

Final Report for ACLU BPD Project

Team Members: Ryan Yap Xiang Li, Zijie Li, Hayden Rothman

Introduction

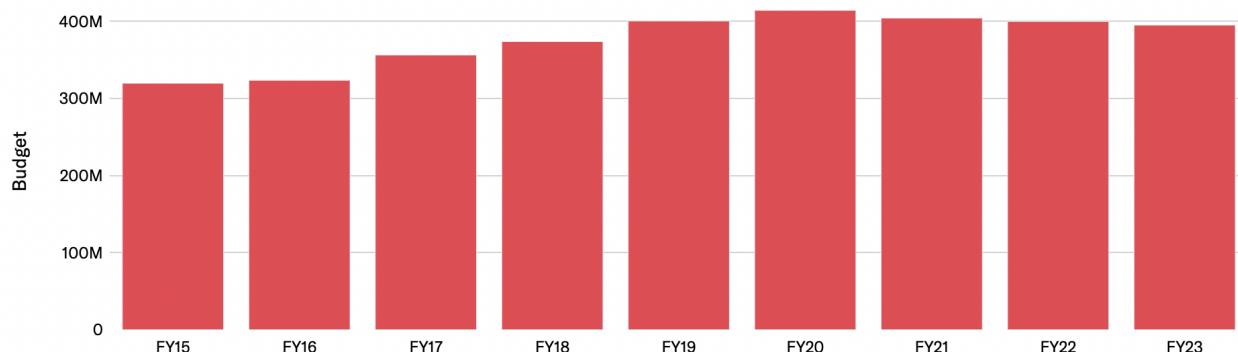
Every year a budget is approved and adopted by the City of Boston for its police department. Our goal is to analyze and understand how funds are being allocated to and from the BPD and find any trends. This report will include our team's answers to each of the base questions given to us. Each answer will include a graph as well as an analysis of the associated budget data. The end of the report will also include our extension project work on the police overtime hours.

Base Questions

Question 1 – BPD budget (adopted) vs previous years

Updated

BPD budget has only slightly decreased in recent years after a long period of budget increases
The values graphed are specifically those of the Adopted Budget



Analysis:

We can see that the adopted budget has been increasing from 2015 to 2020 but afterwards decreases slightly. In response to calls for a decrease in police spending in Boston, BPD budget has only slightly decreased, remaining mostly the same.

Data source:

Boston.gov operating budget data

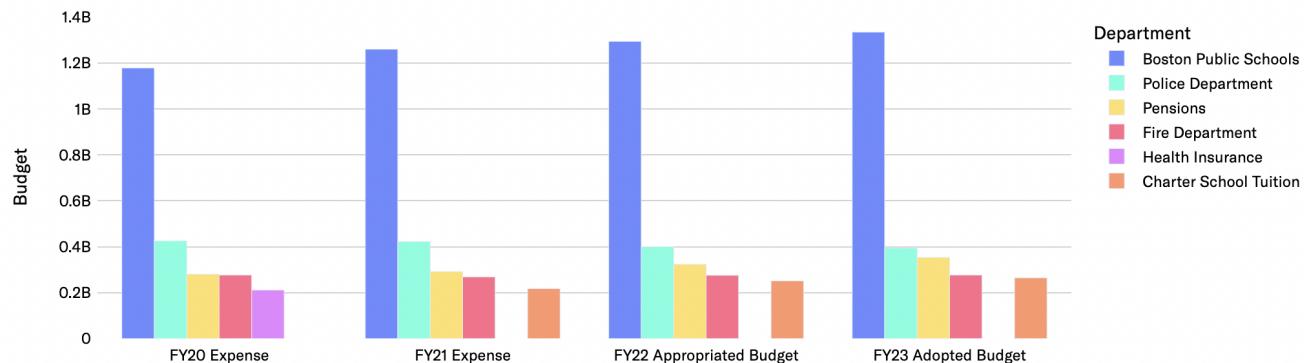
Issues / limitations:

N/A

Question 2 – BPD budget vs other departments

Updated w/ Issues

The BPD consistently ranks as the department with the second highest budget



Analysis:

BPD remained the department with the second highest budget each year despite decreases in budget. BPD has the highest budget among public safety departments.

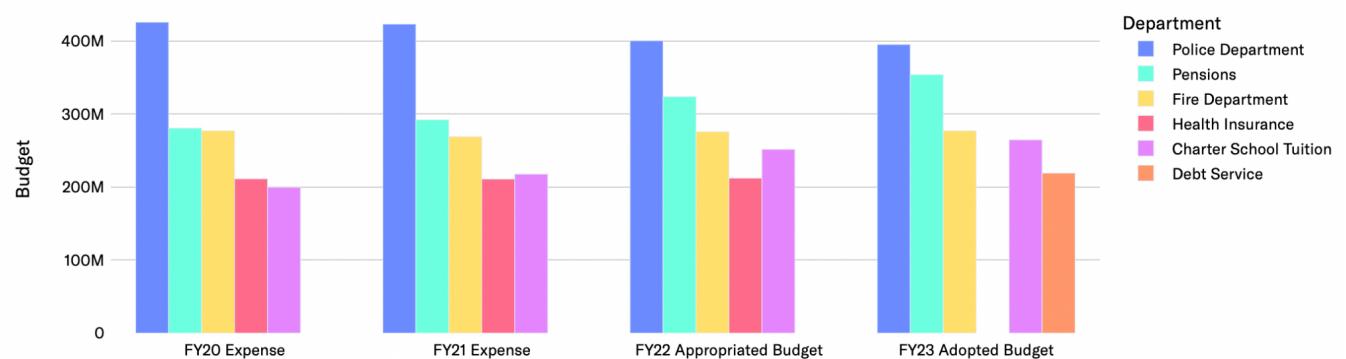
Data source: Boston.gov operating budget data

Issues / limitations:

We use different variables each year, expenses, appropriated budget, and adopted budget. They have very similar values but are by definition different (See Q4)

... excluding Boston Public Schools

BPD remains the department with the highest budget, excluding Boston Public Schools

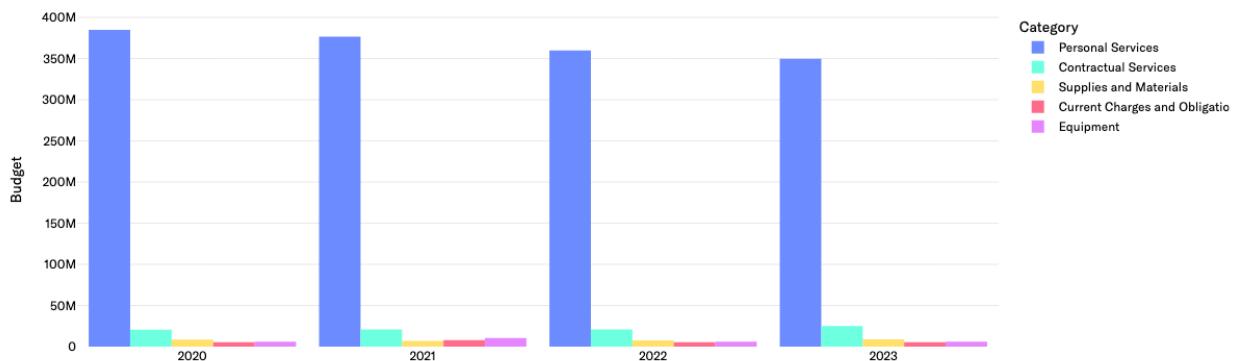


Issue: Gap between bars in FY23. Could not figure out how to fix, may have to use a different graphing library

Question 3 - BPD Budget spend categories + change over time

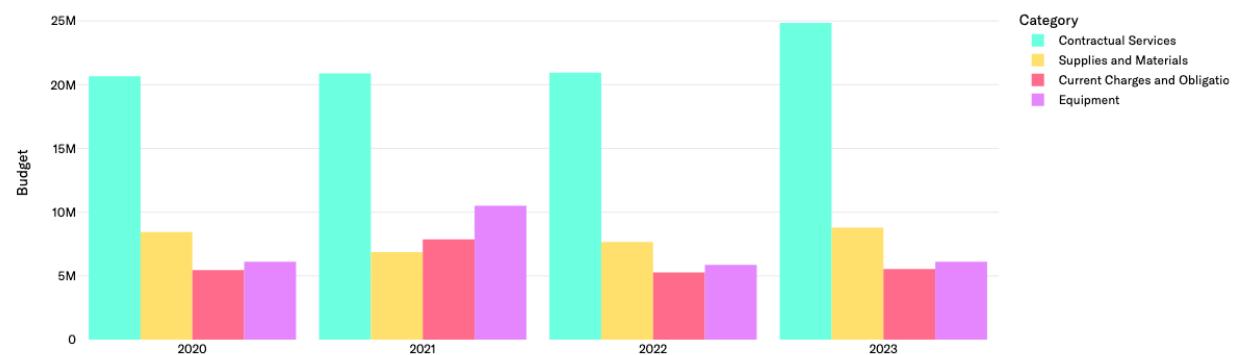
Updated

BPDs Budget spend categories



...
excluding Personal Services

BPDs Budget Spend Categoreis without Personal Service



Analysis: Personal Services is the category with the highest budget. A lot more than the other categories, and it keeps dropping down over the four years. Here, contractual service is the only one that is predicted to have a great increase in 2023. The interesting thing is that equipment had an increase in 2021, it may be the cause of the covid19 pandemic.

Data source: Boston.gov operating budget data

Issues / limitations: N/A

Question 4 – BPD proposed vs adopted budget (changed measured values)

Updated

NOTE: We found it difficult to find proposed budget data so instead we looked at adopted budget vs appropriated budget vs actual expense data. We also believe this will give more useful information on spending throughout the year.

Definitions (clarified by the Budget Director of Boston):

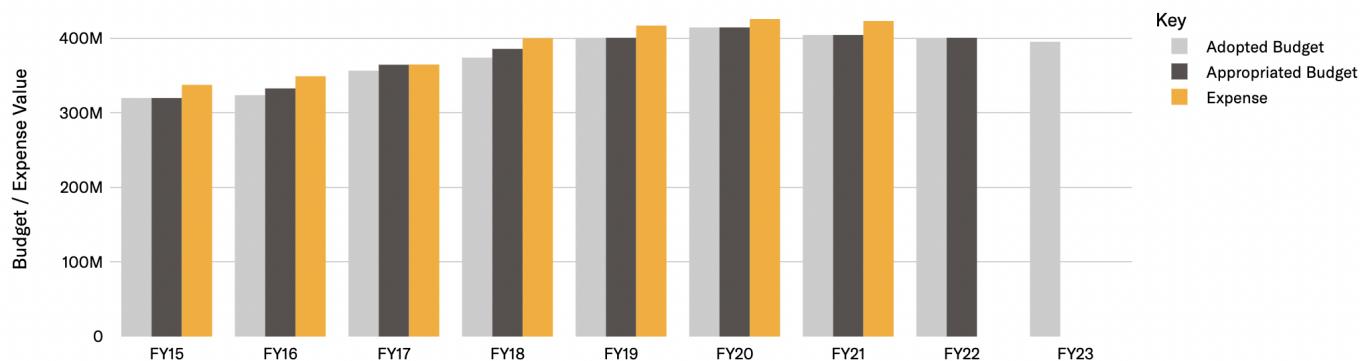
“Adopted budget”: The budget that is initially accepted by the city to use at the beginning of the financial year.

“Appropriated budget”: The budget which includes supplemental budget changes that happen throughout the year.

“Actual expenses”: Expenses calculated after the financial year has ended.

...

BPD budget has stabilized after FY2020, following an upward trend in budget increases



'Adopted Budget' is the budget initially accepted by the city

'Appropriated Budget' is the budget that includes supplemental budget changes throughout the year

'Expense' is the actual expense calculated at the end of the fiscal year

Analysis:

We can see in each financial year, the appropriated budget either matches or exceeds the adopted budget and the actual expense either matches or exceeds the appropriated budget. In every year measured, actual expenses always exceeded the adopted budget. BPD fails to stick with the budget every year. From FY15 - FY20 it seems like the adopted budget each year is based on the previous year's actual expenses which may help explain the upward trend of adopted budget in those years. We can see that the adopted budget finally stabilizes after FY20 (and even has a slight downward trend)

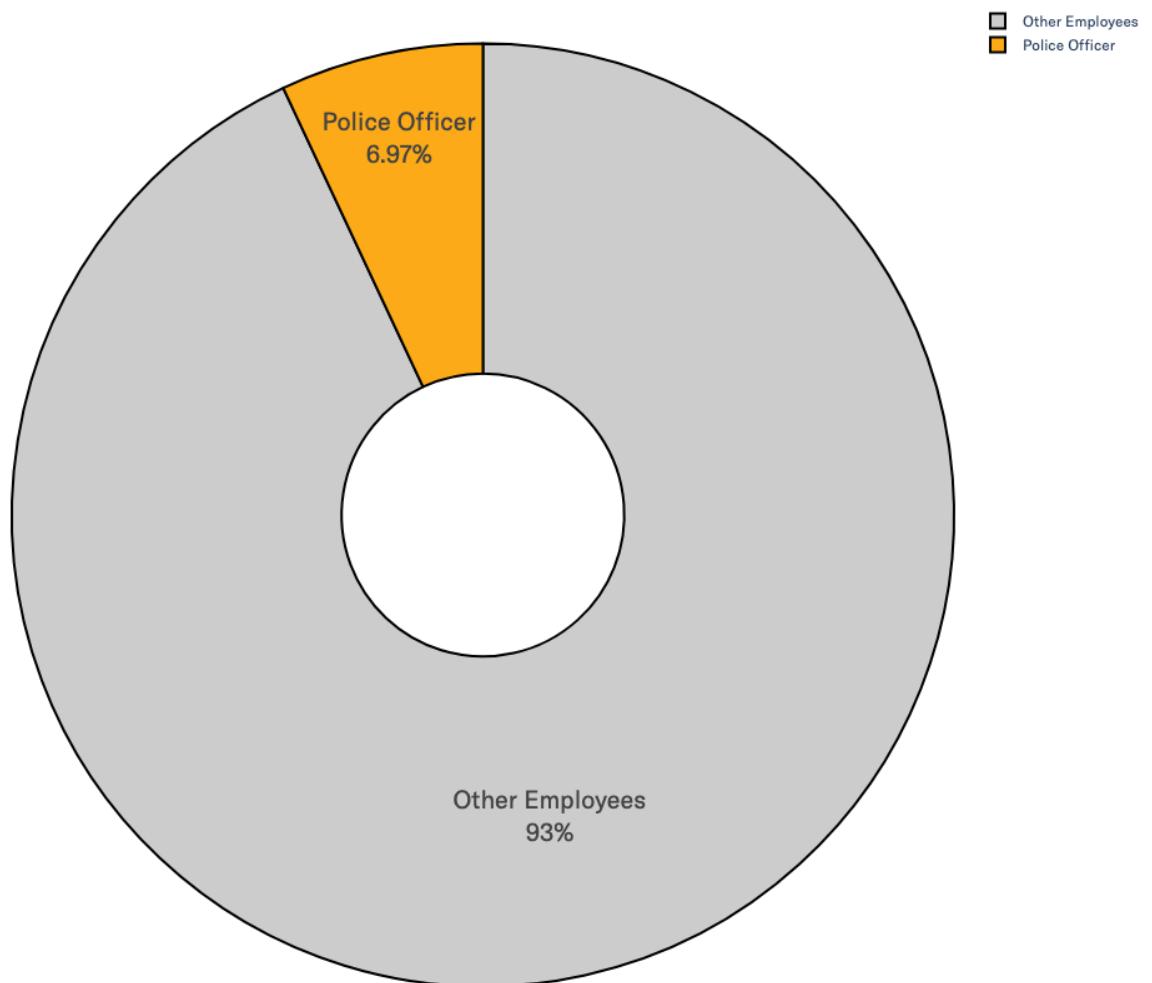
Data source:

