Examining Fairness in the Stops, Citations, and Arrests by the Carmel Police Department

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CONTENTS

EXECUTIVE SUMMARY

- During 2019 and 2020, several news media outlets in the Indianapolis area ran stories making claims that the Carmel Police Department follows a pattern or practice of racial profiling, disproportionately targeting African-American individuals for stops, citations, and arrests. These allegations, which were echoed by the Indiana ACLU, relied upon anecdotal interviews, a lawsuit from many decades ago, and an unscientific analysis of a sample of traffic citations from court records.

- Out of concerns about the potential validity of these claims, the City of Carmel contracted with the Dolan Consulting Group LLC (DCG) to conduct an independent, objective, and scientifically rigorous analysis of its stop, citation, and arrest practices to determine if evidence existed to indicate that individuals of any race or sex were treated in a disproportionately biased manner.

- This report describes this detailed analysis of the enforcement actions taken by members of the Carmel Police Department from July 1, 2020 through June 30, 2021. Specifically, the DCG research team examined whether any sex or racial group was treated in a disproportionately punitive manner through vehicles stopped by Carmel police officers, citations issued by Carmel police officers, or criminal arrests made by Carmel police officers during that time period.

- These enforcement actions were compared against scientifically valid benchmarks estimating the populations at risk for stops, citations, and arrests. These enforcement action / benchmark comparisons were then statistically analyzed to determine if patterns of bias were discovered against any specific sex or racial group.

- This analysis followed the established best practices within the social sciences for examining evidence of bias in police behavior. Specifically, these best practices include only exploring proactive (rather than reactive) police activities, using valid benchmarks that have been shown to measure the true populations at risk for the proactive police behaviors, controlling for statistical aggregation bias by disaggregating by district, and controlling for sampling error through the use of statistical tests for significance.

- Data were gathered on 19,349 vehicle stops, 24,872 citations, and 1,351 criminal arrests for analysis. Data were also gathered on several benchmark measures: 2,845 drivers involved in crashes (an estimate of the roadway driving population); stops made during hours of darkness (an estimate of stops made when it was harder for officers to determine the race of the driver prior to stop); citations issued to male drivers and white drivers (under the assumption that bias would focus on females and persons of color); and 2,236 criminal suspect descriptions provided by members of the public who were witnesses or victims of crimes (an estimate of the criminal offender population). We disaggregated these data by each of the six patrol districts across Carmel and analyzed each district separately in order to control for aggregation bias.

- Within each district, we compared vehicle stops (a combination of unknown proportions of stops for traffic violations only, and criminal investigative stops) to benchmarks of crash drivers and criminal offender suspect descriptions. Because it proved impossible to disentangle the traffic-only stops from the criminal investigative stops, we compared this mixed sample of vehicle stops to both a traffic pattern benchmark (crash drivers) and a criminal population benchmark (criminal suspect descriptions). We compared the vehicle stops to each benchmark individually, and then used the two benchmarks as boundaries with the assumption that the true (unknown) benchmark for this mixed sample of stops would rest somewhere between the crash driver and criminal suspect benchmarks.

- Examination of the drivers involved in crashes within Carmel revealed that two-thirds of the drivers on the roadways within Carmel were not Carmel residents, thus revealing the critical error of relying on Census population data to estimate the characteristics of the driving population. While 2.7% of Carmel residents were African-Americans, 12.5% of the drivers involved in crashes on the roadways within Carmel were African-Americans. This suggested that African-Americans were traveling the roadways of Carmel at a rate four and a half times greater than was estimated by the Indianapolis news media sources. Examination of the criminal suspect descriptions provided to the police by members of the public (not officers) who had been witnesses or victims of a reported crime also revealed the diversity found within Carmel. While 2.7% of Carmel residents were African-Americans, 34.9% of these suspect descriptions described the suspect as African-Americans.

- We also compared vehicle stops made during hours of daylight with vehicle stops made during hours of darkness. This method was based on the assumption that during daylight it was easier for officers to determine the characteristics of the drivers prior to stop, thus helping facilitate the practice of bias in stops. During hours of darkness, however, it was assumed to be harder to determine the driver's characteristics prior to stop, thus reducing an officer's opportunity to practice bias in stops. Therefore, the stops during darkness (when the opportunity for bias was reduced) served as the benchmark for comparison to stops made during daylight (when the opportunity for bias was greater).

