

Exhibit V

**IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION**

ERIC WILKINS, MAHARI BELL,	)	
ESSENCE JEFFERSON, JOSE MANUEL	)	
ALMANZA, JR., AND JACQUEZ	)	
BEASLEY,	)	
	)	Case No. 23-cv-04072
Plaintiffs,	)	
	)	Hon. Mary M. Rowland
v.	)	
	)	
CITY OF CHICAGO,	)	
	)	
Defendant.	)	
	)	

**SUPPLEMENTAL DECLARATION OF DEAN KNOX, Ph.D., IN SUPPORT OF
PLAINTIFFS’ MOTION FOR CLASS CERTIFICATION**

I. INTRODUCTION, QUALIFICATIONS, EXPERIENCE, AND COMPENSATION

1. I previously submitted a Declaration dated August 7, 2025 and re-filed on December 2, 2025 (Dkt. No. 194-1) in support of Plaintiffs’ Motion for Class Certification (“Prior Declaration”). The statements set forth in ¶¶1–6 of the Prior Declaration, under the heading “Introduction, qualifications, experience, and compensation,” are hereby incorporated by reference.

II. BACKGROUND, SCOPE OF WORK, AND MATERIALS RELIED UPON

2. The statements set forth in ¶¶7–10 of the Prior Declaration, under the heading “Background, Scope of Work, and Materials Relied Upon” are hereby incorporated by reference.

3. In my initial analysis, I concluded that “CPD disproportionately stops Black and Latino drivers for moving violations, compared to white drivers engaged in comparably dangerous behavior” (Prior Declaration, ¶8). However, I also noted two important limitations of

these comparisons, due to the fact that Defendant did not supply certain requested information: “First, they compare officer perceptions of race to surname-based estimates of race. And second, surname-based estimates of race do not incorporate additional information on driver home address” (Prior Declaration, ¶32).

4. Defendant has subsequently supplied some of the requested information necessary to address these limitations: “(a) surnames and home addresses of drivers subjected to traffic stops... [and] (b) home addresses of drivers involved in collisions” (Prior Declaration, ¶32).¹

5. I have been asked by counsel representing the Plaintiffs to review the newly provided data and provide updated expert opinions regarding the disproportionate stopping of Black and Latino drivers for moving violations, both jointly as a proposed class and independently as separate groups. In addition, I have been asked to provide an expert opinion on whether variables such as crime, social conditions, allocation of police resources, and other social and economic factors might provide a nondiscriminatory reason for disproportionate stopping of Black and Latino drivers for moving violations.

6. I have reviewed and considered Defendant’s Response in Opposition to Plaintiffs Refiled Motion for Class Certification Under Rule 23(B)(2) (“Defendant’s Response”) (Dkt. No. 222). To conduct my analysis, I relied on the material described in ¶9 of the Prior Declaration, as well as the following new material:

a. Illinois Department of Transportation vehicle-stop data containing drivers’ names and home addresses: Bates numbers CITY1462826–1462834 and 00236113.

b. CPD data on traffic collisions containing drivers’ names and home addresses: CITY01488140.

c. Public Use Microdata Areas (PUMA) level data on resident demographics and vehicle ownership status from the United States Census Bureau’s American

¹As explained in ¶22 below, the traffic crash data provided by Defendant had a number of limitations and irregularities. I understand that counsel for the Plaintiffs have requested that Defendant re-produce the traffic crash data in a format that corrects these issues. My final analysis of this data may differ from this supplemental analyses if I receive data that corrects these issues.

Community Survey (ACS) 5-year data covering 2019–2023.

d. ZIP Code Tabulation Area (ZCTA) level data on resident demographics from the ACS 5-year data covering 2019–2023.

e. Shapefiles of 2020 Census PUMA and ZCTA boundaries.

f. CPD’s Workforce Allocation Study, which is “the most comprehensive, data-driven examination of staffing, deployment, and organizational capacity undertaken by the Chicago Police Department to date” (Executive Summary, p. 2), published 27 March 2026, obtained from <https://www.chicagopolice.org/wp-content/uploads/Workforce-Allocation-Study.pdf>.

III. SUMMARY OF OPINIONS

7. This section summarizes my conclusions, which are supported by the explanations and analysis presented in the discussion and tables/figures below. Conclusions are based on analysis of data for the period 2015–2024 except where otherwise stated, as some datasets lack coverage for 2015–2016 and others rely on newly released 2026 information where historical data is unavailable.