Manually collected data from adopted budget report pdf posted on Boston.gov

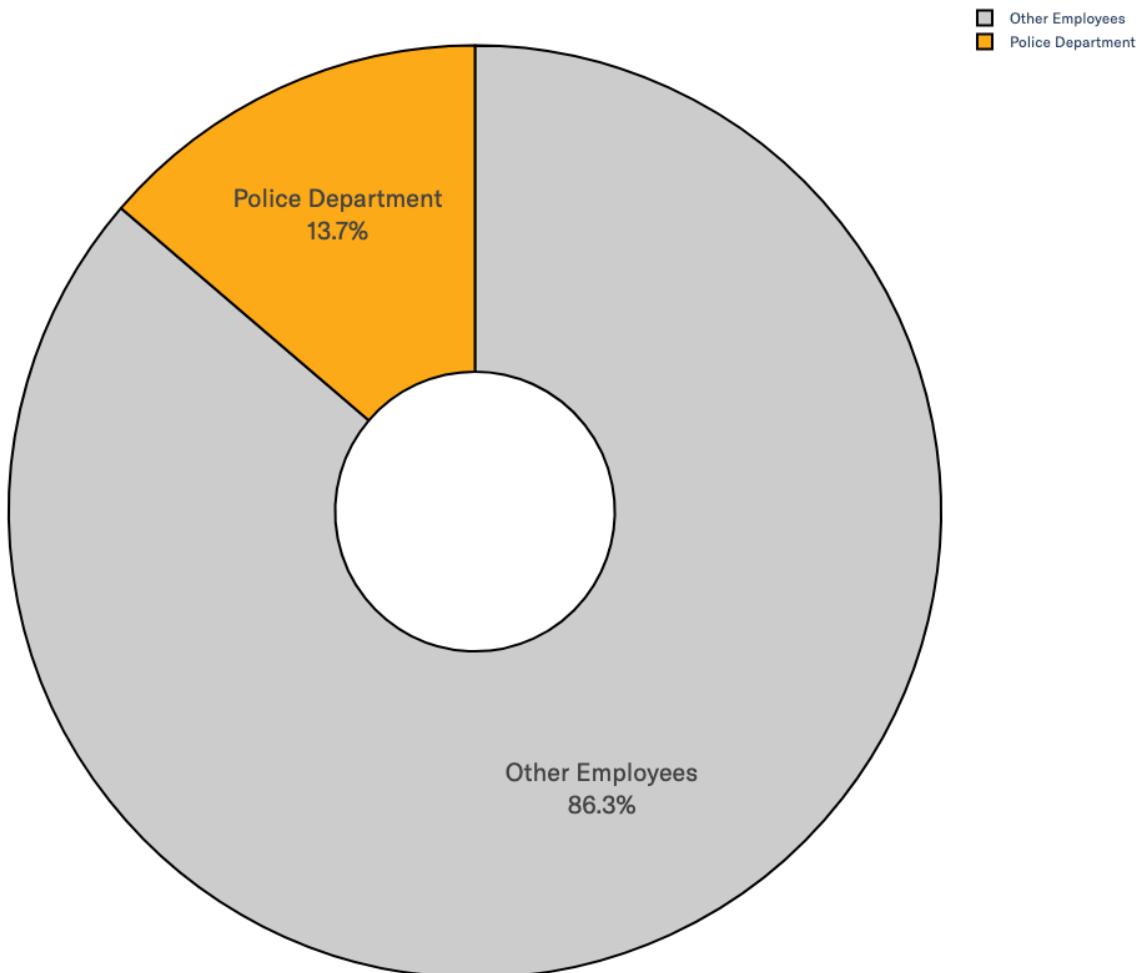
Question 5 - Number of police officers (compared to other boston employees)

Updated

BPD Police Officers vs. Other Employees



BPD Police Department vs. Other Employees



Analysis: There are many jobs with fewer than 100 people, so they are combined as other. Obviously BPS takes a large portion of the employees. And the not all the employee from police department are police officers. The police officer takes a portion of 6.97%.

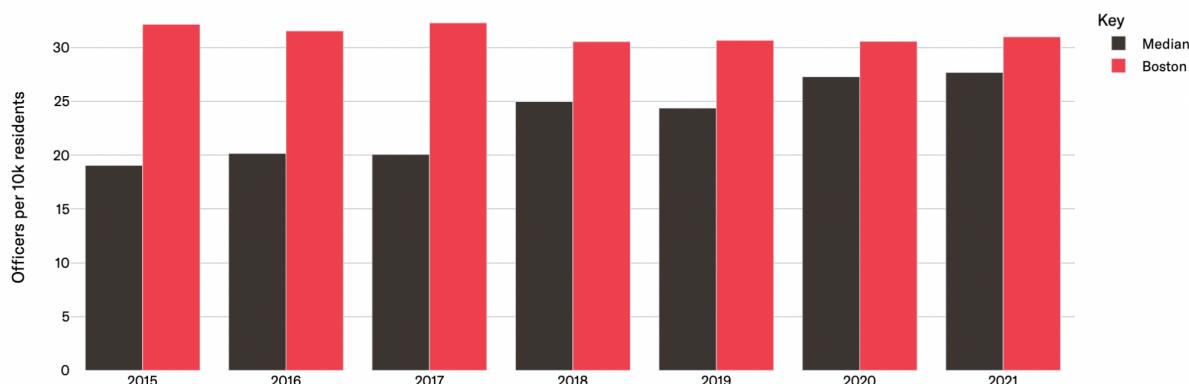
Data source: Boston.gov operating budget data

Issues / limitations: N/A

Question 6.1 – Number of BPD officers per 10,000 residents

Issues

Boston consistently retains more officers per capita than the median of other cities



Analysis:

Boston constantly ranks higher than the median in terms of officers per 10k residents. Boston's officers per 10k pop has decreased slightly over the years but has generally stayed the same. Meanwhile the median has steadily increased (read limitations section).

Data source:

FBI Uniform Crime Reporting data

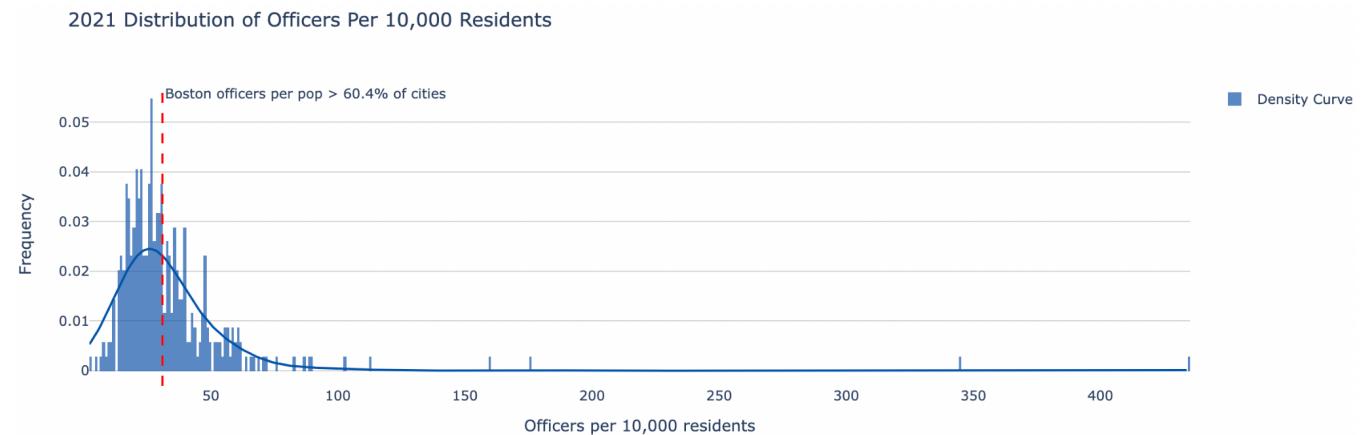
Issues / limitations:

Interestingly, the number of cities which submitted UCR data has been steadily decreasing. This is because UCR is not mandatory! The upward trend of median could potentially be explained by this. Another possible factor is that larger cities (which typically have larger police forces and more resources) may continue to report UCR while smaller cities may have opted out.

... below Q6.3 we look at cities of similar population to Boston (500k - 999k pop)

+ Q6.4 very useful alternative visualization

Question 6.2 – Another way of displaying the same data



Analysis:

This is a different way of displaying the "Officers / 10k residents" statistic. We are able to see where Boston lies compared to other cities. Boston's percentile is also displayed

Issues:

- Outliers
- Can only plot values for 1 year

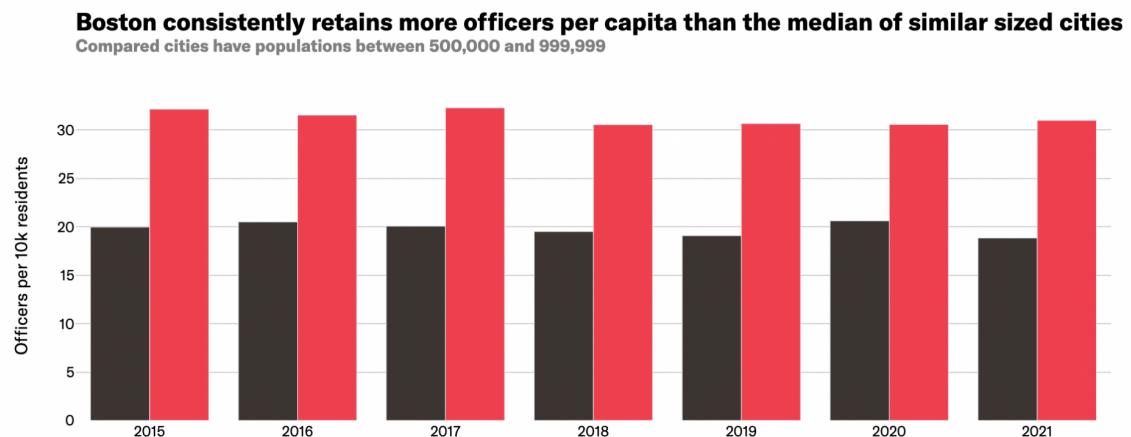
... does not look good when we only look at cities with population 500k-999k

Question 6.3 - Number of BPD officers per 10,000 residents + Compared to similar sized cities

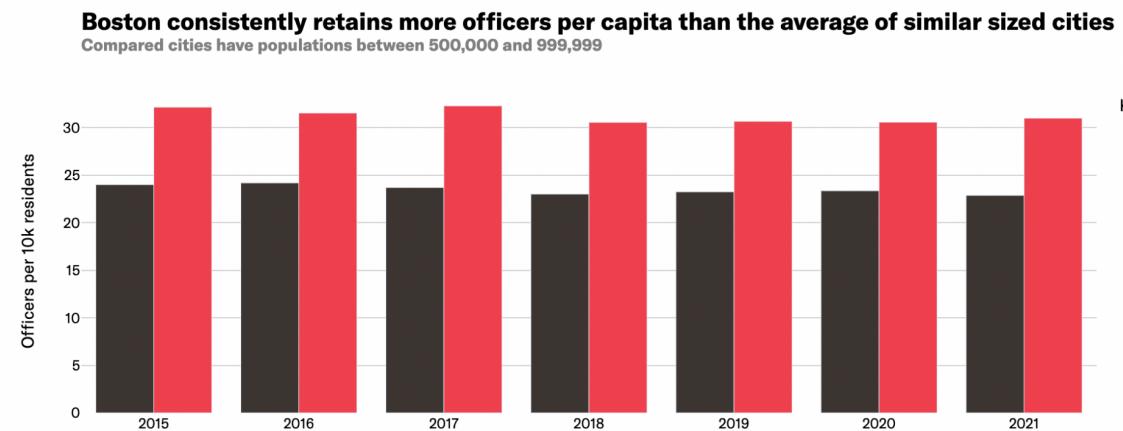
New

NOTE: "Similar sized cities" can be defined as cities with populations between 500,000 and 999,999 as that is how cities are grouped in the FBI UCR data

Boston vs Median



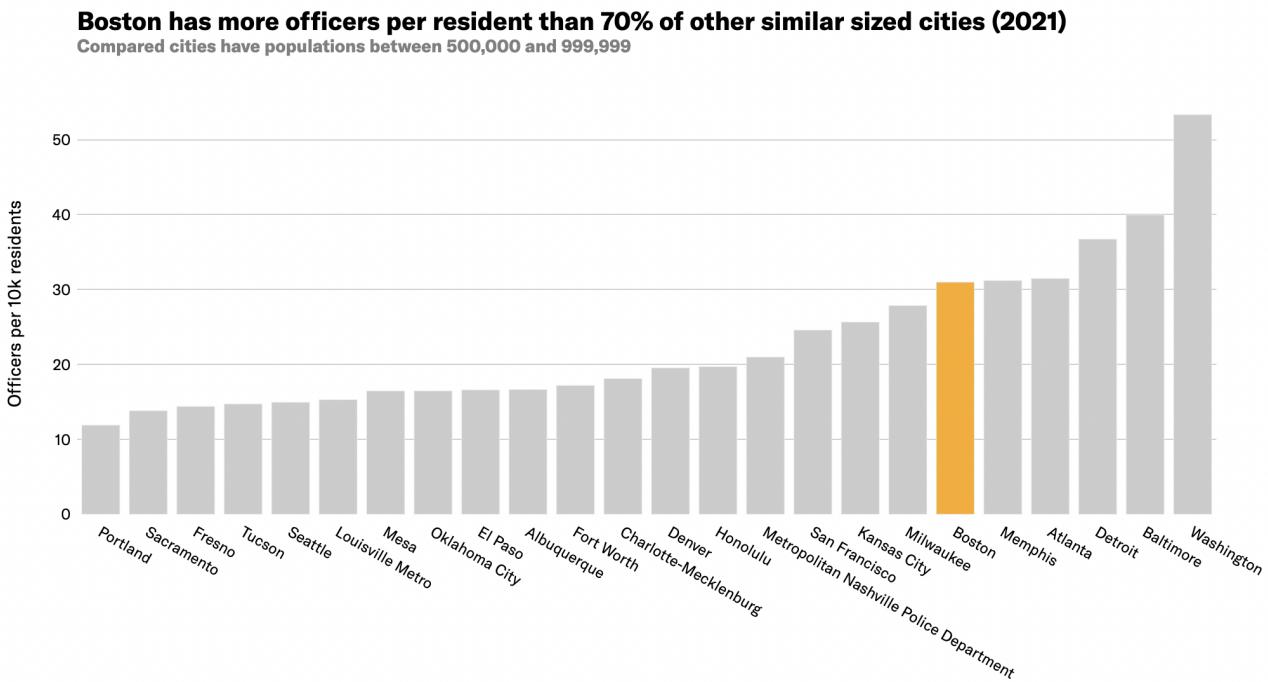
Boston vs Average



Analysis: I provide graphs of both median and average values of similar sized cities vs Boston. I believe the average may be more meaningful than the median here since we no longer have the issue of extreme outliers (which was the original reason I only displayed the median in Q6.1).

Question 6.4 - Number of BPD officers per 10k residents + Displaying individual city data for 2021

New



Analysis: Very informative graph which shows where Boston's officers per capita statistic lies compared to other similar sized cities.

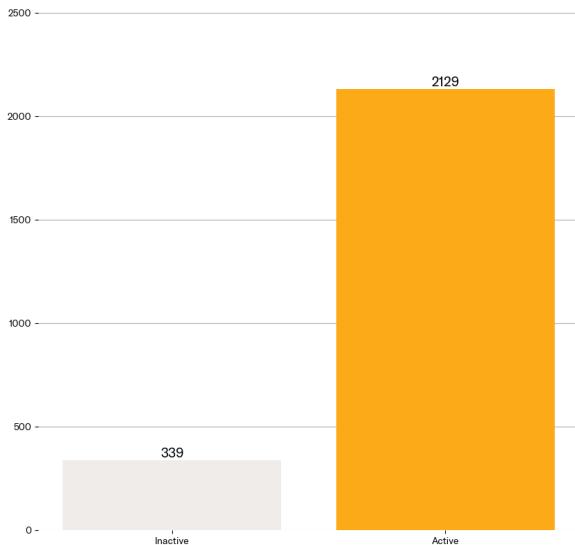
Values for reference:

	City or Agency Name	Officers per 10k residents
0	Portland	11.906375
1	Sacramento	13.832087
2	Fresno	14.410653
3	Tucson	14.740328
4	Seattle	14.954002
5	Louisville Metro	15.304407
6	Mesa	16.468339
7	Oklahoma City	16.471100
8	El Paso	16.619520
9	Albuquerque	16.662324
10	Fort Worth	17.207146
11	Charlotte-Mecklenburg	18.132727
12	Denver	19.548533
13	Honolulu	19.712974
14	Metropolitan Nashville Police Department	20.997664
15	San Francisco	24.601539
16	Kansas City	25.670456
17	Milwaukee	27.876232
18	Boston	30.989361
19	Memphis	31.211313
20	Atlanta	31.480565
21	Detroit	36.736984
22	Baltimore	39.963694
23	Washington	53.354227

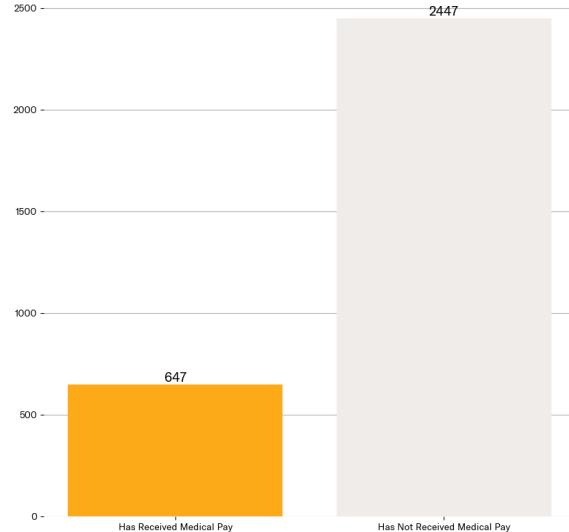
Question 7 - Number of Police Officers Active, Medical Leave, etc.