- Analyses of the crash driver benchmark by hours of daylight and darkness also revealed the racial diversity of the driving population within Carmel fluctuated by time of day for several districts. During the evening hours, the proportion of drivers on the roadways who were African-Americans tended to increase, while the proportions of drivers of all other races tended to decrease. Therefore, the representation of African-American drivers on the streets and roads of Carmel was highest during hours of darkness, when the opportunity for exercising biased stops was lowest due to the difficulty in clearly observing the race of the driver prior to stop.

- We examined traffic citations by first controlling for differences in the circumstances of various stops. We compared stops for the same offense, and the same number of offenses, to see if females were more likely to be cited than males, and persons of color were more likely to be cited than white drivers stopped under similar circumstances.

- We examined the arrest data and compared it to the criminal suspect description benchmark to determine if any group was arrested disproportionately more often than they exist among the offender population benchmark.

- In all of these comparisons we statistically controlled for the influence of sampling error through the use of the binomial proportional test. The binomial test formula takes into account the magnitude of difference between the percentage being examined and the percentage of the benchmark, the sample size, and the laws of probability regarding sampling error. The test determines if two percentages are statistically similar or are true differences.

- In terms of driver sex, our results were mixed. We found that when compared to the crash driver and criminal suspect benchmark boundaries, the percentage of female drivers stopped consistently fell in between these two benchmark boundaries, or within the margin of sampling error. However, when using the darkness stops as a benchmark, we found evidence that female drivers were disproportionately more likely to be stopped during daylight hours within five of the six patrol districts. After being stopped, we found that female drivers were either shown more leniency when compared to male drivers, or were treated in a manner equal to male drivers in terms of the decision to issue a traffic citation. Finally, we found no evidence of disparity, with females being arrested at similar proportions to their representation among the criminal suspect description benchmark in all districts.

- Conversely to the treatment of female drivers, we found evidence that male drivers were less likely to be stopped during daylight hours within all but one of the districts. We found evidence that after being stopped, male drivers were either more likely than female drivers to receive a citation, or were treated in a manner equal to female drivers. Finally, we found no evidence of disparity by sex with regards to criminal arrests.

- We found no evidence that Alaskan Native / American Indian individuals were treated with bias by the Carmel Police Department. Individuals of this U.S. Census race category were not disproportionately more likely to be stopped than expected in any of the districts, even after using multiple methods of analysis. After being stopped, Alaskan Native / American Indian drivers were either less likely than white drivers to receive a citation, or were treated in a manner equal to white drivers. Finally, we found no evidence of disparity or bias with regards to the criminal arrests of Alaskan Native / American Indian individuals.

- We found no evidence that Asian / Pacific Islander individuals were treated with bias by the Carmel Police Department. Individuals of this category were not disproportionately more likely to be stopped than expected in any of the districts, even after using multiple methods of analysis. After being stopped, Asian / Pacific Islander drivers were treated in a manner equal to white drivers. Finally, we found no evidence of disparity or bias with regards to the criminal arrests of Asian / Pacific Islander individuals.

- We found that African-Americans were consistently ***less*** likely than members of other races to be stopped by the police within Carmel. When compared to the crash driver and

criminal suspect benchmark boundaries, the stops of African-American drivers either fell between these two boundaries, or below both boundaries, suggesting being stopped less often than expected. When daylight stops were compared to stops during darkness, African-American drivers were significantly less likely to be stopped during daylight when it was easier for officers to determine the driver's characteristics prior to stop. During darkness, when the opportunity to discern the driver's characteristics declined, the proportion of African-American drivers stopped increased.

- We found that when stopped under similar circumstances, white and African-American drivers were equally likely to receive a citation for their traffic offense, with the exception of speeding offenses within one district where less than two additional African-American drivers was received a speeding citation each month. The evidence revealed that the arrests of African-Americans within each district was similar to the percentage of the active offender population within that district that was African-American.