8. The mixture approach of McCartan et al. (2025) is, on the whole, a highly accurate method for inferring driver race from surname and home ZIP code. I find that its estimates agree with CPD officer perceptions in 94% of incidents where comparison was possible in the newly provided CPD data.

9. However, mixture estimates also indicate that among drivers that CPD officers describe as non-Hispanic white, over 150,000 drivers were mislabeled (relative to standard Census-based racial/ethnic categories). Many of the drivers that CPD officers describe as non-Hispanic white are estimated to fall into the Hispanic Census category. My estimates, which corrected for this mislabeling, suggest that CPD-reported stops of white drivers are overstated by 33% and CPD-reported stops of Latino drivers are underestimated by 9%.

10. After accounting for these reporting discrepancies in CPD traffic stop data and applying the same mixture approach to crash data, I estimate that Latino drivers are 11% more likely to be stopped by CPD for alleged moving violations, compared to white drivers committing similarly dangerous moving violations. I further estimate that Black drivers are 85% more likely to be stopped by CPD for alleged moving violations, compared to white drivers committing similarly dangerous moving violations.

11. Contrary to claims made in Defendant's Response, my Prior Declaration did control for and rule out driver-race and neighborhood differences in traffic-related criminal behavior and allocation of police resources as non-discriminatory explanations for the patterns observed. Another class of proposed controls in Defendant's Response—household income or other social/economic factors—do not constitute valid statistical controls for the patterns observed, because a driver's income and socioeconomic status are not relevant criteria in determining whether or not the driver has committed a moving violation.

12. However, newly released data from CPD's 2026 Workforce Allocation Study permits a more detailed examination of whether police resource allocation might explain the observed patterns. I estimate that in majority non-white districts (compared to majority white districts), officers are 46% more likely to make a moving-violation stop, per dangerous moving violation that could have been observed during the officer-hours available for proactive patrol. This accounts for (a) the number of patrol officers within each district, the CPD-estimated base workload within each district in officer-hours, and the number of CPD-estimated excess officer-hours available for proactive patrol; (b) the estimated number of vehicle-miles driven in each district, via GPS data; and (c) the relative rate of dangerous driving incidents per vehicle-mile driven in each district, via crash data. Thus, the allocation of police resources does not offer a non-discriminatory explanation for CPD stopping Latino and Black drivers at higher rates for moving violations, compared to white drivers engaged in similarly dangerous moving violations.

IV. MIXTURE METHODS ARE HIGHLY ACCURATE FOR INFERRING RACE IN CPD DATA AND REVEAL THAT CPD MISLABELS MANY LATINO DRIVERS AS WHITE

13. This section discusses methods for estimating the racial composition of drivers based on surnames and home location. I demonstrate that the mixture-based estimates used in this declaration are, in general, highly consistent with officer-perceived race as documented in IDOT traffic-stop data.

14. Two chief methods are available for estimating race from surname and home location: (a) Bayesian Improved Surname Geocoding (BISG; Elliott et al., 2008); and (b) the mixture-based method of McCartan et al. (2025). In the traffic context, BISG relies on the assumption that there is no selection bias—implying that in crash data, for example, that drivers of different races will engage in dangerous driving behavior at equal rates. In contrast, the mixture method allows for the possibility that drivers of different racial groups may engage in dangerous driving at different rates, but that within a racial group, dangerous driving behavior is unrelated to their surname.

15. I evaluated both the BISG and mixture methods using recently supplied IDOT data on traffic stops, which now provides driver surnames and home addresses. To do so, I stratified the stops based on officer-reported driver race, separately estimated race, and then examined the rate of agreement between officer-reported and estimated race. Four estimation methods were evaluated: BISG with surnames only, BISG with surnames and home ZIP codes, mixture with surnames only, and mixture with surnames and home ZIP codes. When incorporating ZIP code demographics, I adjust raw ZCTA-level resident demographics with estimated vehicle ownership rates that are areally interpolated from Chicago PUMAs—the finest-grained geography for which vehicle ownership data is available—to obtain the estimated demographics of vehicle owners in each Census ZIP code tabulation area.

