (53.4%); the Age Group of 30-39 was the single highest group for traffic stops at 27.7%. The subject of the traffic stop was also more likely to be male in gender (60.0%).



Figure 4, in both the table and the chart, indicated that the majority of the individuals involved in traffic stops with the Alexandria Police Department are White, Non-Hispanic/Unknown (52.0%), followed by Black, Non-Hispanic/Unknown (36.1%).

Figure 4: Race/Ethnicity of individual in table and pie chart (N = 92,993)

| Race/Ethnicity                | Count        | % of Total   |
|-------------------------------|--------------|--------------|
| White (NHU)                   | 48348        | 52.0         |
| Black (NHU)                   | 33591        | 36.1         |
| Hispanic                      | 7703         | 8.3          |
| Asian/Pacific Islander (NHU)  | 2436         | 2.6          |
| Unknown/Other (NH)            | 880          | 0.9          |
| American Indian/Alaskan (NHU) | 35           | 0.0          |
| <b>Total</b>                  | <b>92993</b> | <b>100.0</b> |



Note: NHU = Non-Hispanic/Unknown & NH = Non-Hispanic

- White (NHU)
- Black (NHU)
- Hispanic
- Asian/Pacific Islander (NHU)
- Unknown/Other (NH)
- American Indian/Alaskan (NHU)

Figure 5: Race/Ethnicity of individual by Year (N = 92,99)

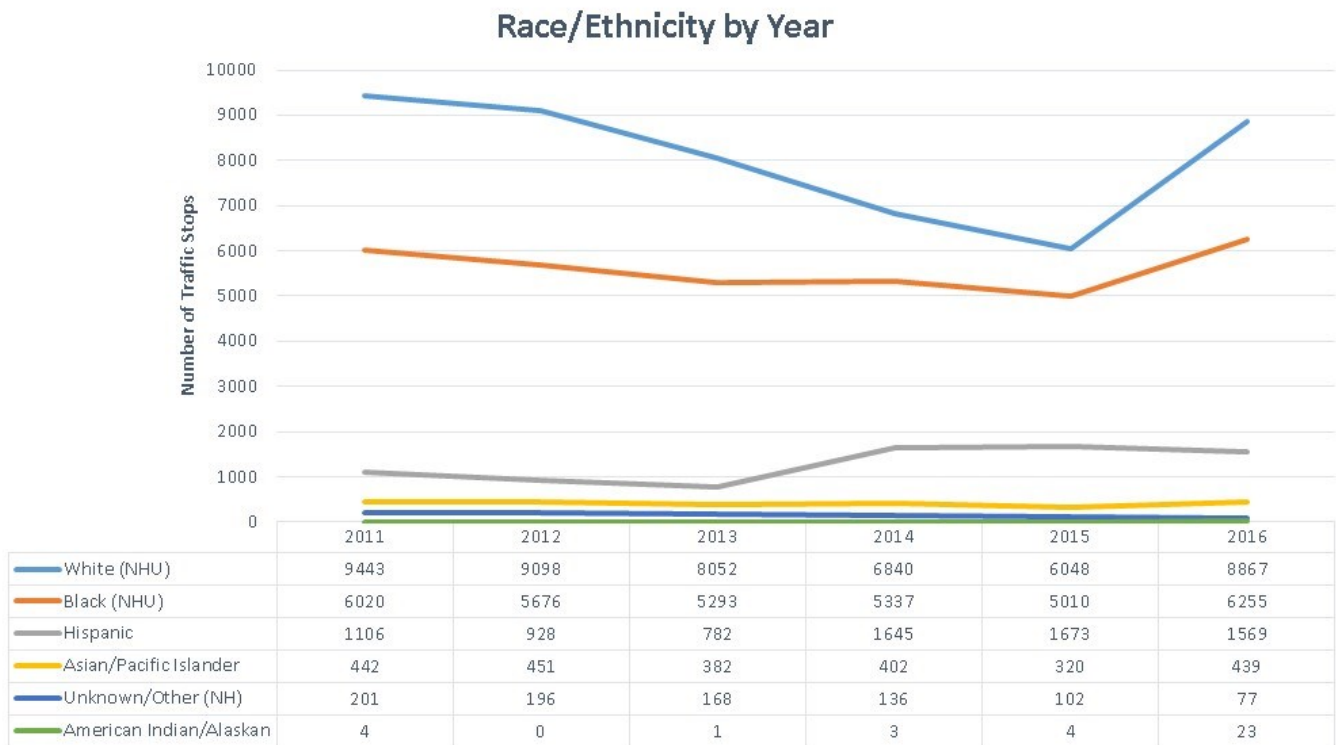
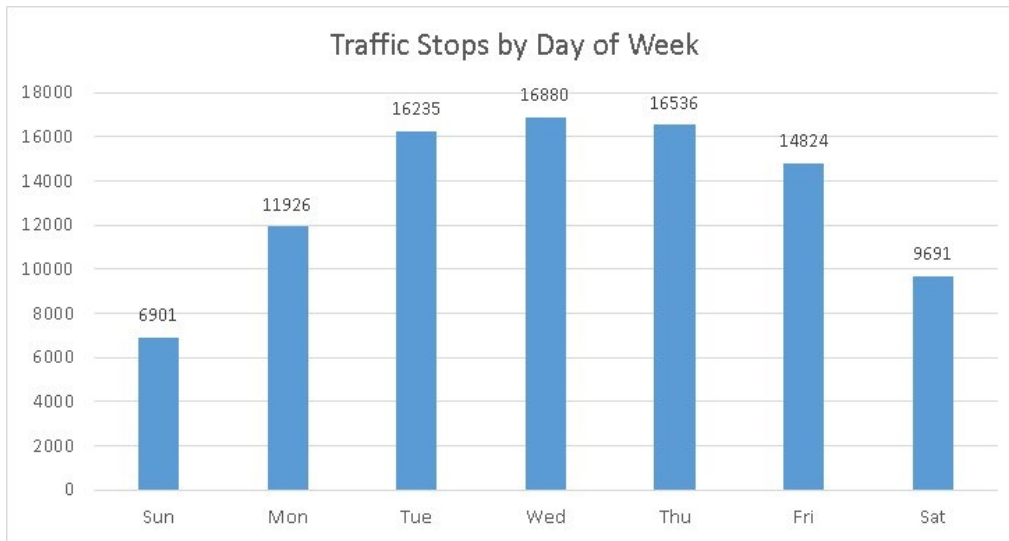