- We found little evidence that Hispanic individuals were treated with bias by the Carmel Police Department. Individuals of this category were not disproportionately more likely to be stopped than expected in any of the districts, even after using multiple methods of analysis. After being stopped, Hispanic drivers were slightly more likely to receive a citation for speeding within one district, less likely to receive a citation for expired plates within three districts, and in all other cases were treated in a manner equal to white drivers. Finally, we found no evidence of disparity or bias with regard to the criminal arrests of Hispanic ethnicity individuals.

- We found evidence to suggest that Caucasian / White drivers were disproportionately more likely to be stopped during daylight hours within half of the districts in the city. We also found evidence that, after being stopped, Caucasian White drivers were more likely to receive a citation than Alaskan Natives / American Indians for speeding within one district, and more likely than Hispanic drivers to receive a citation for an expired plate within three districts. Nevertheless, for other offenses, Caucasian / White drivers were no more or less likely to be cited than drivers from other racial groups. Finally, we found no evidence of disparity for Caucasian / White individuals with regards to criminal arrests.

- In general, we found no evidence of a pattern or practice by members of the Carmel Police Department target persons of color for vehicle stops, citations, or arrests. In fact, we found evidence to suggest a small degree of hesitancy on the part of officers to stop African-American males, thus creating disparity in the stops of female and white drivers. Our overall conclusion was that we found no evidence of a pattern or practice of disproportionately stopping, citing, or arresting of African-Americans, nor any other racial minority group.

1. PURPOSE

In January of 2020, the leadership of the Carmel Police Department in Indiana approached the Dolan Consulting Group LLC (hereafter referred to as simply DCG) with a request for an objective, external, and scientific analysis of its vehicle stops and arrests to determine if evidence of racial disparities existed in the treatment of drivers and other individuals. The leadership expressed that this request resulted from a desire for complete transparency with the public. It was also expressed that there was a desire to determine if biased-based policing was occurring within the agency so that, if it was occurring, it could be addressed.

Carmel is a suburban city in Hamilton County that rests immediately north of Indianapolis. It had a 2021 Census population estimate of 100,777 residents.[1] It covers an area of roughly 48 square miles, is bordered by the White River to the east, Boone County to the west, and shares a border with Marion County / Indianapolis to the south. Carmel has been ranked as one of the "Best Places to Live in America" by *Money* magazine for multiple years.[2] It has received similar awards and designations by *Wallet Hub*, *Niche*, and *SafeWise*, as being one of the safest cities, best places to launch a career, and best places to raise a family in America.[3]

During the period from 2019 through 2021, a number of news stories appeared in the *Indianapolis Star* newspaper, and on the *WISH Channel 8 News* television program through their *I-Team* investigative journalism segment. These news stories alleged racial profiling and the disproportionate ticketing of African-American drivers in traffic stops made by the Carmel Police Department. These stories, relying on anecdotal interviews of stopped drivers, and a review of court records on traffic citations, declared that the Carmel Police Department targeted African-American motorists for traffic stops, and cited African-American drivers "eighteen times more often than they did white drivers".[4] These new stories were picked up by, or reprinted verbatim by, the *Hamilton County Reporter* (the Hamilton County newspaper) and the *Current*, a newspaper covering six northern suburbs of the Indianapolis metropolitan area.[5] The American Civil Liberties Union (ACLU) of Indiana followed up with a public statement of condemnation of the Carmel Police Department, claiming that the law enforcement agency had a long history of engaging in racial profiling through the disproportionate stopping, citing, and arresting of African-American motorists.[6]

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[1] *U.S. Census Bureau QuickFacts: Carmel City, Indiana; United States*. www.census.gov. Retrieved June 10, 2022. Source: https://www.census.gov/quickfacts/fact/table/US,carmelcityindiana,IN/HSD310220

[2] Mishkin, S., Bhardwaj, P., Raimonde, O., and Wilt, C. (2019, January). "Carmel, Indiana Is No. 3 on MONEY's Best Places to Live List." *Money*.

[3] City of Carmel (2021, December 7). *City Wide Awards*. City of Carmel. https://www.carmel.in.gov/about-the-city/city-wide-awards. Retrieved December 7, 2020.

