# Jail Population Forecast Terms and Conditions Report

NYC Department of Correction, Operations Research January 15, 2025

#### **Executive Summary**

**Terms and Conditions:** As a condition of the funds in unit of appropriation 003 of the Department of Correction (the Department, DOC) and unit of appropriation 001 of the Office of the Criminal Justice Coordinator (MOCJ), DOC and MOCJ shall submit a 2-year forecast or relevant plausible policy impact models, given the makeup of the actual observed jail population and related trends. Such forecast or impact models shall include the methodology of such forecast or impact models. In addition, such forecast or impact models shall also include the projected impact of proactive policy strategies, as practicable, such as Alternatives to Incarceration, Supervised Release, and Electronic Monitoring programs on the jail population across the period. The first report shall be submitted on or before January 15, 2025 and shall cover the period beginning July 1, 2024 and ending December 31, 2024. The second report shall be submitted on or before July 15, 2025 and shall cover the period beginning July 30, 2025.

**Forecasting Methodology:** The Department's Operations Research team constructed a Discrete-Event Simulation to forecast jail population for a 2-year period. The framework incorporates advanced machine learning models and traditional statistical models to estimate both the admission rate into the jail and the amount of time that incarcerated individuals remain in DOC custody.

**Baseline Population Projection:** Given the historic trends and patterns in admissions, arrests, and discharge data through 12/31/2024, DOC anticipates an initial increase in population, peaking at around 6,700 in February 2025, followed by a net decrease in jail population across the rest of the forecast period, culminating with an expected population of about 5,800 at the end of 2026. This forecast assumes that the trends and patterns in arrests, admissions, and court processing time continue their current trajectories, and does not account for changes in policies, or other unforeseen events. Systems like New York City jails are complex and volatile, and there is significant uncertainty that must be accepted as a result. Rigorous back-testing was used to calculate prediction intervals to aid in visualizing the uncertainty in the resulting forecast.

#### **Forecasting Methodology**

The NYC Department of Correction's Operations Research team designed and developed a Discrete-Event Simulation to forecast jail population, with the use of machine learning and statistical time-series models. This framework will eventually enable DOC to estimate the potential shifts in population levels across subpopulations resulting from changes to policies and procedures, which will allow for better operational planning.

The simulation models the jail population flow as a discrete sequence of events in time. Each event, such as a new admission or a discharge of an incarcerated individual, marks a change in population. To capture the real-world dynamics of jails, DOC developed two core components for the simulation: a SARIMAX model to forecast average daily admission rates<sup>1</sup> and a pair of Random Forest Regression models to forecast the daily distribution of Length of Stay (LOS) of those in custody<sup>2</sup>.



Please see Figure 1 for the architecture of this simulation framework.

FIGURE 1. Simulation Architecture

<sup>&</sup>lt;sup>1</sup> SARIMAX is an acronym for Seasonal AutoRegressive Integrated Moving Average with eXogenous variables. The exogenous variable in this model is average daily arrest count by month. The most recent four years of data were used for training, which was chosen via hyperparameter tuning across the historic training data. Arrests were modeled with a SARIMA model.

<sup>&</sup>lt;sup>2</sup> Both the mean and variance for LOS were modeled with Random Forest Regressors via the ScikitLearn Python package. For the simulation, each person admitted to DOC custody during the forecast period or incarcerated on the first day of forecast period was assigned a duration of their stay, which was drawn from distributions defined by the modeled mean and variance. The idea is to model the distributions of LOS for overall population or any subpopulation of interest and forecast their changes over time.





FIGURE 2. Population Baseline Forecast

New York City jails are inherently dynamic, with populations constantly fluctuating due to factors such as crime and arrest rates, policy changes, and decisions made during the course of court case processing. While the population of incarcerated individuals dropped significantly from 2012 through 2020, it has been trending steadily back upwards since, which has been the result of recent increases in both the admission rates and the length of stay of incarcerated individuals. Policy changes as a result of New York State's bail reform initiative served to focus pre-trial detainment toward those with the most serious charges. However, the time to reach resolution for criminal cases tends to scale with their severity [2] [3].