16. Overall, both variants of the mixture method achieved extremely high accuracy,

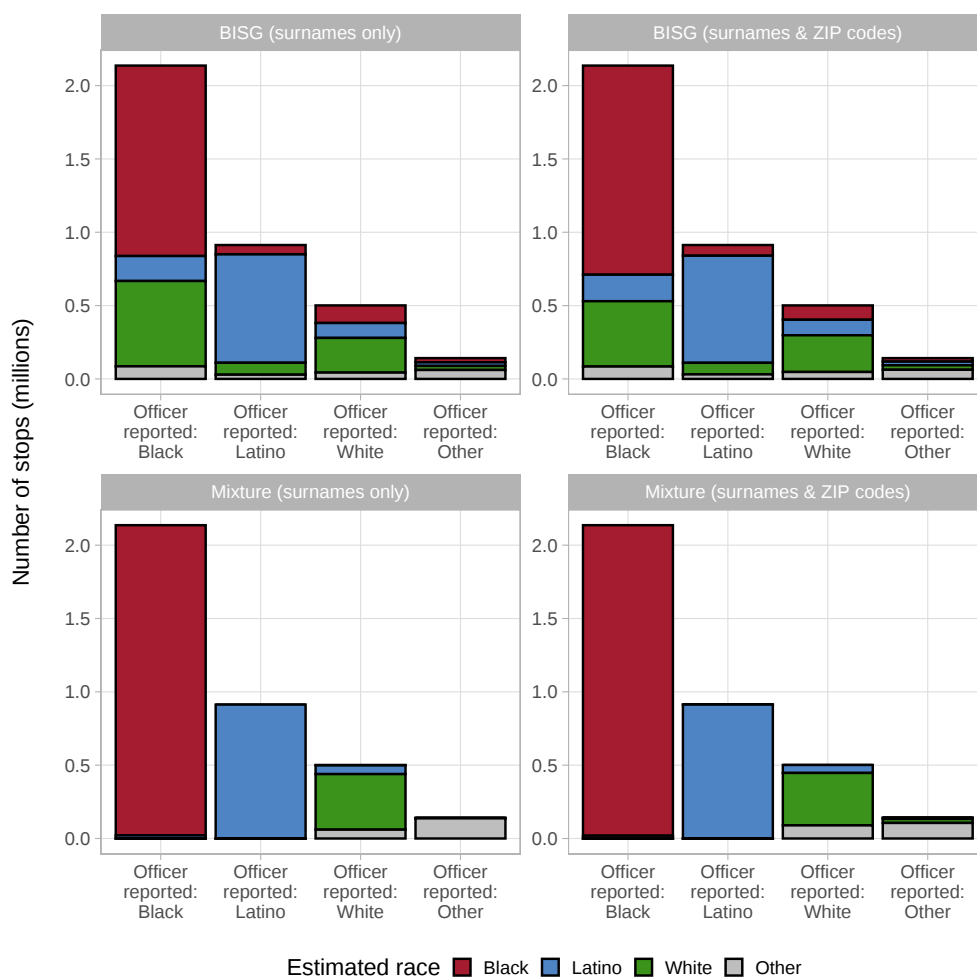
agreeing with officer-reported perceptions in over 90% of all stops for which comparisons could be made. In contrast, both variants of BISG performed poorly, with accuracy below 70%. Incorporation of home ZIP code information substantially increased the precision of both methods. A detailed breakdown of each method's accuracy by officer-reported race is given in Table 1.

Table 1: Evaluation of race estimation methods. Each row represents a group of drivers in IDOT traffic stop data, based on officer-reported race. Successive columns indicate agreement rates from various race estimation methods. Mixture methods consistently outperform BISG in replicating officer perceptions; as a result, the mixture approach is used throughout the remainder of this supplemental declaration. Among drivers that officers describe as Black or Latino, mixture-based estimates are in near-perfect agreement. However, mixture-based estimates indicate that among drivers that officers describe as non-Hispanic white, a substantial share would not be categorized as such in Census data. 95% confidence intervals are within ± 0.3 and ± 0.2 percentage points for surnames-only and surnames-and-ZIP-codes estimates, respectively.