[4] Lange, K. (2020, July 12). "Carmel has a negative reputation when it comes to race relations. Here's why." *Indianapolis Star*; WISH Channel 8 News (2019, December 4). "Carmel's own data supports I-Team 8 investigation into police ticketing black drivers at a higher rate." *Indianapolis WISH Channel 8 News*.

[5] Shambaugh, A. M. (2020, October 13). The best place for all to live?: Black Carmel residents speak out on frustrations, building more inclusive community. *Current*; Zepelin, S. (2019, November 20). "Carmel police ticket black drivers at higher rate, data show." *Hamilton County Reporter*.

[6] ACLU of Indiana (2019, November 20). *ACLU of Indiana Statement on Recent Reporting Regarding Carmel Police Department*. Indianapolis, IN: American Civil Liberties Union of Indiana.

Not surprisingly, these accusations troubled the leadership of the City of Carmel, and the Carmel Police Department. A closer examination of these news articles, however, reveals that the "evidence" for racial profiling they presented was problematic. First, the journalists declared the presence of racial profiling after tallying the percentage of the citations in court that were issued to African-American drivers, and comparing this percentage to the percentage of the Carmel census population that was African-American / Black. As early as 1996, social scientists and courts hearing civil rights cases acknowledged that census population estimates bear no resemblance to the racial composition of drivers on the roadway at a given place and time.[7] As will be described in much greater detail later in this report, for three decades social scientists have been demonstrating that census data are not appropriate benchmarks for measuring racial disparities in traffic matters.

Second, the articles provided anecdotal examples of African-American drivers who argued that they had been stopped and cited by officers of the Carmel Police Department for no apparent reason. Surprisingly, in every one of these cases the articles go on to reveal that all of these drivers who were stopped for "no apparent reason" were operating with suspended driver's licenses and were cited for that offense. One must stop to examine this fact. Under the Indiana traffic laws, a person's driver's license can only be suspended for serious breaches of the traffic laws, such as accumulating a high number of moving violations during a few years' time, multiple failures to appear in court for traffic offenses, or being involved in a motor vehicle crash without having auto insurance coverage. As this is the case, and all of the drivers presented as case examples were suspended drivers, their seriously poor past driving records call into question their claims to have been simply driving along safely and targeted by the police for no apparent reason. Furthermore, the fact that all of these suspended drivers knew their licenses were suspended, yet continued to defy the law and drive (which is a misdemeanor offense carrying the possible punishment of jail time), calls into question their willingness to comply with any of the less serious traffic laws.

Third, many of the news reports and the ACLU of Indiana repeatedly stated that the Carmel Police Department had a "long history of lawsuits claiming racial profiling." Yet the only example ever presented in these articles was a case from 1995 in which an African-American state trooper was stopped in his personal vehicle while off duty, and this trooper later filed a lawsuit alleging he was stopped without probable cause and because of his race. This case was settled out of court in 1996. The city paid the plaintiff a sum of money and members of the Carmel Police Department underwent retraining dealing with racial diversity awareness and legal rules for vehicle stops and searches. None of these articles pointed to any other similar lawsuits since that incident 26 years ago.

As the typical career length for a law enforcement officer in Indiana is 25 years, very few officers who were members of the Carmel Police Department in 1996 are still employed with that agency. Furthermore, the Carmel Police Department is almost twice as large an organization as it was in 1996, meaning that the overwhelming majority of the 162 sworn and civilian personnel employed by the Carmel Police Department, joined the agency many years after that one 1995 incident. In fact, any employee under the age of 27 was not even born when this past incident occurred.

[7] *State of New Jersey V. Soto*, 324 N.J. Superior Law Div. 1996; *Wilkins v. Maryland State Police* (CCB-93-483, 1996).

Nevertheless, this broad media coverage claimed as fact that members of the Carmel Police Department engaged in a routine pattern and practice of targeting African-Americans for enforcement action. This was very troubling. Reports of racial discrimination by the police puts fear and anger into the hearts of most Americans. Being targeted based on one's sex, race, or ethnicity runs against all principles of the U.S. Constitution and democracy. These news reports tarnished the public reputation of the agency and its employees. Obviously this was disconcerting to the city, its residents, the police department, and its officers. In response, the Carmel Police Department contacted the Dolan Consulting Group LLC (DCG) for an objective review of their patterns of vehicle stops, citations, and arrests for evidence of bias against any group. If evidence of biased policing was found, the City of Carmel could then act on reliable evidence and take firm actions to end such patterns of practice.