Updated

The number of Boston Police Officers currently active is more than 6 times larger than the number of inactive Officers.

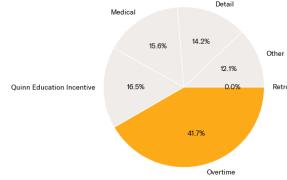


Roughly 20% of Boston Police Officers Received Medical Pay in 2021.

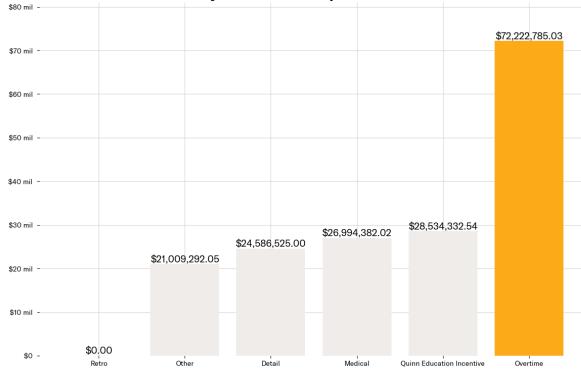


The first graph shows the number of BPD officers active vs inactive, to the right we have a graph showing the number of BPD officers who have received medical compensation this fiscal year.

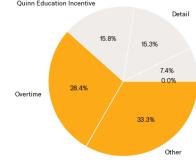
The total paid in overtime to Boston Police Officers makes up nearly half of the total paid to all officers.



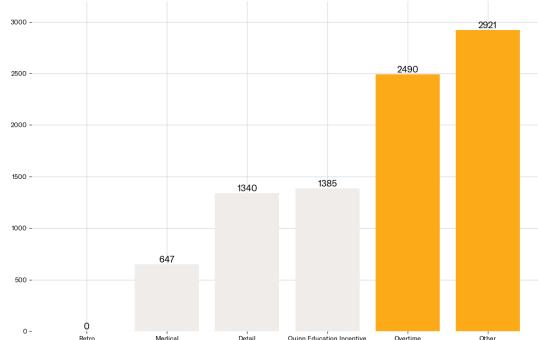
The total paid in overtime to Boston Police Officers makes up nearly half of the total paid to all officers.



The amount of Boston Police Officers that received Overtime and Other Pay is nearly twice the amount of officers that received all other categories combined.



The amount of Boston Police Officers that received Overtime and Other Pay is nearly twice the amount of officers that received all other categories combined.

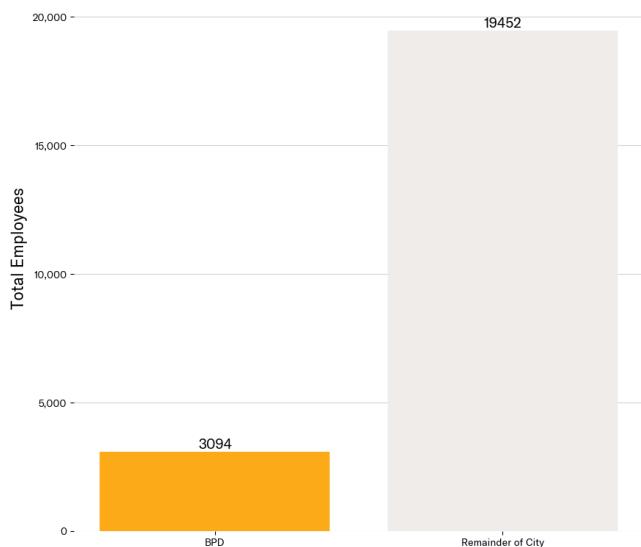


The graph above shows the number of BPD officers receiving payments in the 6 major payment categories. To the right we see that same compensation but in the form of the sum being said to said officers. We can see that the averages for each category will be as expected since each graph follows an almost identical trend.

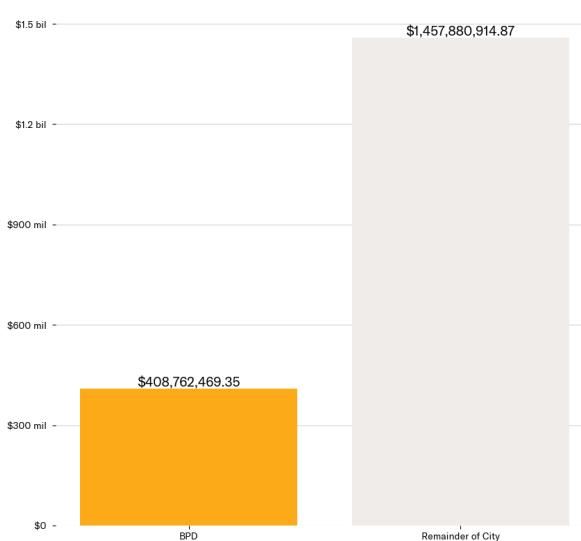
Question 8 - Employee compensation comparison to non-BPD employees

Updated

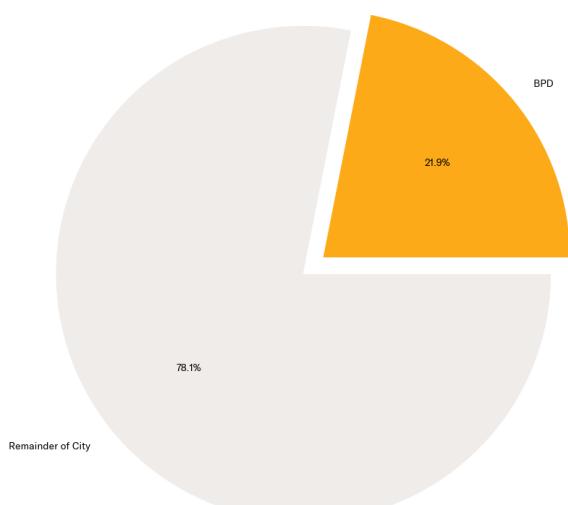
Boston Police Department employees make up less than 14% of the cities total employees.



Boston Police Department budget makes up nearly a quarter of the cities budget.



Boston City Budget Breakdown for the 2021 Fiscal Year



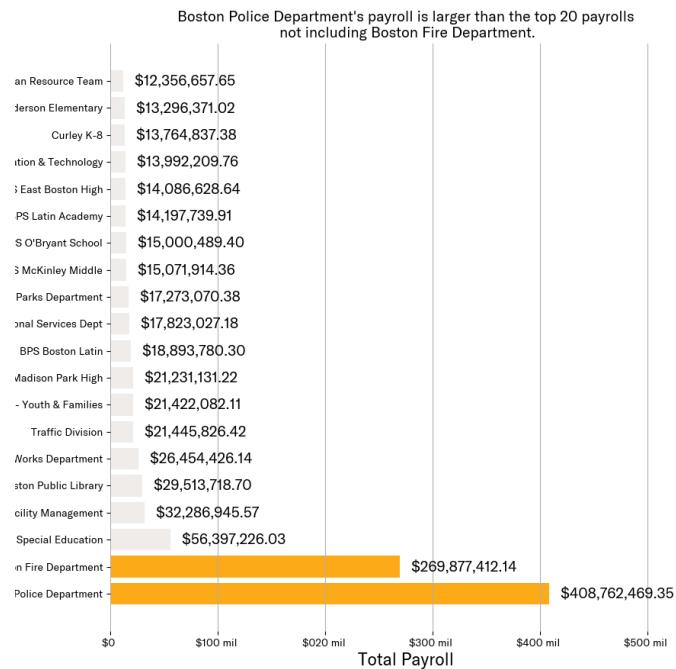
On average, BPD employees salaries are nearly double that of all other city employees.



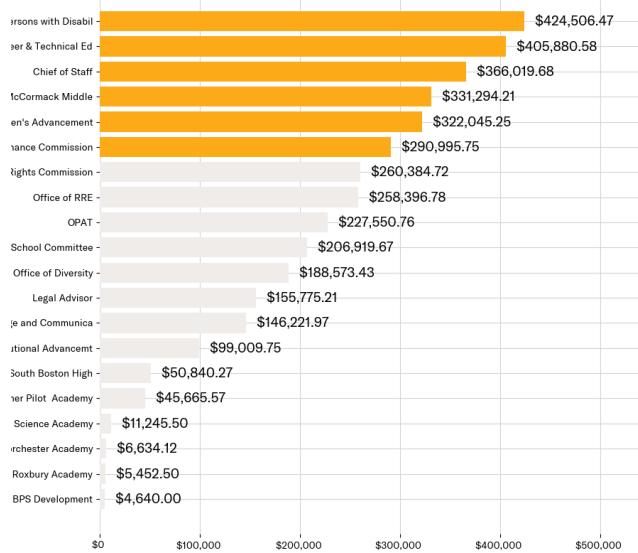
The graph above shows the number of employees in the Boston Police Department vs the rest of the city. To the right we have that same graph but using the sum of the BPD's

payroll vs the rest of the cities departments payrolls. On the bottom left we have another graph showing the average salary for a BPD employee vs an employee working for any other department in the city. The pie chart to the right displays this same data however using percentages. From these graphs we can see that a BPD employee's average salary is nearly double that of the average salary of an employee working for any other department in the city of Boston.

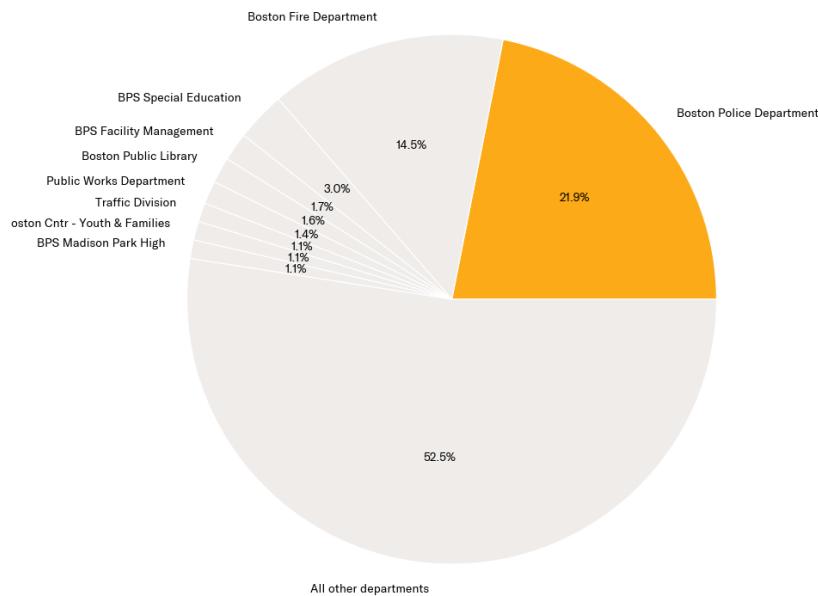
Boston Police Department's payroll is larger than the next 5 largest payrolls.



Breakdown of City of Boston's 20 Smallest Payrolls



Boston Police Department payroll makes up over 21% of the cities total payroll.

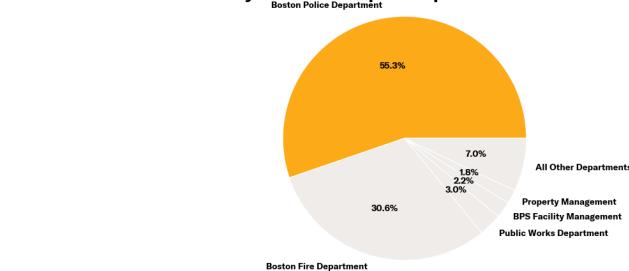


Above we have the 20 smallest total payrolls in the city of Boston for the 2021 fiscal year, to the right we have a graph of the 20 largest payrolls in the city of Boston for the 2021 fiscal year. Below we have a pie chart displaying the 10 largest payrolls with the 10th category being all other departments as a whole. From these graphs we can see the massive size of the Boston Police Department Payroll in comparison to the remainder of the city. Being that the Boston Police Department Payroll makes us over 21.9% of the city's total payroll.

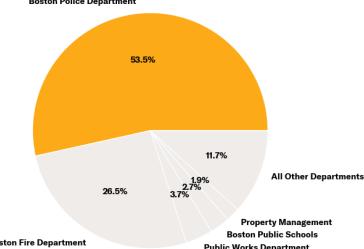
9 - Total overtime of top departments + over time

Updated

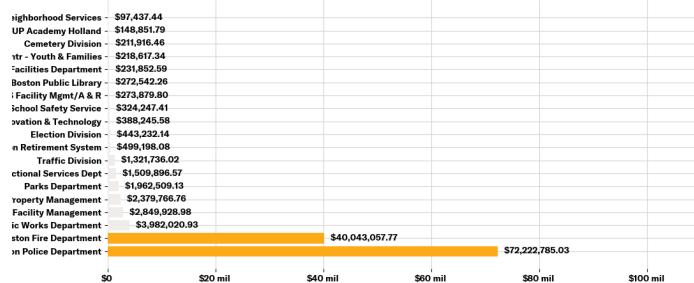
Total Overtime Pay across the top 20 Departments in the 2021 Fiscal Year



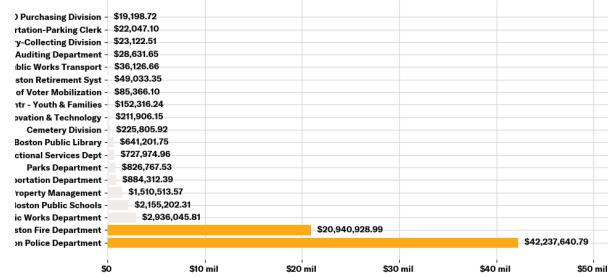
Total Overtime Pay across the top 20 Departments in the 2011 Fiscal Year



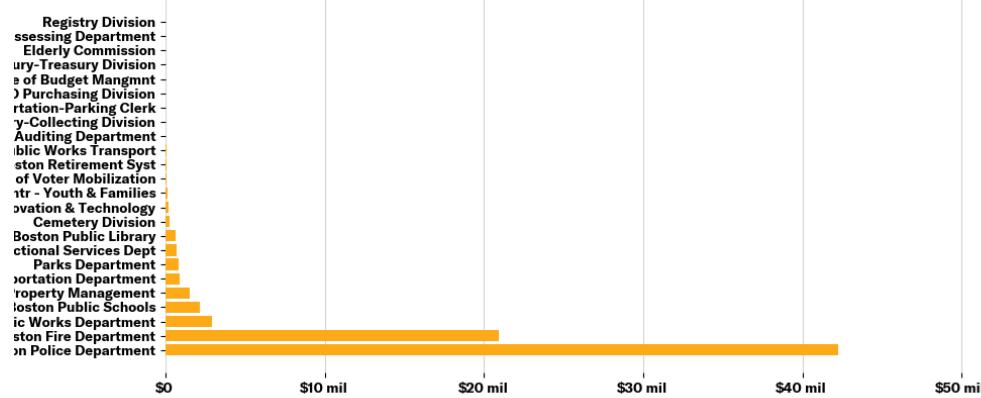
Total Overtime Pay across the top 20 Departments in the 2021 Fiscal Year