For the next two years, the forecast results suggest arrests and admissions rates will stabilize, while there will be a slight decrease in the average length of stay of those in DOC custody. This is anticipated to drive the population count down to about 5,846 individuals in custody by 2027, as shown in Figure 2. It is crucial to

remember that all forecasts involve uncertainty, which generally increases farther into the future that one projects. This uncertainty can be estimated by measuring errors collected by a series of back-tested forecasts.

#### **Back-Testing Results**

The Department used back-testing to calculate prediction intervals and quantify uncertainty for its final forecast. This involved training the component models on historical data through a series of past dates, running the simulation for the following two-year period, and then using those recorded errors to estimate the prediction interval for each time step in the final forecast, as shown in Figure 2. A sample of the back-testing runs is shown in Figure 3. It is worth noting that 2020-2022 were problematic periods for time-series forecasting as a whole. The COVID-19 pandemic proved to be a very disruptive event that resulted in large forecast errors across domains[1].



FIGURE 3. Sample back-testing results

#### References

- John O'Trakoun. "Business forecasting during the pandemic". In: *Business Economics* (2022). url: https://link.springer.com/article/10. 1057/s11369-022-00267-2.
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# **Jail Population Update** NYC Mayor's Office of Criminal Justice

## January 2025

Terms and Conditions Report, covering through December 2024

### Introduction: Jail Population Dynamics & Good Governance Efficiencies

This report examines the composition of the jail population, highlighting key groups currently in jail and how shifts in case processing influence the number of individuals in waiting for their case outcome. This report demonstrates the building blocks for proactive policies related to people and processes contributing to the jail population. Good governance, in this context, involves optimizing resources effectively to minimize crime harm to the public, while also reducing inefficient costs and negative public health/public safety impacts.

## **Key Findings**

#### **Recent Trends in the NYC Jail Population:**

- **Population Growth:** The jail population has risen over the past two years, driven by an increase in individuals designated with a mental health classification across all charge types.
- **Stabilization:** Despite the overall population growth, case processing times have begun to decrease over the past two years, and certain key subgroups have stabilized, including long-term detainees and those facing murder charges.

## Looking Ahead: Good Governance Opportunities for Efficiencies:

- Subpopulations with Acute Needs and Other Key Subpopulations: A significant portion of the jail population has specific, high-needs profiles. These individuals often require tailored interventions, which can be more effectively addressed through proactive case processing or integrated responses. Most of this population will return to community fairly soon, and so a public health/public safety integrated response regarding addressing behavioral health needs will be necessary.
- **Case Processing Efficiencies:** Even minor improvements in case processing times can result in meaningful reductions in the jail population.

#### **Recent Trends in the NYC Current Jail Population**

**Current Jail Population** By the end of December 2024, the NYC jail population was 6,507. This total is an ~9% increase from December 2023, and a ~14% increase from December 2022. Of this

population, 86% are held pretrial, 8% are city sentenced, and other categories make up the remaining 5%. The population has remained 94% men and 6% women over the past two years.

The largest increase in total beds used was among non-violent felonies. Among VFOs, the population had been flat for two years, with a recent uptick in the fall of 2024.

- VFO Detainee +6% (237 beds)
- NVF Detainee +38% (312 beds)
- Misdemeanor Detainee +60% (80 beds)
- City Sentenced +27% (111 beds)



Data Source: MOCJ Analysis of DOC Census

**Increase in Brad H Population:** The recent increase in the jail population has been driven almost entirely by people with a Brad H Mental Health designation.<sup>1</sup> This population has increased across all charge severities, and the city sentenced population.

**Increased Admissions to Discharge Ratio:** The ratio of admissions to discharges has slightly increased over the last year, with the largest improvement in Brooklyn. In 2024, 42 more people were admitted to jail per month than discharged, resulting in a net population increase of 504 individuals. On average, each borough saw 8 more admissions than discharges per month in 2024.