DCG is an organization of public policy experts who address issues related to public service provision organizations, such as law enforcement agencies, corrections agencies, fire departments, emergency medical services, hospitals, and school districts. DCG provides services such as assessments, training, and research with the goal of improving the operations and outputs of these agencies through evidence-based solutions. DCG's staff includes former public safety leaders, attorneys, and statisticians, all of whom also have real world experience working in government.

Specifically regarding traffic stop data analysis projects, DCG has provided training and consulting services to law enforcement agencies since 2016 by helping law enforcement agencies gather and track data on potential racial disparities. In this regard, DCG has assisted more than a hundred law enforcement agencies across the United States. DCG has also provided independent, external, and objective examinations of traffic stop patterns for several law enforcement agencies. DCG employs three research scientists on these projects. All three of these researchers possess doctorates in criminal justice from leading universities in that discipline, have strong foundations in statistics and quantitative research methods, and have extensive records of publishing empirical research articles in peer-reviewed quantitative academic research journals.

DCG agreed to review and scientifically analyze 12-months' worth of vehicle stop and arrest data for the Carmel Police Department. Plans were made to collect data on appropriate benchmark measures (drivers involved in crashes and suspect descriptions from crime victims) for comparisons to vehicle stops and arrests. Data collection was originally scheduled to begin on March 1, 2020. Unfortunately, the unprecedented events of the COVID-19 pandemic, and the resulting lockdowns, created a significant interference and posed a threat to the validity of the project.

In mid-March, 2020, the United States began to realize that it was in the midst of a serious and deadly pandemic. Government agencies across the nation took swift and unprecedented actions to try to stop the spread of COVID-19. On March 19, 2020, the Hamilton County Superior Court and Hamilton County Circuit Court implemented their emergency operations plans that included temporarily closing all court functions except for emergency hearings. Trials were postponed indefinitely, the grand jury was postponed, and many arrested individuals were released from custody on their own recognizance whenever possible to avoid COVID exposure in the jail.[8]

[8] Hamilton County Reporter Staff (2020, March 19). "County circuit, superior courts declare emergency operations." *Hamilton County Reporter*.

On March 24, 2020, the Hamilton County Commissioners ordered the county government to operate under a Level Three Operations condition. This closed all county government operations – including the county courthouse, sheriff's department, and jail – to in-person public activity and directed non-essential staff to not report to work, or to work remotely.[9] On March 25, 2020, Indiana Governor Eric Holcomb implemented a stay-at-home order for the entire state which resulted in all schools, universities, non-emergency government services, and many businesses either closing or transitioning to remote, online operations.[10] These tremendous restrictions remained fully in place until late July, 2020, when the restrictions were gradually eased in a five-step plan that was not complete until November of 2020.[11]

These societal changes dramatically influenced police activity across Indiana for half of the year 2020. A substantial proportion of the population could no longer go to work or school. Recreational activities such as movie theaters, concerts, bars and nightclubs, sporting events, public pools, museums, and parks were closed. These unprecedented conditions drastically changed traffic patterns with a dramatic decrease in vehicles on the roadways, resulting in extremely few vehicle stops by the police, and extremely few traffic crashes to use as a benchmark measure. The closing of schools and many stores and businesses considerably reduced public human interaction, and thus resulted in a tremendous decline in incidents requiring police intervention, such as disturbances or crimes. As relatively few police-citizen contacts were being made by members of the Carmel Police Department during the first half of 2020, it was decided to postpone data collection until after the pandemic restrictions began to be lifted. As a result, the beginning of data collection was postponed until July 1, 2020.