Officer perception	BISG, surnames only	BISG, surnames and ZIP	Mixture, surnames only	Mixture, surnames and ZIP
Black	60.8%	66.7%	99.0%	99.0%
Latino	80.9%	80.0%	100.0%	100.0%
White	47.2%	50.0%	75.6%	69.9%
Other	43.0%	44.1%	96.7%	75.7%
Total	63.2%	66.9%	96.0%	94.4%

17. A close examination strongly suggests that among drivers who would self-describe as Hispanic in Census responses, CPD officers systematically mislabel a substantial share as non-Hispanic white in data reported to IDOT. My best estimates suggest that out of the roughly 500,000 drivers labeled as white in the data supplied, more than 150,000 of these—roughly a third—were mislabeled relative to Census categories. Figure 1 provides a detailed breakdown of the disagreements, showing that many of the drivers that CPD officers describe as non-Hispanic white are estimated to fall into the Census's Hispanic category. These estimates suggest that as a result of mislabeling, CPD-reported stops of white drivers are overstated by 33%, and CPD-reported stops of Latino drivers are underestimated by 9%.

Figure 1: Estimated composition of drivers based on surname, home ZIP code, and self-reported racial/ethnic Census responses. BISG estimates have poor agreement with officer-reported labels across all categories, suggesting low-quality estimates. Mixture estimates indicate near-perfect agreement in those that officers describe as Black or Latino, but systematic mislabeling among those that officers describe as white.



18. In closely examining IDOT data, I find numerous cases that further call into question the facial validity of officer-reported race. For example, there are over 8,500 drivers labeled by CPD officers as white despite having recorded home addresses in the 60632 and 60639 ZIP codes, which are predominantly Hispanic (over 80% of residents self-describe as Hispanic in Census data). According to officer-reported race in nearly 100,000 stops, only 67% of stopped drivers from the 60639 ZIP code were Hispanic—a statistically significantly lower proportion than the 81% of self-described Hispanic residents in Census records.

19. As another example, there are over 20,000 drivers labeled by CPD officers as white despite having surnames that Census data indicate are predominantly Hispanic (over 90% of Census respondents with each surname self-describe as Hispanic). Those labeled by officers as non-Hispanic white include hundreds of drivers with the predominantly Hispanic surnames Garcia, Rodriguez, Perez, Martinez, Gonzalez, Lopez, Hernandez, Rivera, Sanchez, Torres, Flores, Diaz, Ramirez, Gomez, Ortiz, Ruiz, Medina, Soto, Morales, Alvarez, Castillo, Guzman, Moreno, Munoz, Chavez, Mendez, Vazquez, Vargas, Delgado, Rios, Vega, Herrera, Serrano, Gutierrez, Sandoval, Jimenez, Maldonado, Garza, and Velez. Similarly, the share of stopped drivers with these names that officers label as Hispanic is significantly lower than would be expected in a random sample of self-reported individuals from Census records with the same surnames.

20. Based on the results described in this Section IV, I conclude that the mixture-based method with surnames and home ZIP codes is the most accurate method for estimating the race of drivers stopped by CPD. The remaining analyses in this supplemental declaration utilize this method.

V. MIXTURE ESTIMATES INDICATE THAT BLACK AND LATINO DRIVERS ARE DISPROPORTIONATELY STOPPED FOR MOVING VIOLATIONS COMPARED TO WHITE DRIVERS WITH SIMILAR DANGEROUS DRIVING BEHAVIOR

21. I used the newly provided IDOT vehicle stop data and CPD crash data to conduct an updated benchmark analysis of CPD stops for alleged moving violations, comparing the estimated racial composition of stopped drivers to that of drivers found to be at fault in crashes.

22. This required handling a number of irregularities in the newly provided datasets. First, the newly provided 2024 IDOT vehicle stop data does not indicate whether a stop was initiated due to a moving violation. To identify these stops, I therefore extracted all statutes corresponding to a moving violation, *e.g.* “625 ILCS 5.0/11-601-B IVC - DRIVING 15-20 MPH ABOVE LIMIT,” “9-24-010(B) STOP AT STOP SIGN,” “9-12-050(B) LANES, FAIL TO KEEP IN.” I consider a stop to be made for a moving violation if IDOT data contain any such value in the provided “STATUTE” column. Second, the newly provided crash data contained numerous apparent duplicate entries for the same vehicle “unit number” in a crash at the same time and place, including many that contained conflicting values. To handle this issue, I deduplicated these entries by taking the last non-missing crash field for each vehicle number, time, and place; this allowed for the possibility that subsequent refiled reports might have corrected an initial error. Finally, the newly provided crash data omitted the reason for the crash, despite this information being available in previously provided versions of the crash data. To address this, I merged the newly provided crash data with the previously provided version, so that the following analysis could exclude crashes for external reasons such as evasive action or weather (as in my Prior Declaration).