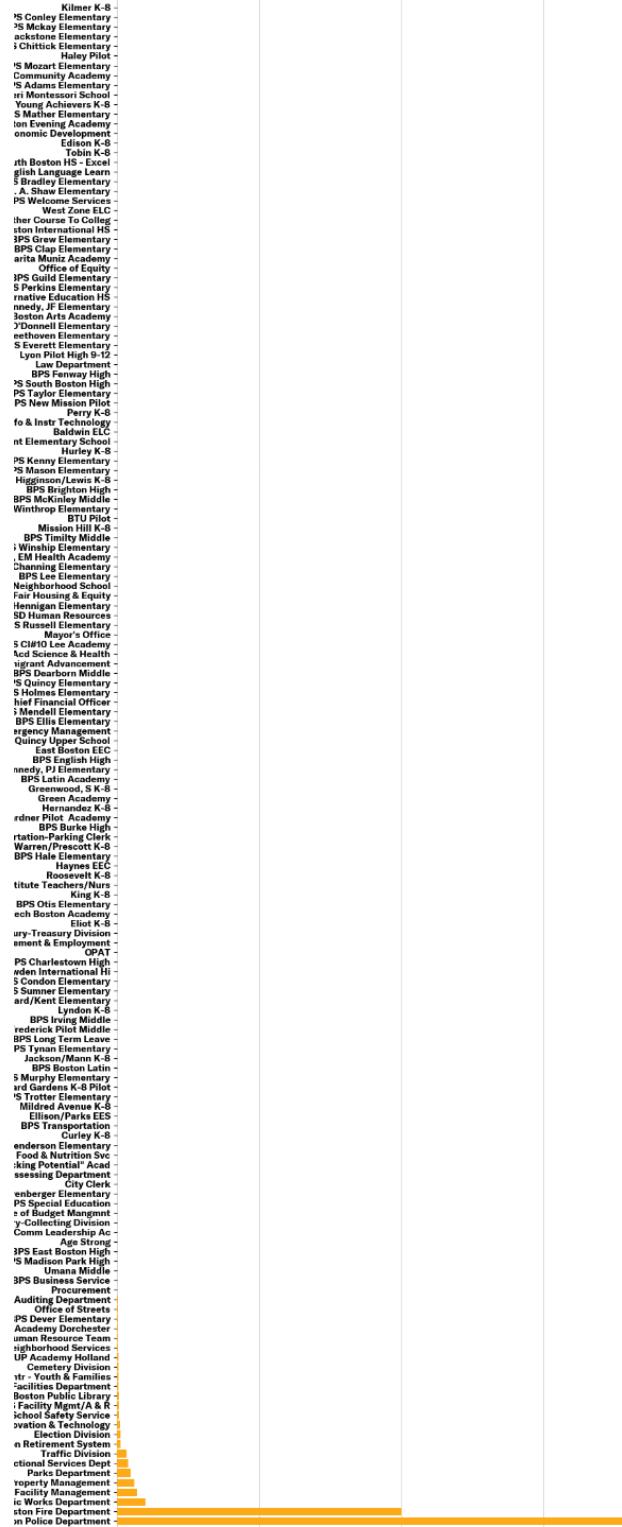
Total Overtime Pay across the top 20 Departments in the 2011 Fiscal Year



Total Overtime Pay Across All Departments in the 2011 Fiscal Year



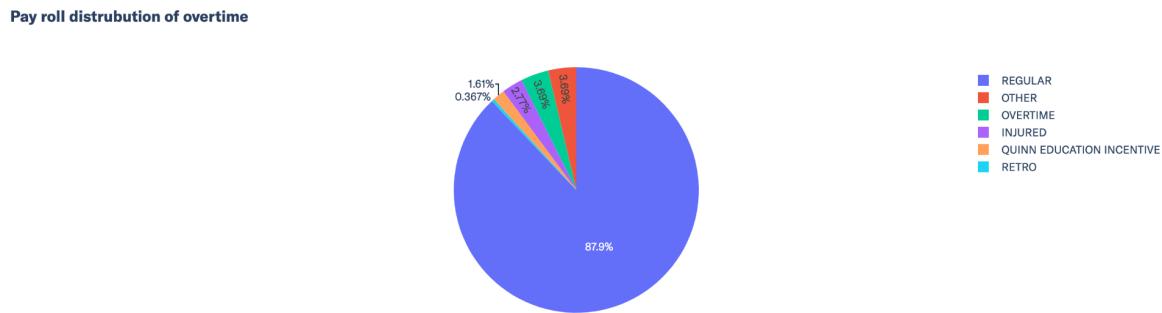
Total Overtime Pay Across All Departments in the 2021 Fiscal Year



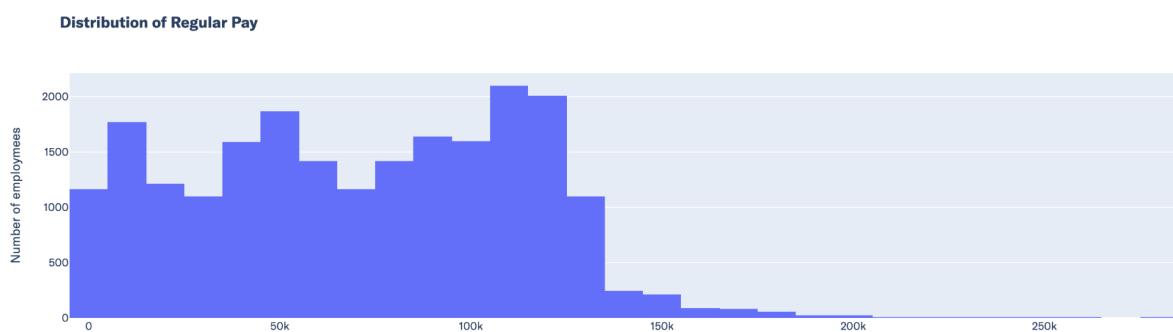
The graph above shows the total amount paid for overtime across the top 20 Departments. To the right of this graph we have a pie chart showing the same data however using percentages rather than the sum of the payroll category. Below we have two graphs both showing the same data as well however with an expanded scope. The graph on the bottom left shows overtime pay across all departments for the 2021 fiscal year, while the graph to the right shows overtime pay across all departments for the 2011 fiscal year. We can see from these graphs that the Boston Police Department's overtime pay makes up over 50% of the city's total overtime pay. Interestingly enough the data for both the top and bottom graphs from 2021-2011 looked very similar as we can see with the bottom graphs. As a result I choose to neglect all other years, however the graphs are present in the github repository.

Question 10 Payroll distribution over time (base, overtime, retro, detail, etc.)

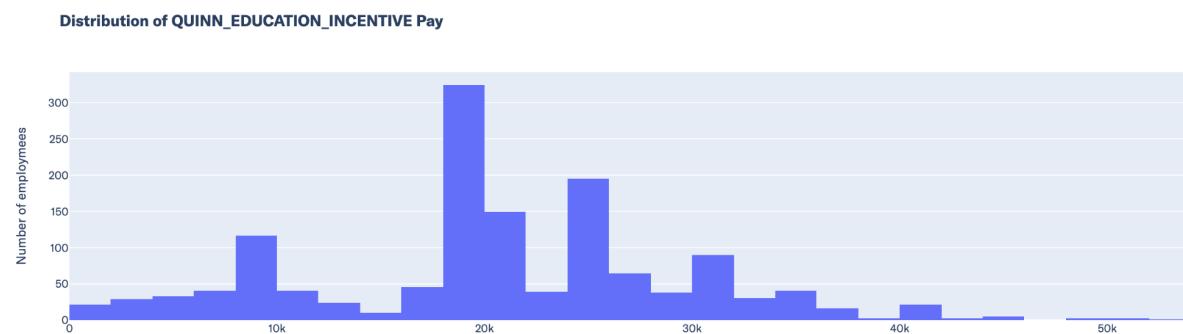
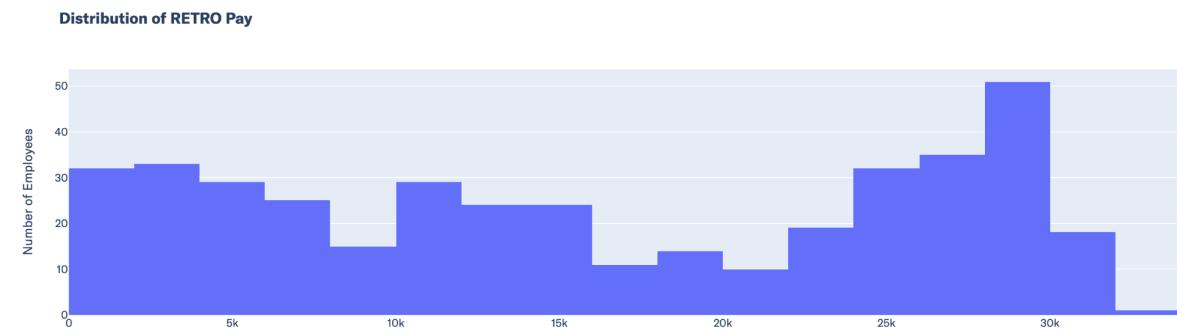
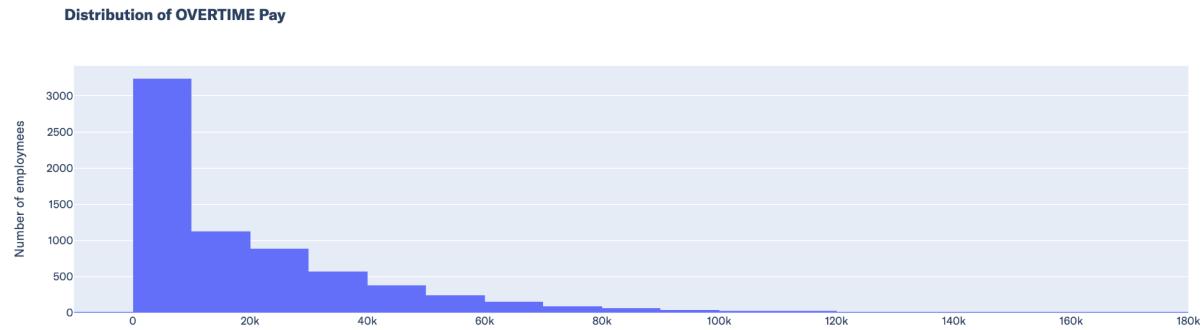
Updated

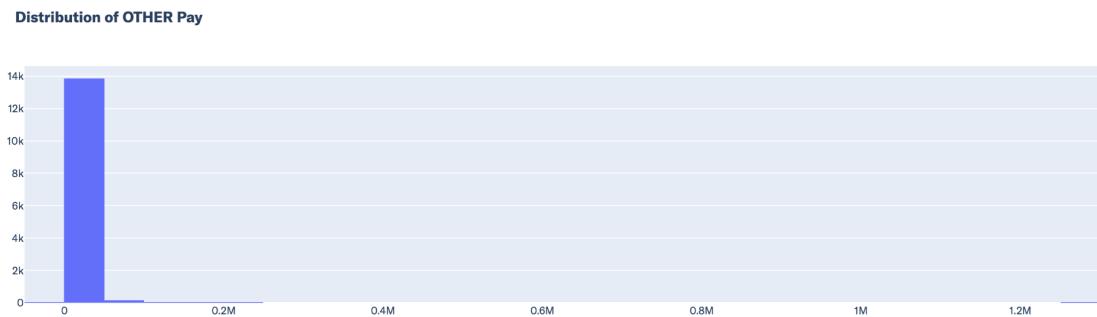
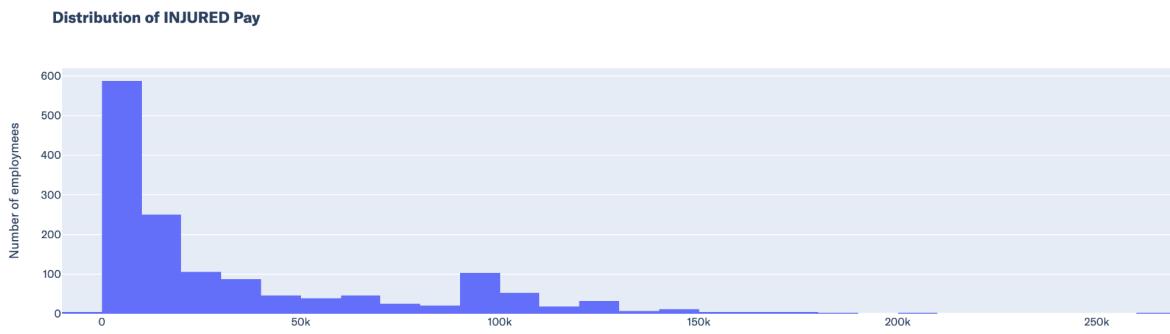


This is the pie chart of total payroll type. Base the above pie chart. We can see that regular(base) is taking the majority of the payroll which is 87.9% while other takes 3.69%, overtime takes 3.69%, retro takes 0.367%, quinn education incentive takes about 1.61%, and injured takes 2.77%.



From the above pie chart we can see the regular pay is the majority. This graph shows the density distribution of regular pay. We can see the regular(Base) payroll is most clustered in the range 50000 to 120000.

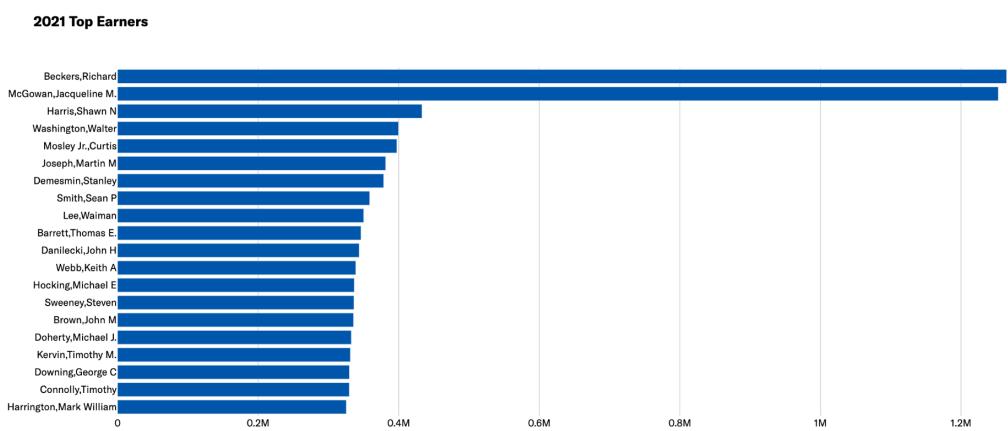




These graphs show the density distribution of other payroll types. We can find other, overtime and injured distributions show a smaller mean value than the median, which means these are the overall low wage. And OTHER type is mainly less than 13k which is quite low compare to other payroll types.

Question 11 Top 20 Earners (change from previous year)

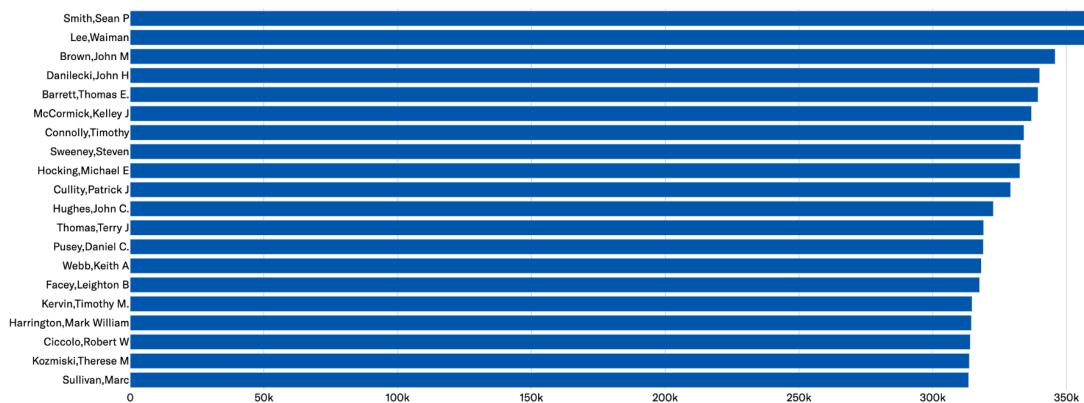
Updated



The top 20 earners for 2021 are:

Beckers,Richard, McGowan,Jacqueline M., Harris,Shawn N, 'Washington,Walter, Mosley Jr.,Curtis, Joseph,Martin M, Demesmin,Stanley, Smith,Sean P, Lee,Waiman, Barrett,Thomas E., Danilecki,John H, Webb,Keith A, Hocking,Michael E, Sweeney,Steven, Brown,John M, Doherty,Michael J., Kervin,Timothy M., Downing,George C, Connolly,Timothy, Harrington,Mark William.