	2023	2024
Average Monthly Admissions	1,859	1,989
Average Monthly Discharges	1,837	1,947
Net Monthly Change	+ 22 Beds per month	+ 42 Beds per month
Net Beds Per Borough Per Month	+ 4 Beds	+ 8 Beds
Net Total Year Jail Pop Change	+264 Beds	+ 504 Beds

Data Source: MOCJ Analysis of DOC Admissions and Discharges

<sup>&</sup>lt;sup>1</sup> This designation refers to anyone who during a single incarceration stay has engaged with the mental health system at least 3 times, has been prescribed certain classes of medication, or has otherwise been assessed by the Health Authority as needing further mental health treatment. Correctional Health Services (CHS) also notes that there has been an increase in the percentage of people enrolled in mental health services (53% in August 2023 to 57% in December 2024) over that time.

**Decreasing Length of Stay (LOS):** After historic highs in the early 2020s, LOS has ticked down in the last two years. This decrease has been most pronounced for Violent Felony Offenses (VFOs), and among cases that stay in past the initial drop-out points (30 days+). Court parties have also reduced the average time to process a case to discharge to State Prison from initial admission, and for Supreme Court cases.



Data Source: MOCJ Analysis of DOC Discharges

Note: Length of stay is primarily driven by people with VFO charges who stay in jail for 30 days or more (most people leave in under 30 days), and by people with cases in Supreme Court. Currently the total 30+ day LOS is up by about 43 days from 2018, and up by over 100 days from 2018 among prison-bound cases, although some of this may be due to differences in case types and other changes, so case processing comparisons may not be directly comparable. The change is primarily driven by increased case length among A/B felonies.

**Steadying of Long Stayer Population:** The number of long-term detainees has remained steady for the last two years, after a decline between 2022 and 2023 (this number remains up from early 2020).

	Jan 2020	Jan 2022	Jan 2023	Jan 2024	Dec 2024
All People in Jail for 1+ Year	926	1,719	1,366	1,358	1,381
1-2 Years	703	956	845	843	882
2-3 Years	165	450	276	335	295
3+ Years	58	313	245	180	204

Data Source: MOCJ Analysis of DOC Census

**Steadying of Murder Case Population:** The number of people in jail awaiting case processing on murder charges has stayed relatively flat over the past two years (this number remains up from early 2020).

	Jan 2020	Jan 2022	Jan 2023	Jan 2024	Dec 2024
Murder	543	917	967	949	922
Attempt Murder	306	566	570	563	574

Data Source: MOCJ Analysis of DOC Census

**Jail Use:** City jail (as opposed to a long-term state prison) is primarily a temporary holding facility while court parties work towards the disposition of a case. As such, most people detained in the Rikers Island city jail (as with any other city jail) return to the community. Those in jail for long periods of time for the most serious charges are usually eventually transferred to state prison, while the majority of people return back into the community. This pattern has stayed consistent over the past decade.

#### Looking Ahead: Good Governance Opportunities for Efficiencies

**Subpopulations with Acute Needs and Other Key Populations:** Several key populations are identifiable in the jail population. These populations warrant strategic responses to optimize public safety while preventing inefficient use of jail. These strategic populations provide opportunity for optimizing proactive policy scenarios to reduce inefficiencies while increasing public safety. These groups are not mutually exclusive, so people may fall into more than one category.

Population	# of Beds	Notes			
Serious Mental Illness	1,350	• Approximately 21% of the jail population has a serious mental health condition. (CHS Patient Profile, December 2024)			
Homeless	1,700	• Approximately 26% of the jail population is homeless or likely homeless. (CHS Patient Profile, December 2024)			
Substance: Alcohol Use Disorder	1,800	• Approximately 28% of the jail population is experiencing alcohol use disorder. (CHS, December 2024)			
Substance: Opioid Use Disorder	1,550	• Approximately 24% of the jail population is experiencing opioid use disorder. (CHS, December 2024)			
Recently Persistent Low-Charge Recidivists	1,050	<ul> <li>Older adults with a recent persistent pattern of primarily low-level crime, and no A/B felonies.</li> <li>Fewer than 20% of this group are prison-bound.</li> <li>Most require reentry services for safe reintegration.</li> <li>Charges commonly include petit larceny, as well as assault and burglary often tied to shoplifting gone wrong.</li> </ul>			