23. After accounting for these issues, I applied the mixture estimation procedure, using both driver surname and home ZIP code, to (a) IDOT data on vehicle stops for alleged moving violations and (b) CPD data on at-fault crashes. Apart from the use of the mixture method and the additional steps needed to preprocess the newly provided datasets, the procedure is otherwise

identical to that described in ¶¶30–33 of my Prior Declaration.

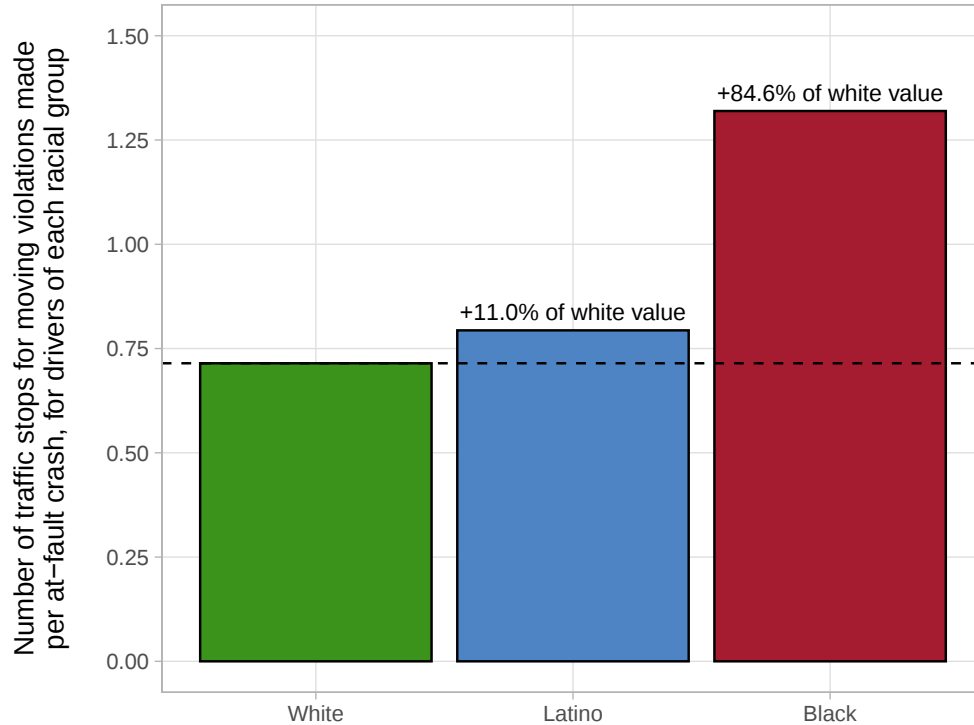
24. I estimate that Latino drivers represent 27.2% of drivers stopped in Chicago for alleged moving violations while being responsible for 34.3% of at-fault crashes. In contrast, white drivers represent 11.9% of stops for alleged moving violations but 16.7% of drivers deemed responsible for at-fault crashes. While both groups are underrepresented in moving-violation stops, the underrepresentation of white drivers is substantially larger. Thus, these estimates imply that Latino drivers are 11.0% more likely to be stopped by CPD for alleged moving violations, compared to white drivers committing similarly dangerous moving violations.

25. I estimate that Black drivers represent 54.2% of drivers stopped in Chicago for alleged moving violations while being responsible for 41.1% of at-fault crashes. These estimates imply that Black drivers are 84.6% more likely to be stopped by CPD for alleged moving violations, compared to white drivers committing similarly dangerous moving violations.

26. Figure 2 visualizes the relative differences in moving-violation enforcement intensity, defined as the ratio of moving-violation stops to dangerous driving incidents involving drivers of each racial group. While the denominator in this ratio (the total number of moving violations committed by each racial group in Chicago) is unknown, the number of at-fault crashes is a direct proxy for this quantity. Therefore, differences in the ratio of moving-violation stops to at-fault crashes—*i.e.*, the 11.0% and 84.6% increases in stops of Latino and Black drivers, versus white drivers—remain identifiable when using the proxy.