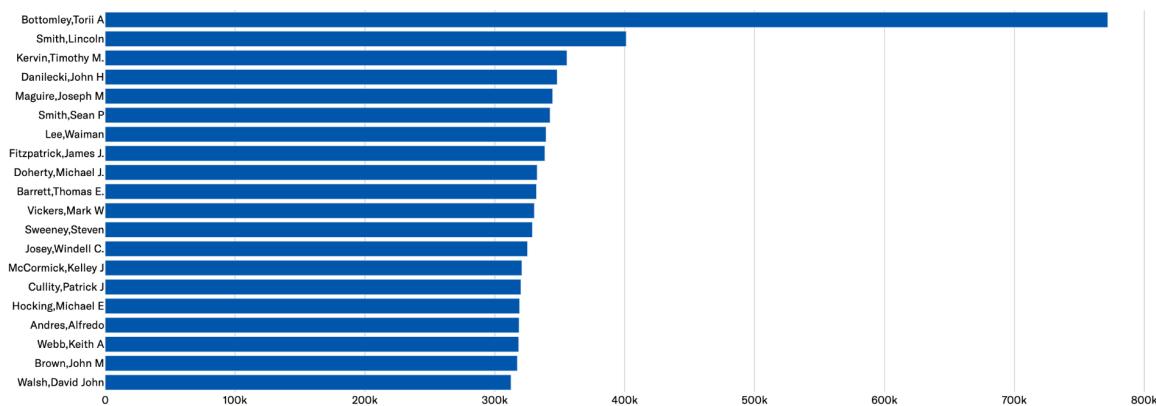
2020 Top Earners



The top 20 owners for 2022 are:

Smith,Sean P, Lee,Waiman, Brown,John M, Danilecki,John H, Barrett,Thomas E., McCormick,Kelley J, Connolly,Timothy, Sweeney,Steven, Hocking,Michael E, Cullity,Patrick J, Hughes,John C., Thomas,Terry J, Pusey,Daniel C., Webb,Keith A, Facey,Leighton B, Kervin,Timothy M., Harrington,Mark William, Ciccolo,Robert W, Kozmiski,Therese M, Sullivan,Marc

2019 Top Earners



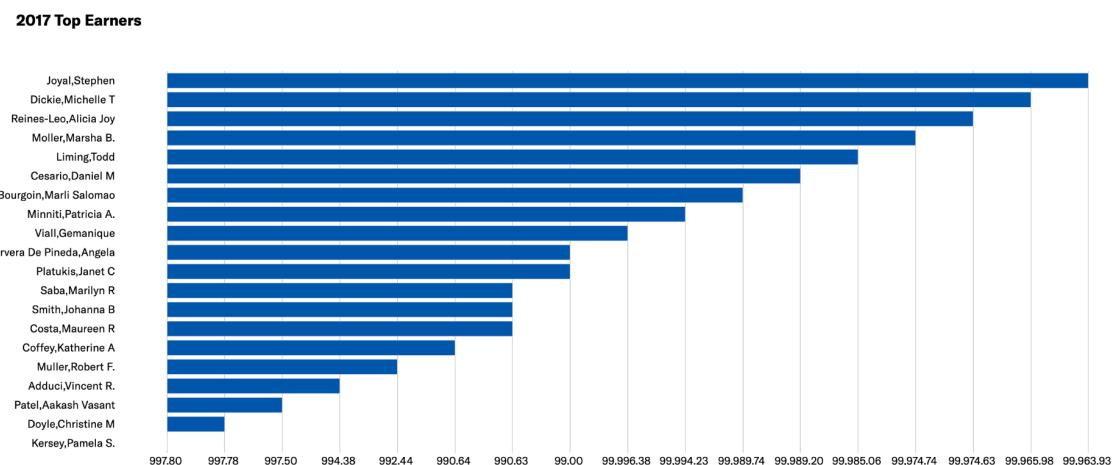
The top 20 earners for 2019 are:

Bottomley,Torii A, Smith,Lincoln, Kervin,Timothy M., Danilecki,John H, Maguire,Joseph M, 'Smith,Sean P, Lee,Waiman, Fitzpatrick,James J., Doherty,Michael J., Barrett,Thomas E., 'Vickers,Mark W, Sweeney,Steven, Josey, Windell C., McCormick,Kelley J, Cullity,Patrick J, 'Hocking,Michael E, Andres,Alfredo, Webb,Keith A, Brown,John M, Walsh,David John



Top 20 earners for 2018 are:

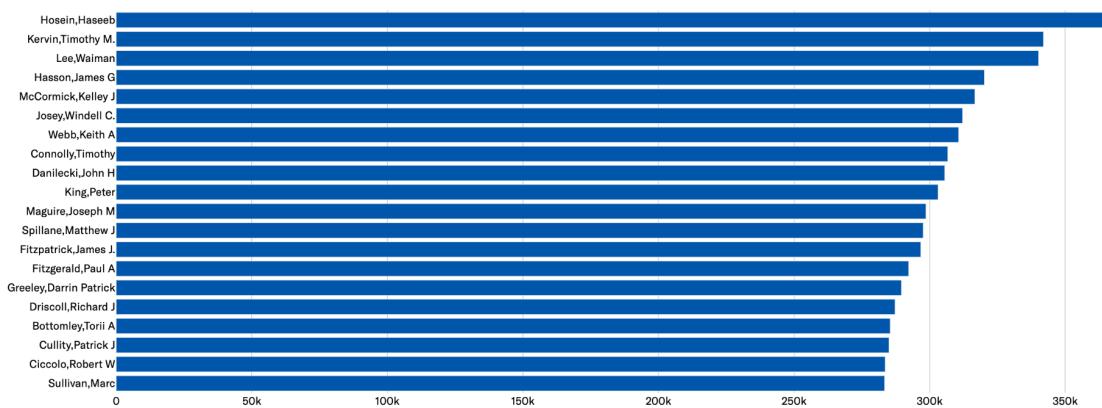
DeLeon,Winston, Parks,Norman, Daly,Stephen F., Pietroski,Jamie, Gallagher,Gregory D, Brienza,Horacio D., Higginbottom,Darrell J, Reid,Jason C, Rioux,Stephen, Murphy,Patrick L, Levichev,Vladimir A., Hosein,Haseeb, Horton,Joseph R, Vandyke,Karyn A, Cutroneo,Tlaloc, Tierney,Matthew M., Dineen,John J, Ball,Brian L, Corbett,Thomas C, Fitzgerald,Edward F



Top 20 earners for 2017 are

Kersey,Pamela S., Doyle,Christine M, Patel,Aakash Vasant, Adduci,Vincent R., Muller,Robert F., Coffey,Katherine A, Costa,Maureen R, Smith,Johanna B, Saba,Marilyn R, Platukis,Janet C, Corvera De Pineda,Angela, Viall,Germanique, Minniti,Patricia A., Bourgoin,Marli Salomao, Cesario,Daniel M, Liming,Todd, Moller,Marsha B., Reines-Leo,Alicia Joy, Dickie,Michelle T, Joyal,Stephen

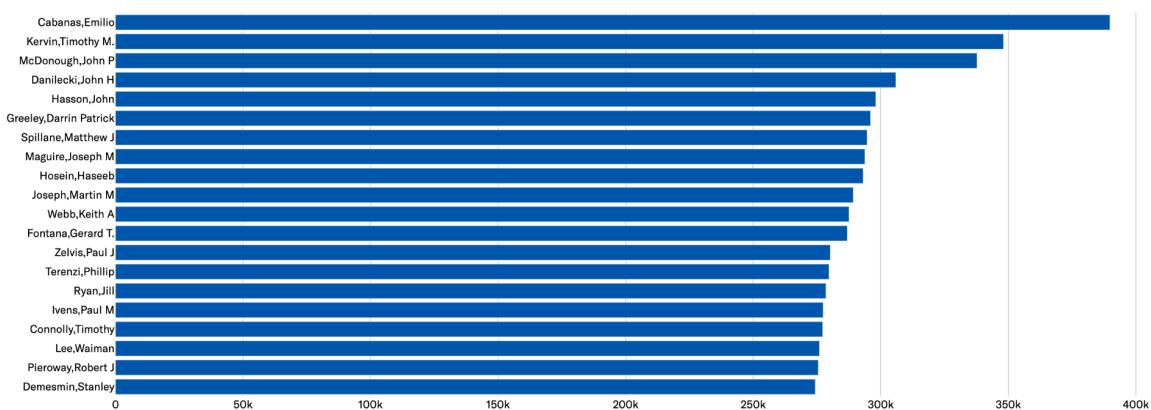
2016 Top Earners



Top 20 earners for 2016 are:

Hosein,Haseeb, Kervin,Timothy M., Lee,Waiman, Hasson,James G, McCormick,Kelley J, Josey,Windell C., Webb,Keith A, Connolly,Timothy, Danilecki,John H, King,Peter, Maguire,Joseph M, Spillane,Matthew J, Fitzpatrick,James J., Fitzgerald,Paul A, Greeley,Darrin Patrick, Driscoll,Richard J, Bottomley,Torii A, Cullity,Patrick J, Ciccolo,Robert W, Sullivan,Marc

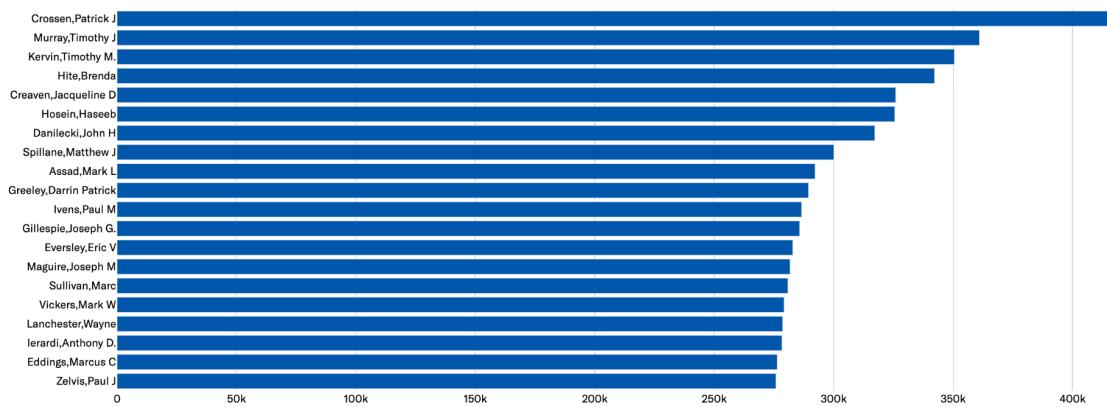
2015 Top Earners



Top 20 earners for 2015:

Cabanas,Emilio, Kervin,Timothy M., McDonough,John P, Danilecki,John H, Hasson,John, Greeley,Darrin Patrick, Spillane,Matthew J, Maguire,Joseph M, Hosein,Haseeb, Joseph,Martin M, Webb,Keith A, Fontana,Gerard T., Zelvis,Paul J, Terenzi,Phillip, Ryan,Jill, Ivens,Paul M, Connolly,Timothy, Lee,Waiman, Pieroway,Robert J, Demesmin,Stanley

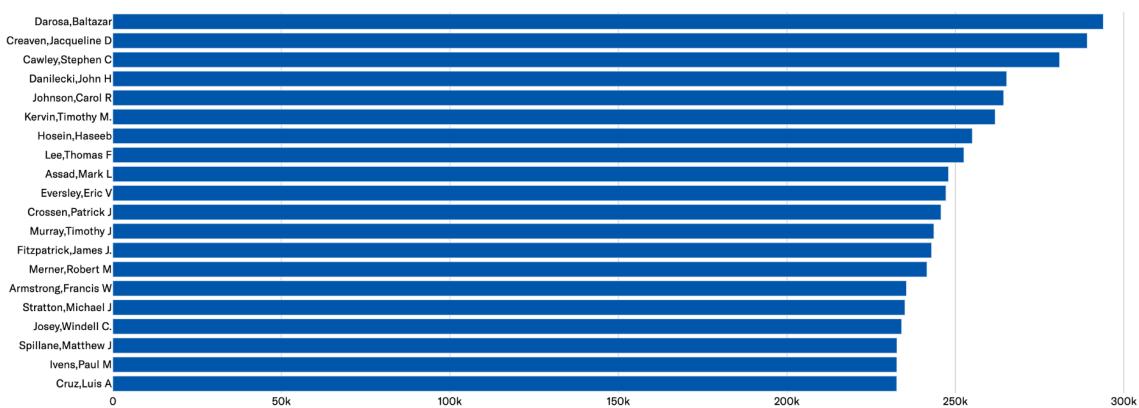
2014 Top Earners



Top 20 earners for 2014:

Crossen,Patrick J, Murray,Timothy J, Kervin,Timothy M., Hite,Brenda, Creaven,Jacqueline D, Hosein,Haseeb, Danilecki,John H, Spillane,Matthew J, Assad,Mark L, Greeley,Darrin Patrick, Ivens,Paul M, Gillespie,Joseph G., Eversley,Eric V, Maguire,Joseph M, Sullivan,Marc, Vickers,Mark W, Lanchester,Wayne, Ierardi,Anthony D., Eddings,Marcus C, Zelvis,Paul J

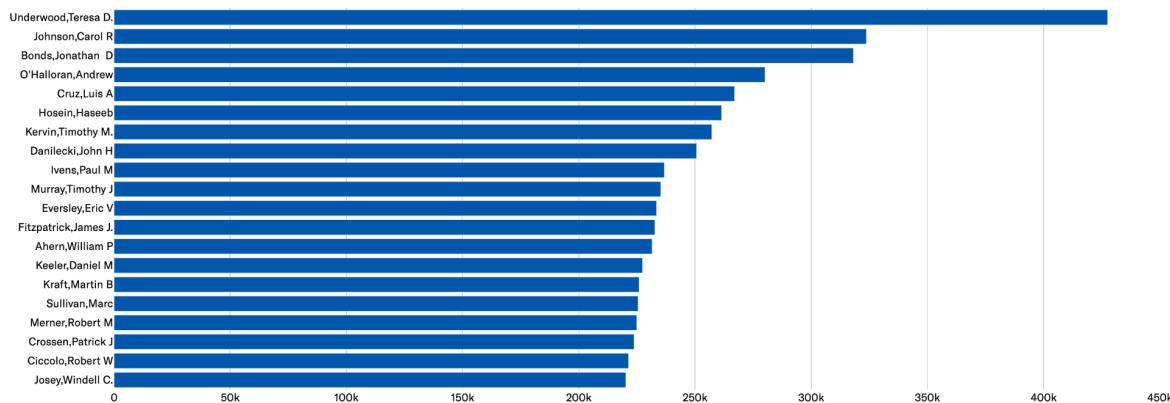
2013 Top Earners



Top 20 earners for 2013

Darosa,Baltazar, Creaven,Jacqueline D, Cawley,Stephen C, Danilecki,John H, Johnson,Carol R, Kervin,Timothy M., Hosein,Haseeb, Lee,Thomas F, Assad,Mark L, Eversley,Eric V, Crossen,Patrick J, Murray,Timothy J, Fitzpatrick,James J., Merner,Robert M, Armstrong,Francis W, Stratton,Michael J, Josey, Windell C., Spillane,Matthew J, Ivens,Paul M, Cruz,Luis A

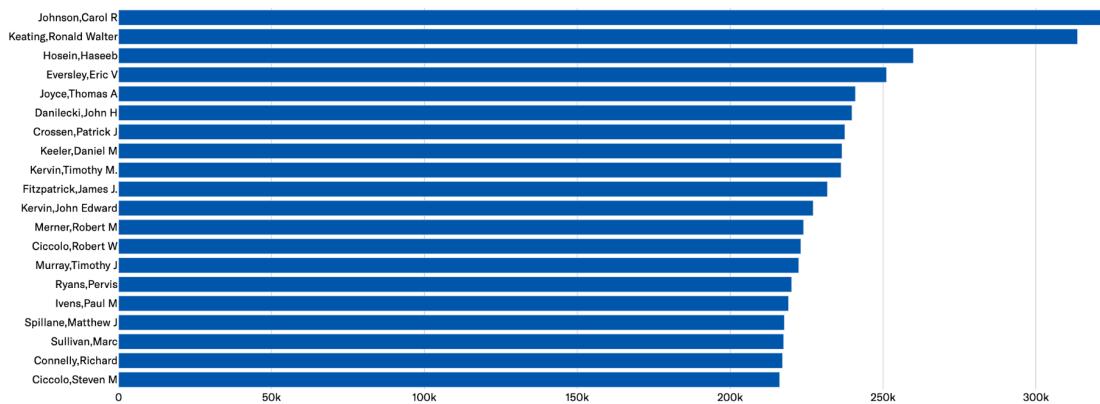
2012 Top Earners



Top 20 earners for 2012:

Underwood,Teresa D., Johnson,Carol R, Bonds,Jonathan D, O'Halloran,Andrew, Cruz,Luis A, Hosein,Haseeb, Kervin,Timothy M., Danilecki,John H, Ivens,Paul M, Murray,Timothy J, Eversley,Eric V, Fitzpatrick,James J., Ahern,William P, Keeler,Daniel M, Kraft,Martin B, Sullivan,Marc, Merner,Robert M, Crossen,Patrick J, Ciccolo,Robert W, Josey, Windell C.