Figure 5 shows that citations issued to the White & Blacks races began to decrease in 2013, reaching a 5-year low in 2015, and then increased between 2015 and 2016. Citations issued to those of Hispanic ethnicity declined between 2011-2013; however, there was a considerable increase in 2014. Since 2014, citations issued to those of Hispanics ethnicity has remained fairly consistent.

## Temporal Results for Traffic Stops (N = 92,993)

In the last section of the analysis, temporal elements will be examined as they pertain to the 92,993 unique traffic stops.

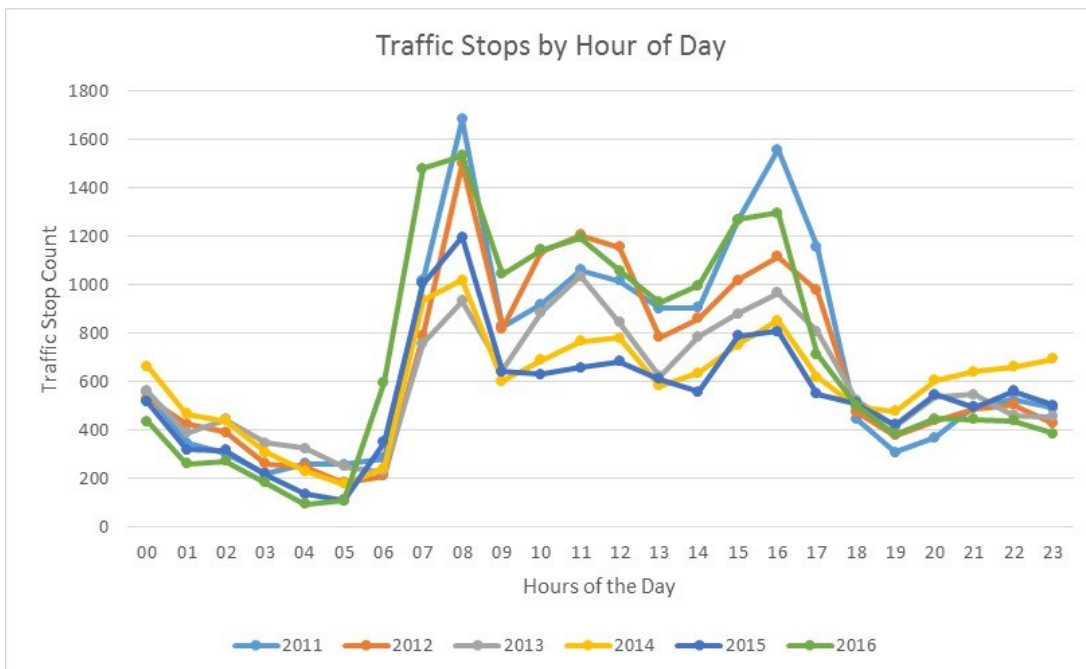
Figure 6: Traffic Stops by Day of Week (DOW)