27. This conclusion updates my previous estimate in ¶33 of my Prior Declaration that Black and Latino drivers, collectively, are twice as likely to be stopped by CPD for alleged moving violations as white drivers committing similarly dangerous moving violations. My supplemental analysis refines this conclusion through the use of newly provided data and the improved mixture-based race estimation method. These refined estimates suggest that Black drivers are approximately 1.85 times and Latino drivers are approximately 1.11 times as likely as white drivers to be stopped for similarly dangerous moving violations (see Figure 2).

Figure 2: Stops for moving violations per at-fault crash, by estimated driver race. White drivers are subject to 71 stops for alleged moving violations for every 100 at-fault crashes. Latino and Black drivers are respectively subject to 79 and 132 stops per 100 at-fault crashes, an increase of 11.0% and 84.6%.



VI. TRAFFIC CRIME, INCOME, AND CPD WORKFORCE ALLOCATION DO NOT PROVIDE NON-DISCRIMINATORY EXPLANATIONS FOR OBSERVED PATTERNS OF RACIALLY DISPROPORTIONATE TRAFFIC STOPS

28. Contrary to claims made in Defendant's Response (p. 31), my Prior Declaration did consider and rule out differences in traffic-related criminal behavior as a non-discriminatory explanation for CPD stopping Latino and Black drivers at higher rates for moving violations, compared to white drivers engaged in similar behavior. The crash-based benchmark that I utilized (Prior Declaration, ¶¶30–33) was specifically designed to account for the rate at which Latino, Black, and white drivers commit traffic crimes and other dangerous moving violations—precisely the behavior that would justify a moving-violation stop. Unrelated crimes—such as the murders and shootings invoked in the Defendant's Response to explain traffic enforcement patterns (p.

10)—are not valid controls in a statistical analysis that seeks to determine the relative rate that CPD conducts moving-violation stops, out of all times that dangerous moving violations are committed. This is because murders and shootings cannot justify a stop for an alleged moving violation if no such moving violation has been committed. Similarly, crimes such as murders and shootings cannot justify a stop for an alleged vehicle equipment or license/registration violation if no such violation is observed. Because rates of these unrelated crimes are highly imperfect proxies for the rates of the relevant traffic violations of interest, they are not valid controls in a statistical analysis that seeks to determine the relative rate that CPD conducts stops for equipment or license/registration violations (see Prior Declaration ¶¶36-37).

29. Defendant's Response (p. 31) correctly states that my Prior Declaration did not consider household income, or other social and economic factors, as a non-discriminatory explanation for CPD stopping Latino and Black drivers at higher rates for moving violations, compared to white drivers engaged in similarly dangerous moving violations. This is because a driver's income is not a relevant criterion in determining whether or not they have committed a moving violation. Controlling for such socioeconomic variables, as Defendant's Response advocates, would represent a statistically invalid use of a racial proxy. Furthermore, as I explained in ¶¶36-37 of my Prior Declaration, while the available data does not definitively prove bias in CPD enforcement for non-moving violations (due to the lack of an available benchmark, *i.e.*, a known rate at which drivers in different racial groups commit equipment or license/registration violations) Black drivers would need to commit equipment violations at a rate that was 2.9 times higher than non-Black drivers, and license/registration offenses at a rate 3.5 times higher than non-Black drivers, for CPD's enforcement pattern to be race-neutral.

30. Contrary to claims made in Defendant's Response (p. 31), my Prior Declaration did consider and rule out the allocation of police resources as a non-discriminatory explanation for CPD stopping patterns. Specifically, my Prior Declaration (¶39) accounted for the number of officers assigned to each district; I found that in districts with larger shares of white residents, the average officer tended to make fewer traffic stops per year, compared to the districts with larger

shares of non-white residents.

31. Using newly released data from CPD's 2026 Workforce Allocation Study, I have conducted a more detailed assessment of whether the allocation of police resources—specifically, the number of officer-hours available in each district for “patrol proactive time,” the category into which traffic stops fall (p. 206)—might explain CPD's stopping patterns. In districts with larger per-officer call-for-service workloads, moving-violation traffic stops might occur less frequently simply because officers are responding to calls for service, rather than proactively patrolling for traffic violations. If this tends to occur in majority-white districts, it might offer a non-discriminatory explanation for CPD stopping drivers in majority non-white areas at higher rates for moving violations, compared to drivers in majority-white areas engaged in similarly dangerous moving violations (Prior Declaration, ¶¶38–39).