2011 Top Earners



Top 20 earners for 2011:

Johnson,Carol R, Keating,Ronald Walter, Hosein,Haseeb, Eversley,Eric V, Joyce,Thomas A, Danilecki,John H, Crossen,Patrick J, Keeler,Daniel M, Kervin,Timothy M., Fitzpatrick,James J., Kervin,John Edward, Merner,Robert M, Ciccolo,Robert W, Murray,Timothy J, Ryans,Pervis, Ivens,Paul M, Spillane,Matthew J, Sullivan,Marc, Connelly,Richard, Ciccolo,Steven M

Based on the above information, from 2019 to 2021 the following people are always in top 20 earners.

From 2019 to 2021: Lee,Waiman, Brown,John M, Smith,Sean P, Sweeney,Steven, Kervin,Timothy M., Danilecki,John H, Hocking,Michael E, Webb,Keith A, Barrett,Thomas E.

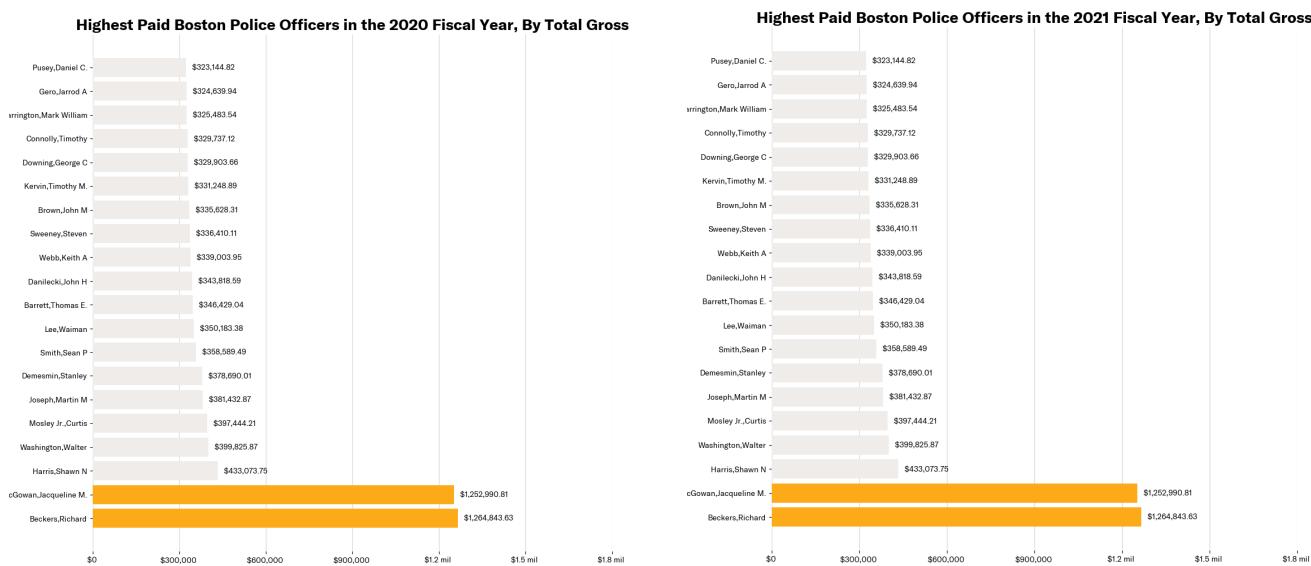
There are no duplicated top 20 earners from 2016 to 2019.

From 2011 to 2016 the following people always on the top 20 earners.

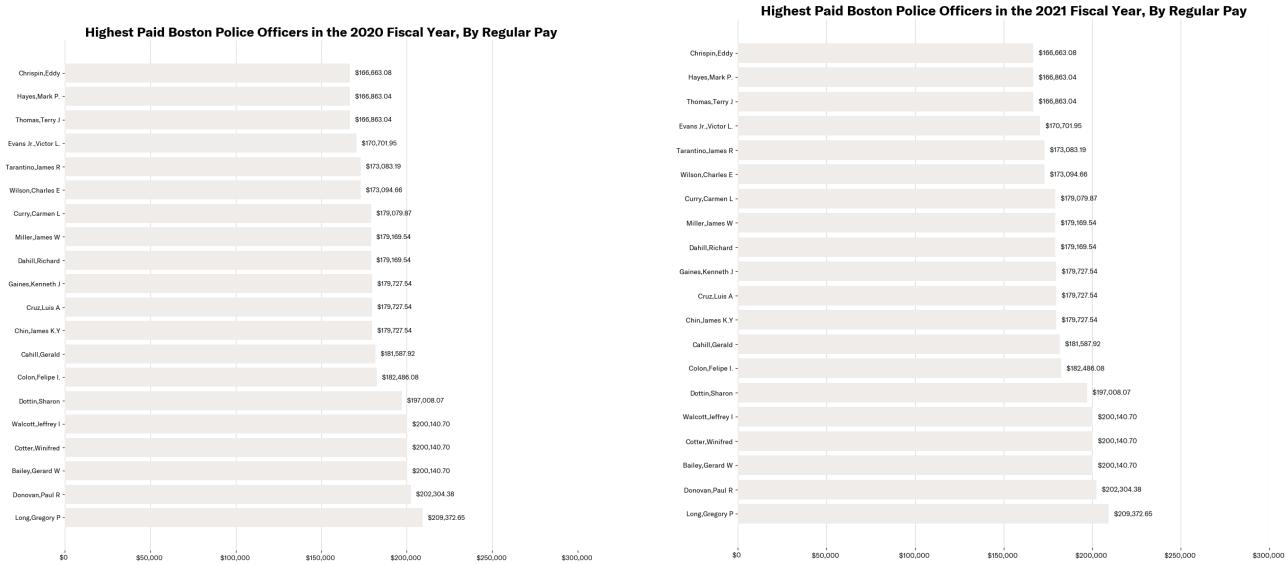
Danilecki,John H, Hosein,Haseeb, Kervin,Timothy M

12 - Top 20 Earners (OT, Base, Other)

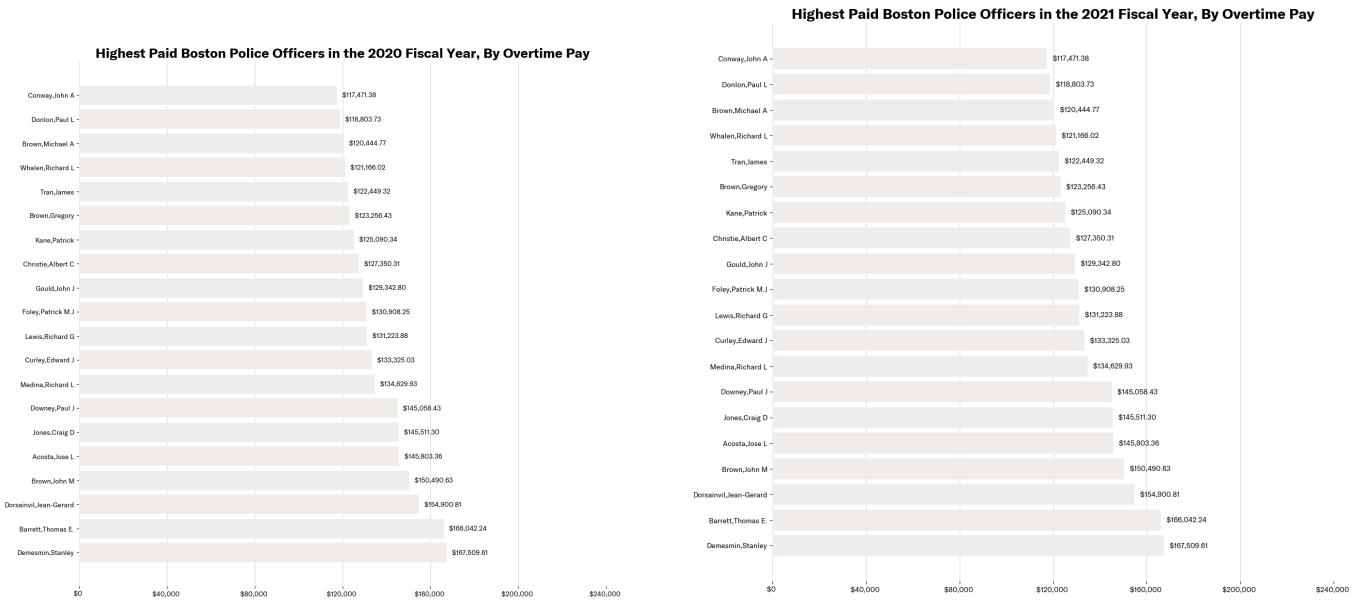
Updated



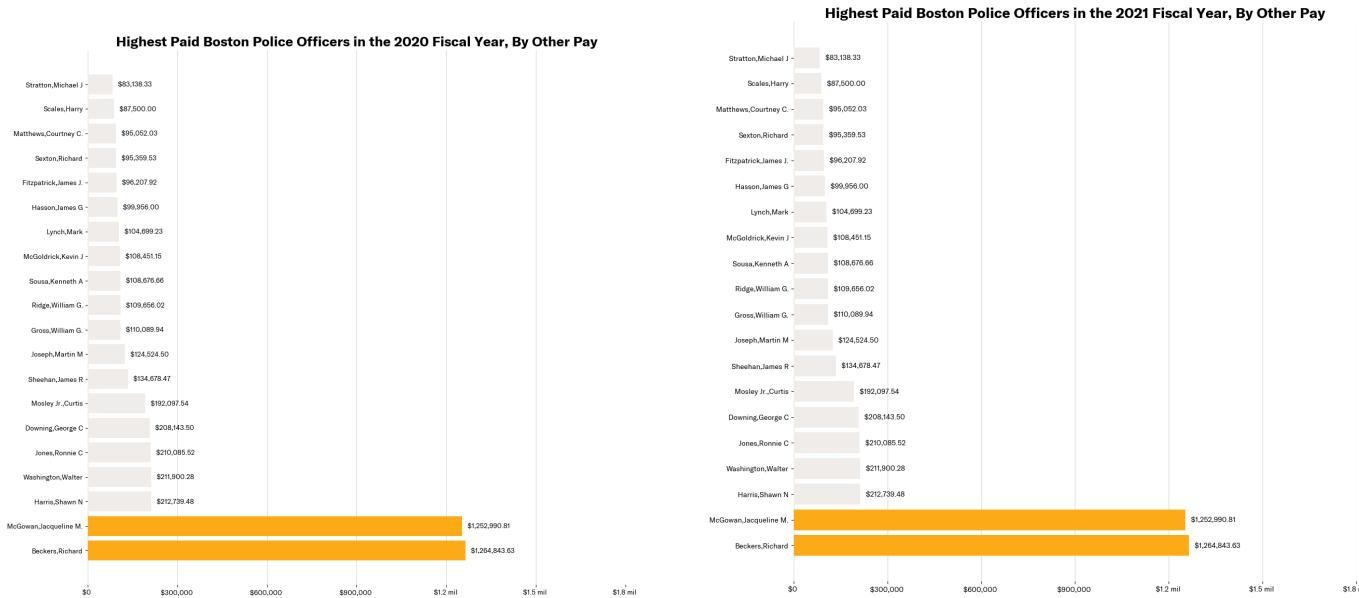
Above we have graphs displaying the total gross pay for Boston police officers for the 2021 and 2021 fiscal years. The 2021 data has 2 obvious outliers that are only present in 2021, these outliers are better displayed in the graphs below.



Above we have graphs displaying the total regular pay for Boston police officers for the 2021 and 2011 fiscal years. The outliers mentioned above are not yet displayed, showing that regular pay is clearly not the source of these outliers.



Above we have graphs displaying the total overtime pay for Boston police officers for the 2021 and 2011 fiscal years. The outliers mentioned above are not yet displayed, showing that regular pay is clearly not the source of these outliers.

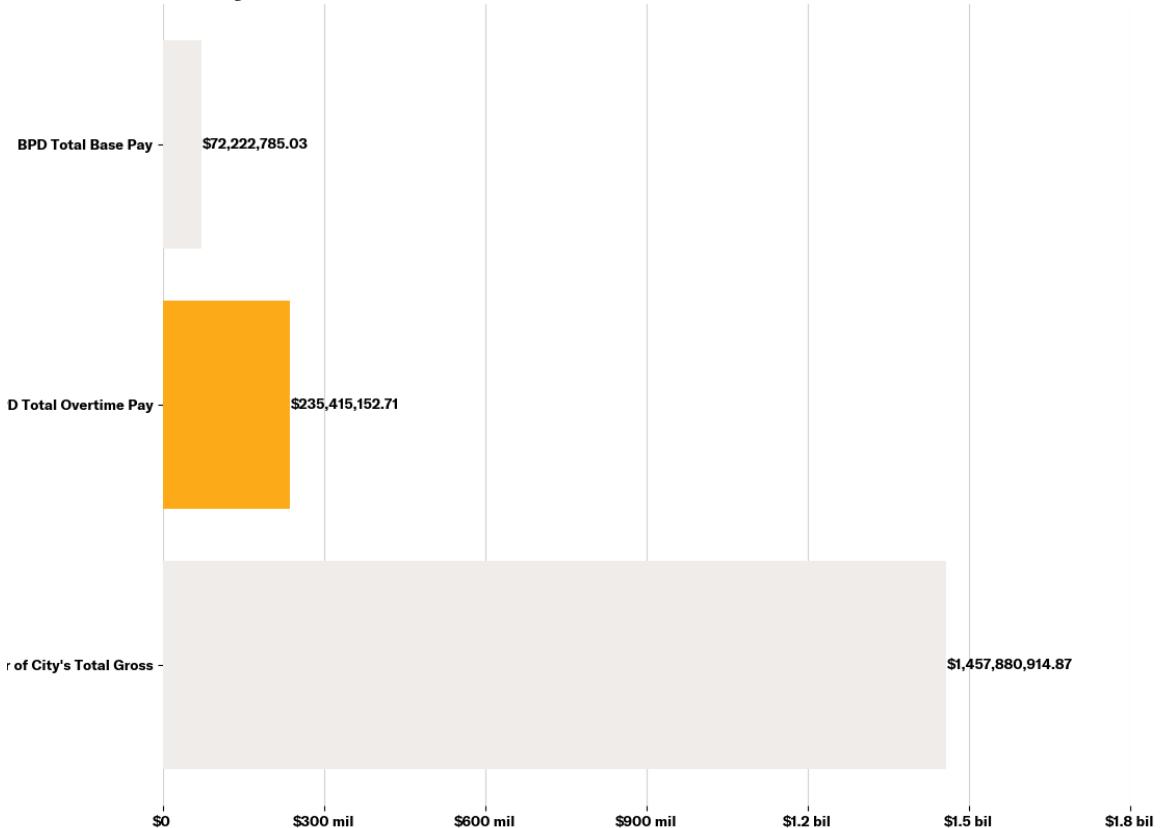


Above we have a graph displaying the total other pay for Boston police officers for the 2021 fiscal year. We can clearly see that the source of the outliers is due to this other pay category.