		<ul> <li>Almost all have past drug-related offenses.</li> <li>While most are rearrested again at some point over the next year after returning to the community, most of their rearrests are for low-level offenses, the most common being petit larceny.</li> </ul>
Long Stayers w/ No Recent Persistent Pattern	650	<ul> <li>Out of 1,381 long-term detainees, about 650 do not have a recent persistent pattern or any other dockets.</li> <li>This group has been detained for an average of 767 days.</li> </ul>
No Recent Court Activity Young Adults	300	<ul> <li>There are about 300 young adults under 25 who do not have a recent persistent pattern of crime.</li> <li>They have been in jail on average for 315 days.</li> <li>Most are not prison bound and have no other recent jail admissions or SC cases.</li> <li>More than 9 in 10 are not rearrested for a serious violent crime in the year following release.</li> </ul>

Data Source: MOCJ Analysis of DOC/OCA Data (except where otherwise indicated). Numbers are rounded.

**Case Processing and Jail Population Relationship:** Small reductions in case processing times (though logistically challenging) would have a large impact on the jail population. Any changes in case processing times would impact either the length of adjournments, or the number of adjournments.

- **Time Between Adjournments:** Currently there are an average of 47 days between adjournments for the 1+ year Rikers population, up from 40 days in 2018 (note that differences in case types drives some of this change). Every 1 day reduced on average between adjournments for these long-stayers would reduce the jail population by 63 beds (holding case types and number of adjournments constant). As such, reducing each adjournment length by 7 days on average would eliminate about 441 jail beds.
- Number of Adjournments: Currently there is an average of about 18 adjournments per person for the 1+ year Rikers population. Reducing this by 1 adjournment for this population would eliminate 195 beds. Reducing the number of adjournments by 1 for the 60+ day population would eliminate about 850 beds, a much higher number because there are so many people who stay for between 60 days and 1 year.

Admissions vs. Discharge • Matching: Similarly, jails can maintain a static number of people with cases pending decision as long as the pace of processing to discharge matches with the pace of admissions. Jails can maintain steady population if а admissions and discharges remain balanced. Historically, these rates have closely tracked each other, with small monthly shifts determining whether the population rises, falls, or stays the same. Even imbalances matter—just



slight Data Source: MOCJ Analysis of DOC Admissions & Discharges

eight more admissions than discharges per borough per month (out of ~2,000 admissions/ discharges citywide) can increase the need for 500+ beds, as seen in 2024.

	2018	2019 (Jan-Jun)	2022	2023	2024
Average Monthly Admissions	3,616	3,189	1,660	1,859	1,989
Average Monthly Discharges	3,687	3,258	1,628	1,837	1,947
Net	-71 Beds per month	-69 Beds per month	+30 Beds per month	+ 22 Beds per month	+ 42 Beds per month
Net Beds Per Borough Per Month	- 14 Beds	-14 Beds	+ 6 Beds	+ 4 Beds	+ 8 Beds
Total Year Jail Pop Change	-852 Beds	-828 Beds	+ 360 Beds	+264 Beds	+ 504 Beds

Data Source: MOCJ Analysis of DOC Admissions & Discharges

#### Public Health, Public Safety, and Inefficiencies

**Time to Final Disposition:** Court parties have many actions to take before the ultimate disposition of a case. Stakeholders are working toward consolidating actions, and reducing the number of actions that must take place on a court date in order to realize efficiencies in the process.

**Clear Needs Unresolved:** Many individuals in need of services reenter the community with unresolved mental health and behavioral health issues that were contributing factors to their arrest. It is worth noting, however, that offending for many of these individuals rises and falls over time as people are stabilized and destabilized, or for other reasons. Following release, this group's arrest frequency tends to decrease over time.

**Destabilization of Short-Stay Individuals**: People who will soon pay bail or have their cases dismissed often spend just enough time in jail to lose jobs, housing, or childcare arrangements.

**Long-Stayers**: Individuals ultimately sentenced to state prison often spend years in jail, interacting with individuals arrested for less serious charges instead of serving time in facilities better suited to their long-term incarceration.

**Threat Response Intensity**: Individuals experiencing heightened nervous system threat responses often have these responses intensified in jail.