The majority of the traffic stops are completed on weekdays, with Wednesday (18.2%), Thursday (17.8%), and Tuesday (17.5%) being the highest. The weekend days (Saturday & Sunday) combined account for 17.8% of all traffic stops.

In this report, the Hour of Day (HOD) was looked at under two different criteria. The first was by Year, and the second was by the Day of the Week (DOW). When the HOD was looked at by the Year (2011-2016), there are variations over the years; however, the majority of traffic stops fall between the hours of 0700—1700.

Figure 7: Traffic Stops by Hour of Day by Year



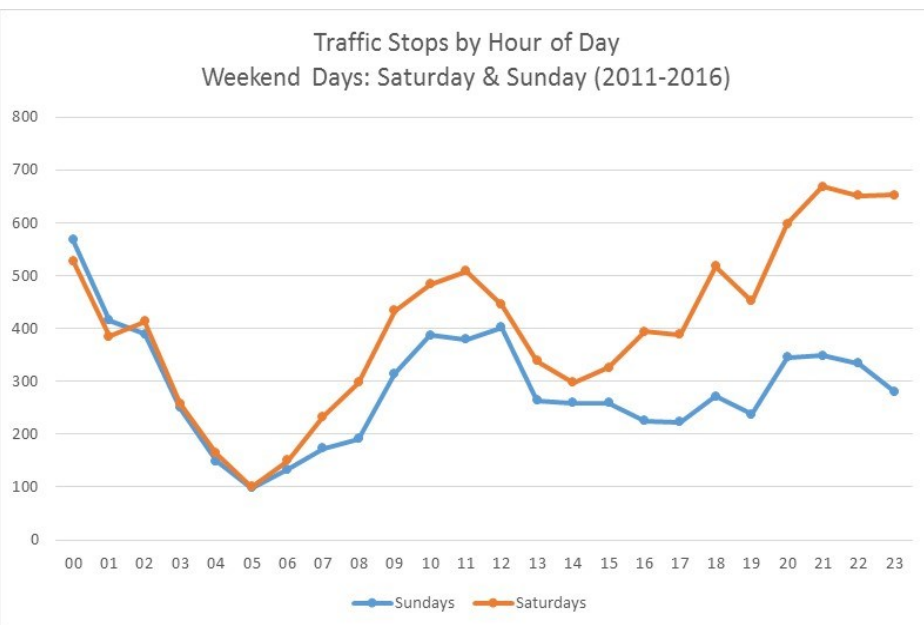
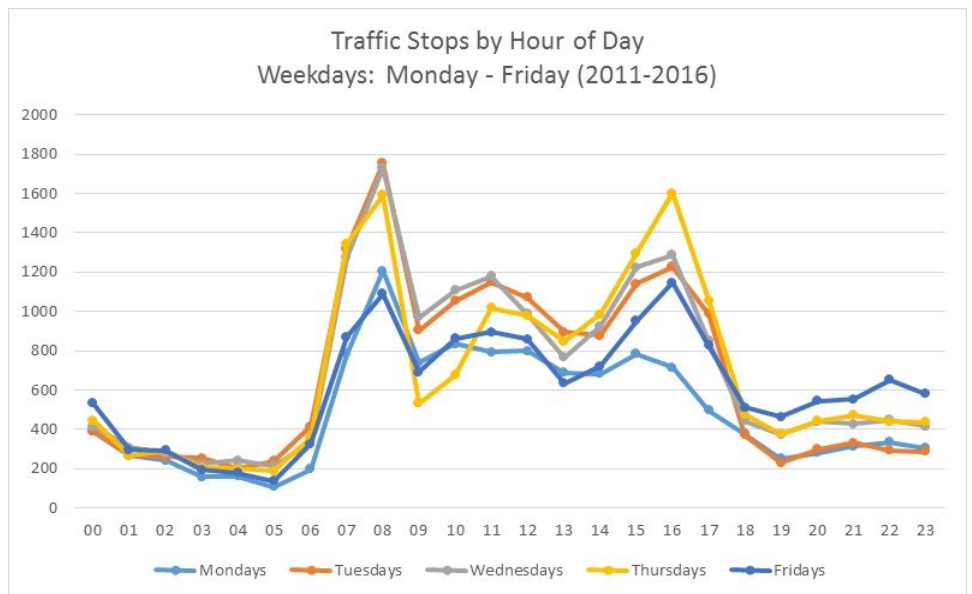
However, the most prominent Hour of Day for traffic stops is in the 0800 Hour across all Year, except 2013, which saw the highest number of traffic stops in the 1100 Hour (Table 2).