13 - High level overtime analysis (base salary vs. overtime vs. other departments)

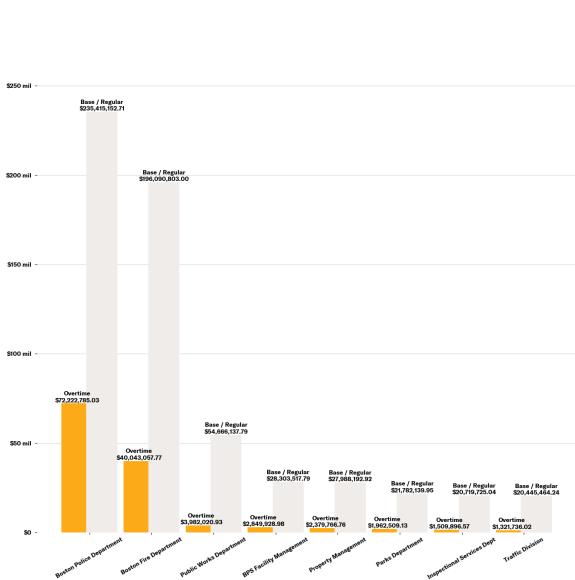
Updated

Overtime Pay for Boston Police Officers in 2021 was more than 3 times the Base Pay.

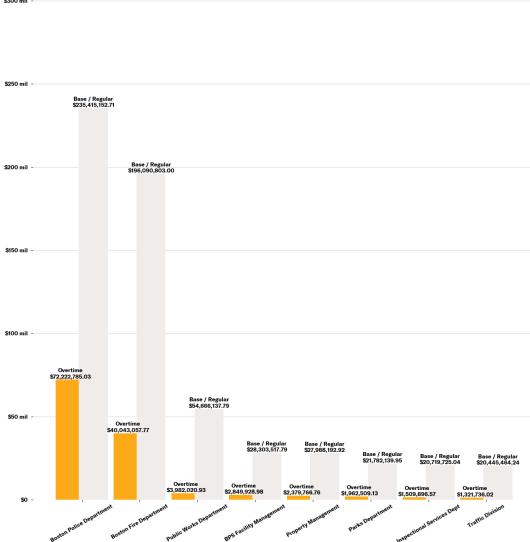


This graph above shows the compensation of Boston Police Officers for the 2021 financial year, broken down by base pay and overtime pay of BPD officers vs total gross pay of all other departments of the Boston city. We can see that the base pay of BPD officers is roughly 16% of the total gross pay across all other city departments.

Comparison of Overtime and Base Pay across the top 10 Departments with Largest Payroll in the 2020 Fiscal Year



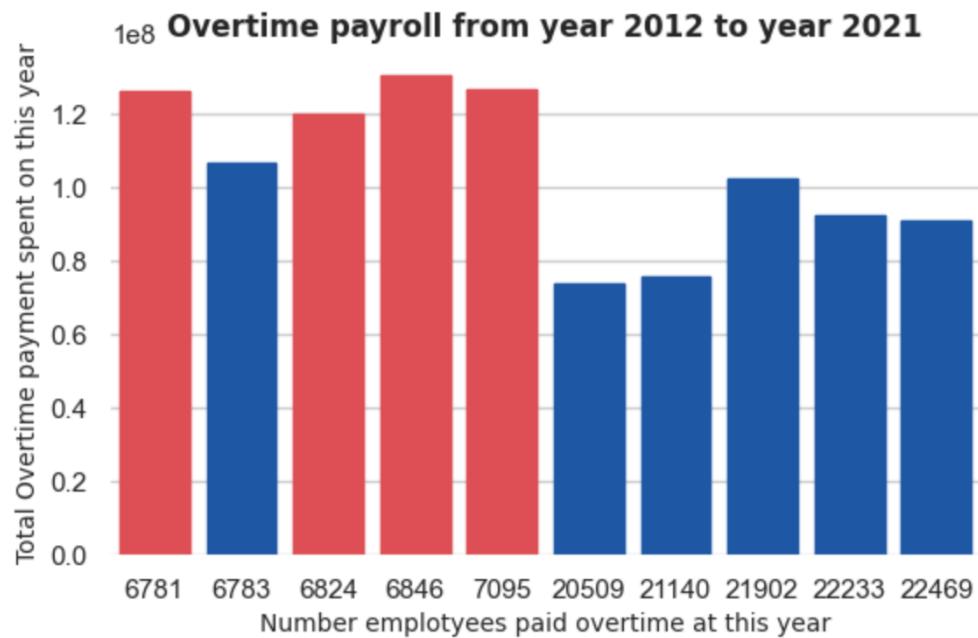
Comparison of Overtime and Base Pay across the top 10 Departments with Largest Payroll in the 2021 Fiscal Year



This graph above shows the compensation of Boston Police Officers for the 2021 financial year, broken down by base pay and overtime pay of BPD officers vs total gross pay of all other departments of the Boston city. We can see that the base pay of BPD officers is roughly 16% of the total gross pay across all other city departments.

14 - Number of employees vs. OT spend

Updated



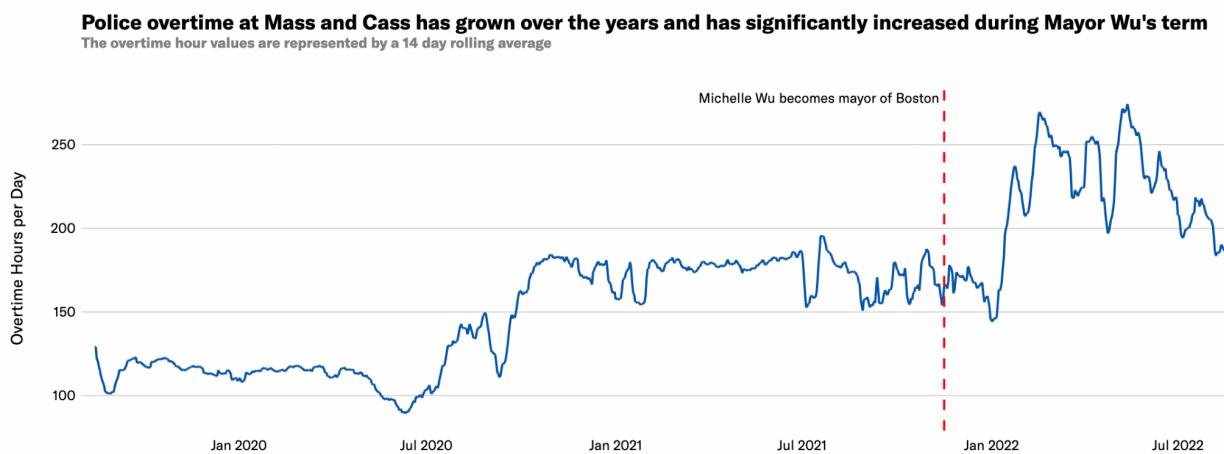
This graph shows the over time data from 2012 to 2021. The X axis shows the number how much is the budget spent on overtime payment each year and the Y axis shows the total employees enrolled in overtime payment of this year. We can see from the employees that overtime continues increasing in these years, but the payment is decreasing.

Updated Extension Project Proposal

- We want to look at police overtime hours worked at the Massachusetts Avenue and Melnea Cass Boulevard homeless encampment.
- This article [here](#), talks about how the millions of overtime pay used on policing could have been attributed to health and recovery services.
- Mayor Wu has made a statement [here](#) on the strategic direction to improve systems of care for the homeless.
- City government website has a dashboard for the progress made so far [here](#) (Decided not to use this)
- Note: Previous mayor has made a attempt to provide similar services but it ultimately made little progress
- We want to look at police OT hour data at Mass/Cass and look for any trends
- **Datasets needed:**
 - **Police OT hours**
 - **Data from [Mass/Cass dashboard](#)** (Not used)

Extension Project: UPDATED

'Mass / Melnea' in OT dataset first appeared in 2019



Analysis:

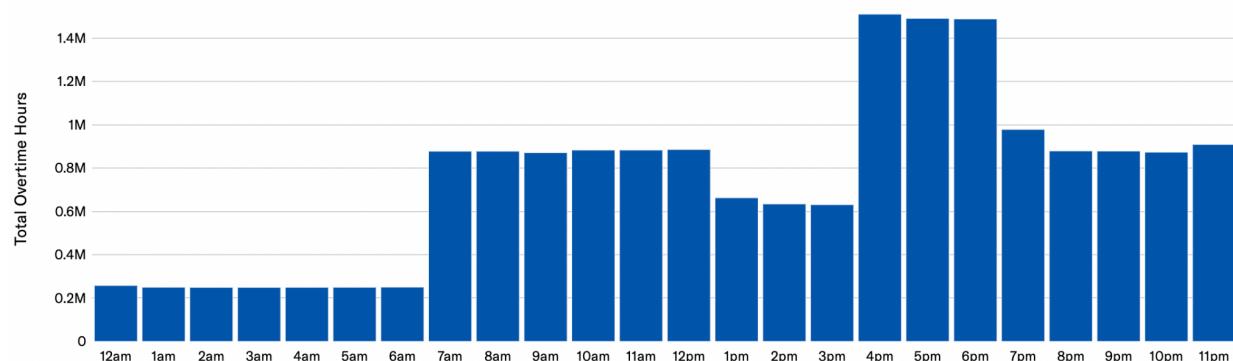
- We can see Police OT jump once (second half of 2020) during Mayor Walsh's term and again soon after Mayor Wu's term begins

Note:

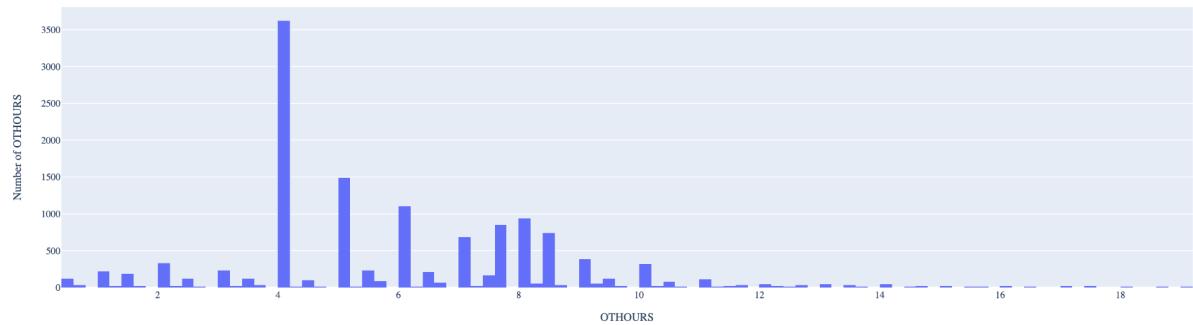
- The above graph has the overtime values represented by a 14 day rolling average to smooth out the line and make it more presentable, this can be changed easily on request

Another graph that may or may not give some insight of police work at Mass & Cass:

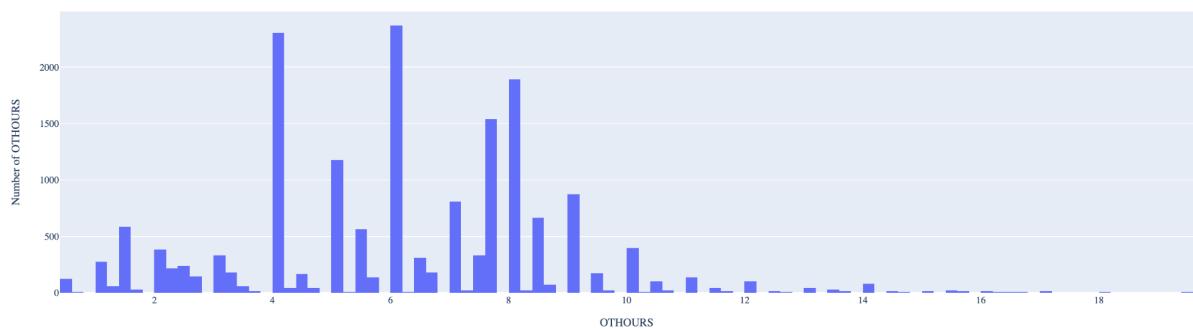
Police are most active at Mass and Cass from 4-7pm and somewhat active from 7am-4pm and 7pm-12am



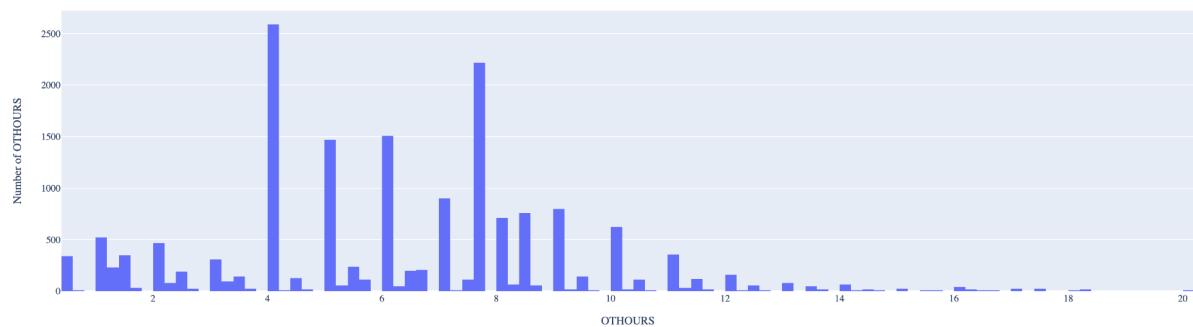
Overtime hours distribution of year 2012



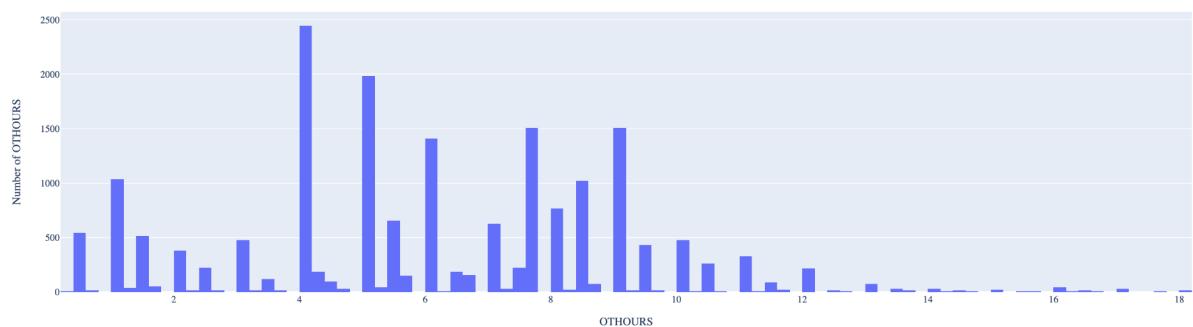
Overtime hours distribution of year 2013



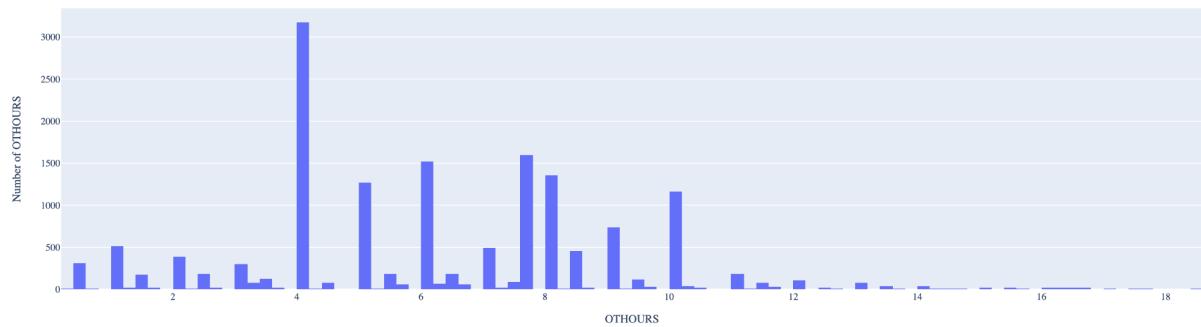
Overtime hours distribution of year 2014