32. However, I find that the number of hours available for proactive patrol cannot explain the differences in moving-violation enforcement intensity between majority-white and majority non-white districts. After accounting for the number of assigned patrol officers; unavailable time due to factors such as leave, training, and administrative responsibilities; and total workload hours due to community-generated calls for service, CPD data indicate that majority white districts (14, 16, 18, 19, 20) have 211,382 hours available for proactive patrol. On an annualized basis, the remaining majority non-white districts have 718,031 proactive hours—*i.e.*, 3.4 times as much proactive patrol capacity. However, estimates from GPS data indicate that there are 3.3 times as many civilian vehicle-miles driven in majority non-white districts. When scaling by the number of vehicle-miles driven by civilians, the ability to observe civilian driving behavior during proactive patrol is slightly higher (by 3.9%) in majority non-white districts, compared to majority white districts (assuming comparable road conditions). Because CPD states that traffic enforcement is conducted during proactive patrol time, this factor could lead to slightly higher traffic-stop rates in majority-nonwhite districts, if officer stopping decisions and civilian driving behaviors were equal.

33. In contrast, on a per-vehicle-mile basis, at-fault crash rates are slightly lower (by

3.5%) in majority non-white districts. Because moving-violation stops target the same dangerous driving behaviors that can lead to crashes, this factor would lead to slightly lower traffic-stop rates in majority-nonwhite districts, if proactive patrol availability and officer stopping decisions were equal.

34. My best estimates indicate that these two factors nearly perfectly offset each other. After accounting for proactive patrol availability and dangerous driving behavior, if officer stopping decisions were the same, then these estimates suggest that moving-violation stopping rates per vehicle-mile driven would be nearly identical in majority and minority districts (within 0.3% of each other).

35. In fact, on a per-vehicle-mile basis, CPD conducts drastically more traffic stops (by 46.3%) in majority nonwhite districts, compared to majority white districts. These estimates suggest that for each dangerous driving incident that a patrol officer has the opportunity to observe during the time allocated for proactive enforcement, officers in majority non-white districts are 46.7% more likely to make a moving-violation stop (compared to officers who have the same opportunity to observe dangerous driving incidents in majority-white districts). Thus, the allocation of police resources does not offer a non-discriminatory explanation for CPD stopping Latino and Black drivers at higher rates for moving violations, compared to white drivers engaged in similarly dangerous moving violations.

36. I have considered the possibility that proactive patrolling patterns may differ when districts are heavily understaffed. However, these estimates remain robust even when excluding understaffed districts (those in which CPD's stated goal of keeping 40% of patrol hours available for proactive enforcement, *i.e.*, districts 3, 4, 6, 8, 11, 12, 18, 19, and 25). Even after excluding these districts, a large gap remains: I estimate that officers in well-staffed non-white districts are 23.7% more likely to make a moving-violation stop, compared to officers who have the same opportunity to observe dangerous driving incidents in well-staffed white districts.

37. In sum, the allocation of police resources between districts cannot account for the

observed pattern that Black and Latino drivers are more likely to be stopped by CPD for moving violations compared to white drivers who commit similar moving violations.

VII. CONCLUSION

38. As noted above and in my Prior Declaration (§69), my analysis and conclusions in this report are based on data supplied by the City of Chicago to Plaintiffs' counsel so far. The data was incomplete and suffered from a number of limitations described above. I understand that discovery in this matter remains ongoing, and I may expand or modify my conclusions based on additional data and evidence supplied in discovery as this litigation progresses.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on May 6, 2025

Dean Knox

A handwritten signature in black ink, appearing to be 'DK', is written over a horizontal line.

References

- Elliott, M., Fremont, A., Morrison, P., Pantoja, P., and Lurie, N. (2008). A new method for estimating race/ethnicity and associated disparities where administrative records lack self-reported race/ethnicity. *Health services research*, 43(5p1):1722–1736.
- McCartan, C., Fisher, R., Goldin, J., Ho, D. E., and Imai, K. (2025). Estimating racial disparities when race is not observed. *Journal of the American Statistical Association*.