Table 2: Most prominent Hour of Day (HOD) for each Year (2011-2016) and the percentage of the Year's Total

| Year | Prominent HOD  | TS Count for HOD | TS Total for Year | % for HOD of Total TS |
|------|----------------|------------------|-------------------|-----------------------|
| 2011 | 08:00- 8:59 am | 1683             | 17216             | 9.8%                  |
| 2012 | 08:00-08:59 am | 1500             | 16349             | 9.2%                  |
| 2013 | 11:00-11:59 am | 1037             | 14678             | 7.1%                  |
| 2014 | 08:00-08:59 am | 1019             | 14363             | 7.1%                  |
| 2015 | 08:00-08:59 am | 1197             | 13157             | 9.1%                  |
| 2016 | 08:00-08:59 am | 1533             | 17230             | 8.9%                  |

Figure 8: Traffic Stops by HOD for the weekdays

When looking at the Hour of Day by the Day of Week, there is a similar distribution as that displayed in the yearly comparisons; however, this similarity is seen only when looking at the weekdays, Monday—Friday (Figure 7). There is a very different pattern of traffic stops seen on the weekend days (Figure 8), with the majority



of the traffic stops happening from 06:00 pm—02:00 am.

**Most prominent HOD for each DOW:**

- Sunday - 12:00-12:59 am
- Monday - Thursday - 08:00-08:59 am
- Friday - 4:00-4:59pm (with the 08:00-08:59 am second)
- Saturday - 9:00-9:59pm

Figure 9: Traffic Stops by HOD for the weekend days

## Conclusion

This basic analysis of the Alexandria Police Department's traffic stops and citations was conducted on data from the years of 2011-2016. The analysis in this report was influenced by the study completed by Dr. Cynthia Lum of George Mason University in April of 2017, which used data from the years of 2011-2015. This report was meant to continue analyzing the Police Department's traffic stops and issuance of traffic citations. Two major differences between the initial study and this continued study is a less finite analysis of ethnicity, but the addition of temporal analysis. Below are summarizing points taken from the review of the data for all six years.

### Summarizing Information:

- ◇ Year 2016 had the highest number of citations issued in the six year period - 19,237
- ◇ In 2016, White Non-Hispanic continue to be the largest population of subjects in traffic stops - 8,867 of the 19,237 (46.1% of the total in 2016), followed by the Black Non-Hispanic population - 6,255 of the 19,237 (32.5% of the total in 2016).
- ◇ The Age Group of 30-39 continues to be the largest group involved in traffic stops.
- ◇ The Gender ratio remains very similar between the reports, with Males being the most frequent subjects of traffic stops.
- ◇ Over the six year period, mid-week, Tuesday, Wednesday, and Thursday, had the highest number of traffic stops.
- ◇ Except in 2013, the Hour of Day (HOD) with the most frequent traffic stops was in 8:00 - 8:59am hour. In 2013, the 11:00-11:59am hour slightly surpassed the 8:00-8:59am and the 4:00-4:59pm hours.
- ◇ The frequency of traffic stops is greatly influenced by the Day of Week. When looking at just the weekdays, there is a very similar HOD distribution as that of the overall yearly distribution. However, when looking at weekend traffic stops over the six years of data, Saturday's most frequent HOD is the 9:00-9:59pm hour and Sunday is the 12:00-12:59pm hour.