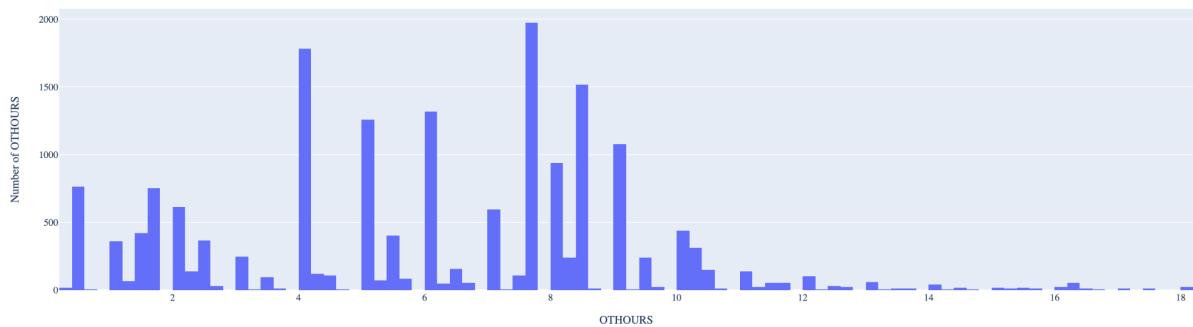
Overtime hours distribution of year 2015



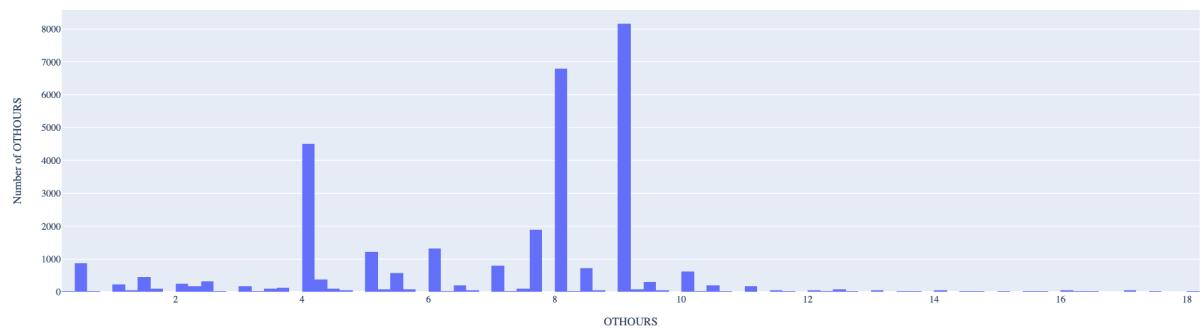
Overtime hours distribution of year 2016



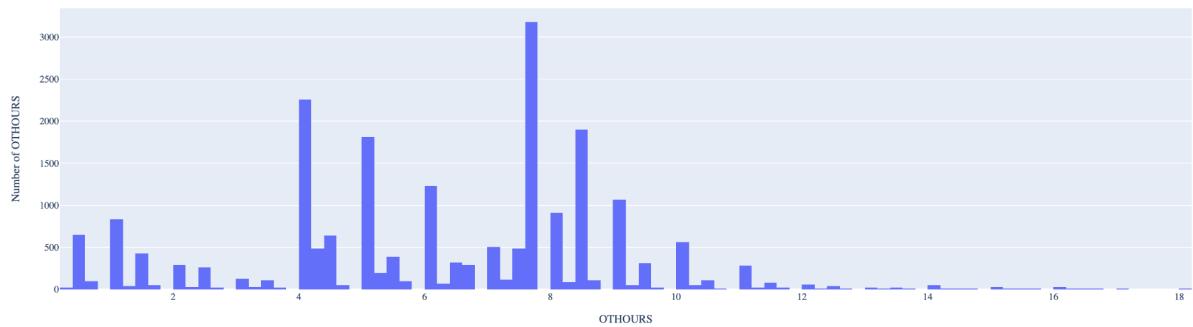
Overtime hours distribution of year 2017



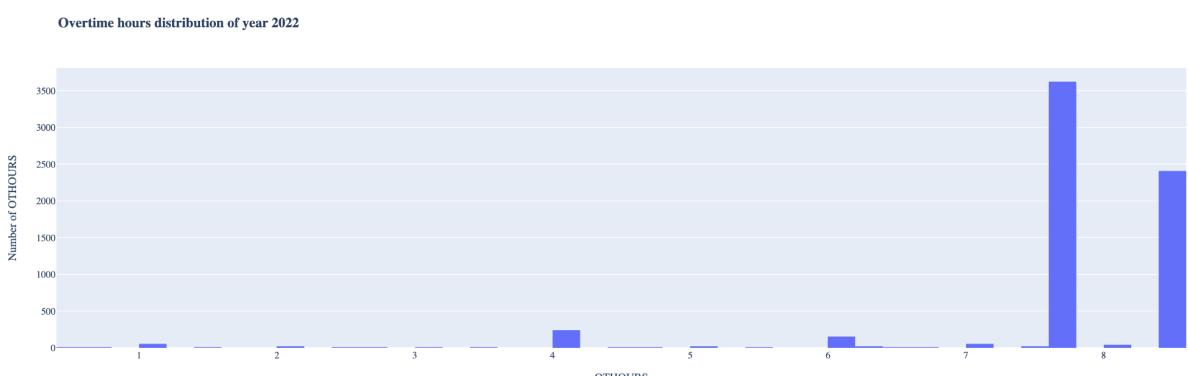
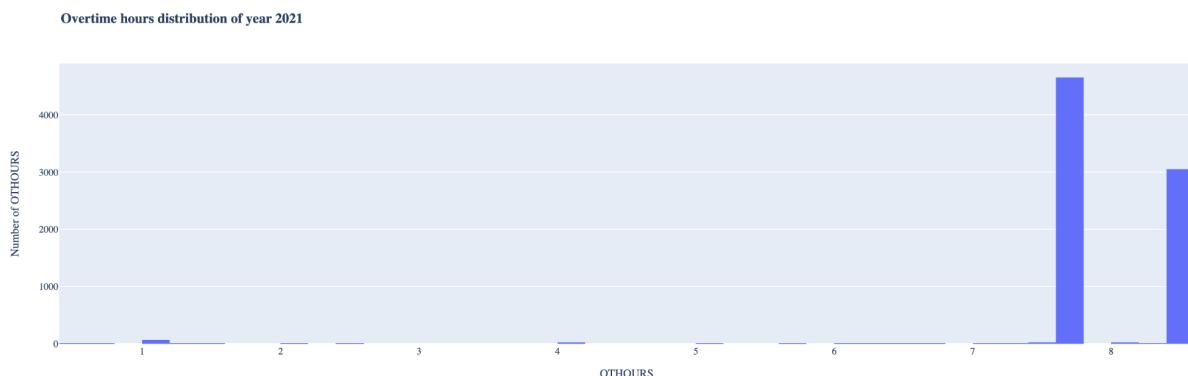
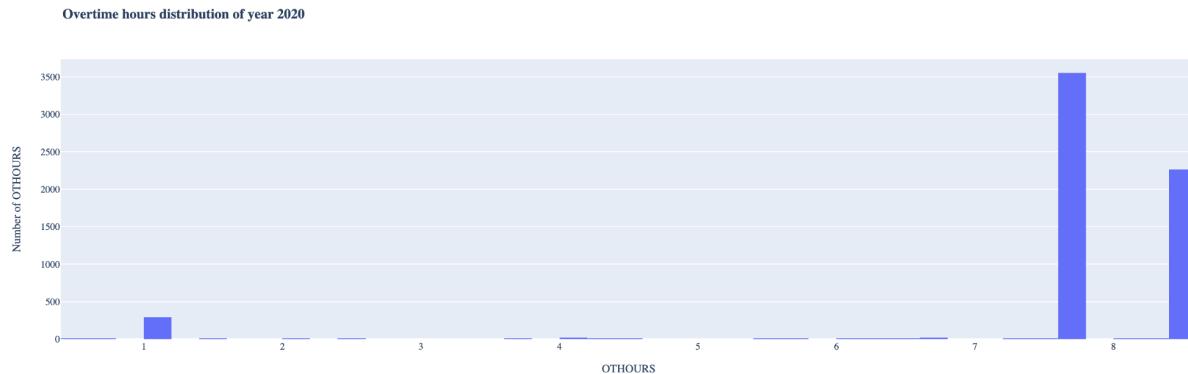
Overtime hours distribution of year 2018



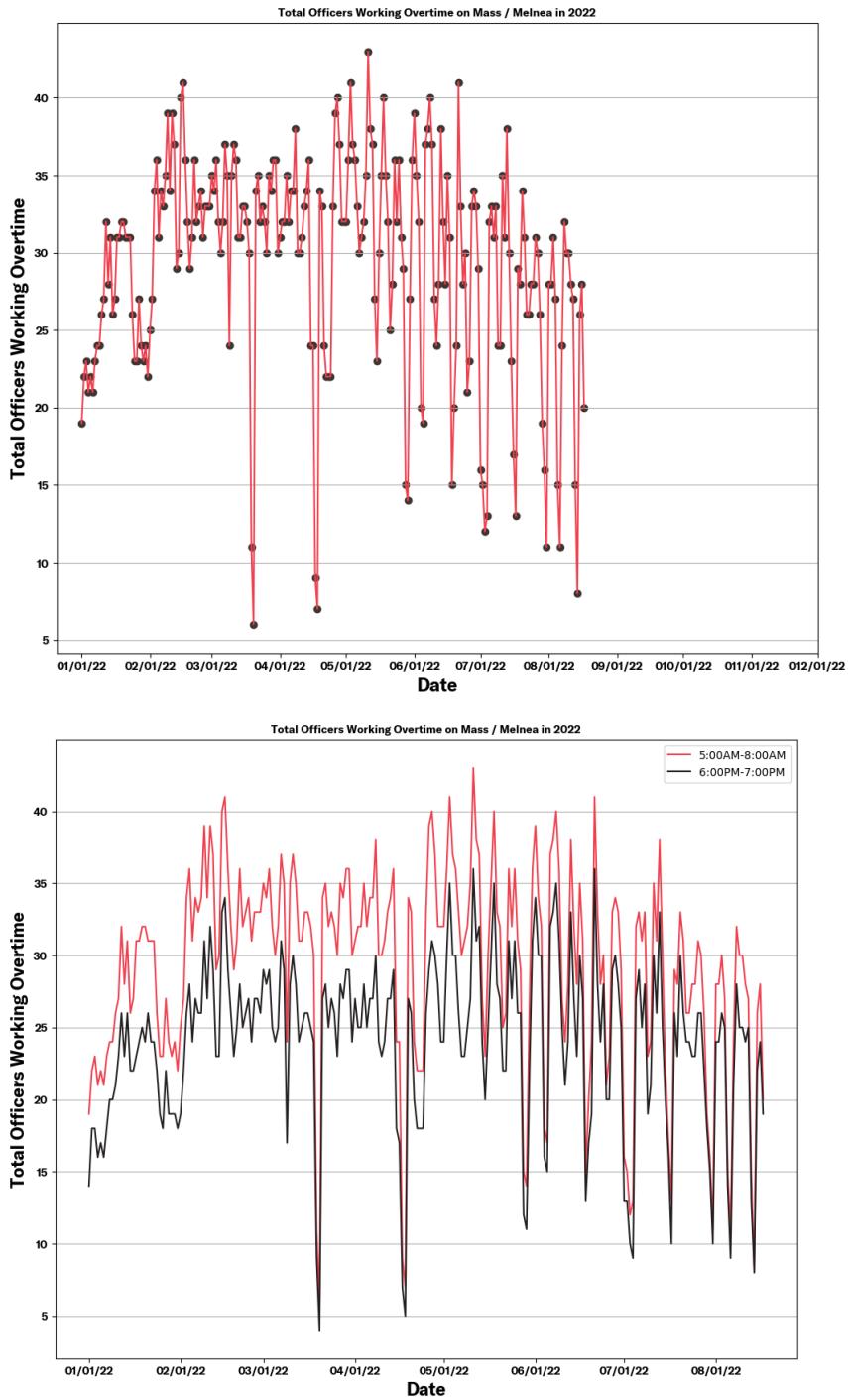
Overtime hours distribution of year 2019



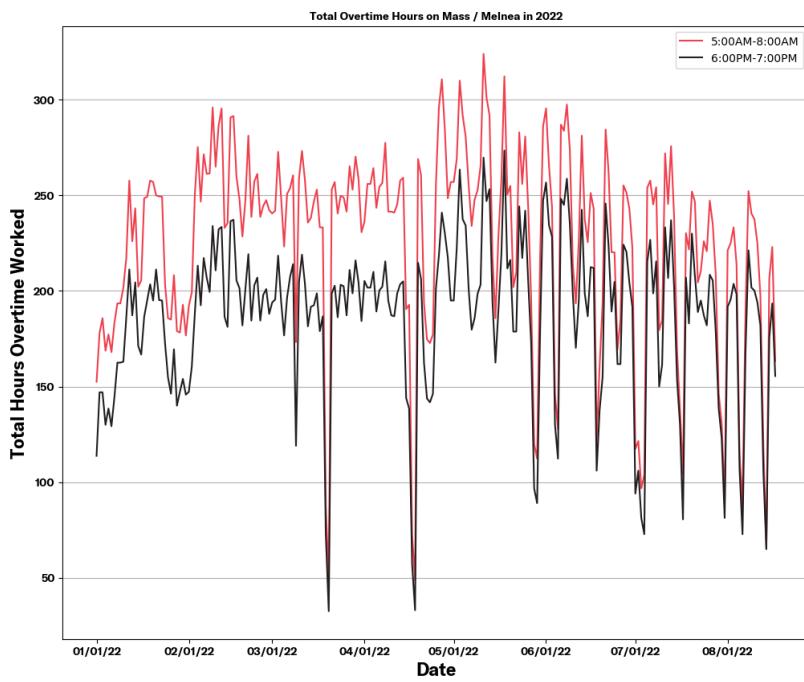
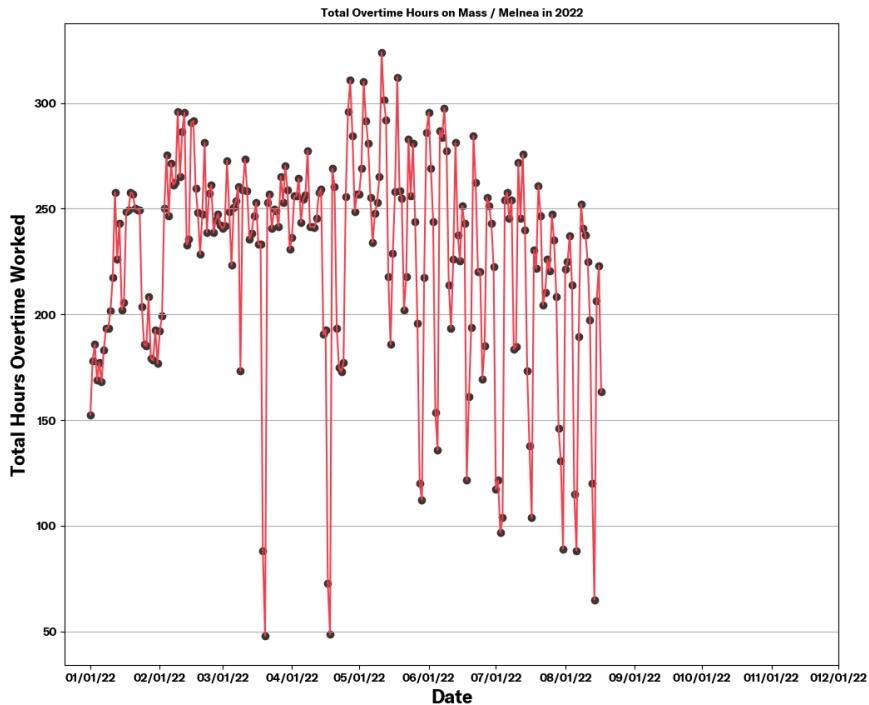
This is the density distribution of overtime data. We can see there is an obvious trend that the total overtime hours in continue increasing from 2012 to 2019.



In the overtime data from 2020 to 2022 we have the description which tells us about the location, these are the graph distributions of MASS / MELNEA(which we do not have on previous year) area data. We can see that the overtime hours are mainly clustered around 8 hours, which seems congruent with the statement Mayor Wu has made [here](#) on the strategic direction to improve systems of care for the homeless.



Above we have a graph of the total number of BPD officers working overtime for Mass / Melnea by the date that the overtime occurred. Using this graph we can compare the curve to those found in the graphs given in the Mass / Cass dashboard. Under that graph is the same graph but using the same time breakdown used in the Mass / Cass Dashboard.



Above we have a graph of the total number of overtime hours worked by BPD officers working overtime for Mass / Melnea by the date that the overtime occurred. Using this graph we can compare the curve to those found in the graphs given in the Mass / Cass Dashboard. Under that graph is the same graph but using the same time breakdown used in the Mass / Cass Dashboard.