This report, therefore, is a detailed analysis of the enforcement actions taken by members of the Carmel Police Department from July 1, 2020 through June 30, 2021. Specifically, the DCG research team examined whether any sex or racial group was treated in a disproportionately punitive manner through vehicles stopped by Carmel police officers, citations issued by Carmel police officers, and criminal arrests made by Carmel police officers during that time period. These enforcement actions were compared against valid, scientifically approved benchmarks estimating the populations at risk for stops, citations, and arrests. These enforcement action / benchmark comparisons were then statistically analyzed to determine if patterns of bias were discovered against any specific sex or racial group.

[9] Hamilton County Reporter Staff (2020, March 24). "All county government buildings closed for non-essential business." *Hamilton County Reporter*.
[10] Indianapolis Star (2020, March 23). "Indiana coronavirus updates: Governor orders Hoosiers to stay at home starting Wednesday." *Indianapolis Star*.
[11] Carden, D. (2020, October 25). "Indiana won't take step back in COVID-19 reopening, but masks are crucial, governor says." *Indianapolis Star*.

2. BEST PRACTICES

In order to ethically and scientifically examine whether or not evidence existed of racial disparities in enforcement activities by the Carmel Police Department, proper and approved social science methods must be followed. Social scientists have systematically studied racial disparities in police enforcement activities for more than half a century, dating back to the Civil Rights era of the 1960s. Social scientists began to systematically investigate racial disparities in police enforcement activities.[12] This body of research, subjected to peer-review critiques by other scientists, and even cross-examination in court when used as evidence in civil rights cases, has gradually become more rigorous and robust over time. Several statistical and methodological issues were discovered, addressed, and improved over the decades. These improved practices enhanced scientific confidence in the validity and reliability of the findings. From this research, a general consensus arose among social scientists on the appropriate "best practices" that should be applied when exploring for the presence of racial disparities in police enforcement actions.[13] Unlike the investigation by the Indianapolis area journalists, the present study adhered to these accepted best practices of social science research.[14] Below we review the most crucial of these many "best practices" lessons that social scientists have learned, and that were employed in the present study.

2.1 Proactive and Valid Enforcement Data

First, in order to examine for the presence of officer bias in police enforcement activities, it is important to specifically examine ***proactive*** enforcement decisions by officers. It is only possible for an officer to exercise bias when the officer has discretion in how to act. For example, police officers do not have control over who calls 911 and requests police services. A number of studies by criminologists across various communities have revealed that African-Americans and Hispanics call the police for assistance more often than non-Hispanic Whites and Asians.[15] As a result, police officers would disproportionately encounter African-American and Hispanic complainants and victims, but have no control over this situation as they were summoned to such situations by the very same citizens. Therefore, it is inappropriate to examine racial disparities as evidence of bias in reactive police behavior situations, in which the officer lacks a choice to engage the citizen.[16]

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[12] Black, D. (1971). The social organization of arrest. *Stanford Law Review 23,* 1087-1111; Black, D. & Reiss, A. J. (1970). Police control of juveniles. *American Sociological Review 35*, 63-77. LaFave, W. (1965). *Arrest: The Decision to Take a Suspect into Custody*. Boston: Little, Brown, Company; Reiss, A. (1971). *The Police and the Public*. New Haven, CT: Yale University Press.

[13] Smith, M.R., Rojek, J.J., Petrocelli, M. & Withrow, B. (2017). Measuring disparities in police activities: a state of the art review. *Policing: An International Journal 40(2)*, 166-183; Tillyer, R., Engel, R.S. & Calnon-Cherkauskas, J. (2010). Best practices in vehicle stop data collection and analysis. *Policing: An International Journal 33(1)*, 69-92; Withrow, B. L. (2005). *Racial Profiling: From Rhetoric to Reason*. Upper Saddle River, NJ: Pearson-Prentice Hall.

[14] Smith, et al. (2017); Tillyer, et al (2010); Withrow (2005).

[15] Gottfredson, M. R. & Hindelang, M. J. (1979). A study of the behavior of law. *American Sociological Review 44(1),* 3-18; Klinger, D. A. (1996). Quantifying law in police-citizen encounters. *Journal of Quantitative Criminology 12(4),* 391-415; Xie, M. & Baumer, E. P. (2019). Crime victims' decisions to call the police: past research and new directions. *Annual Review of Criminology 2*, 217-240; Zaykowski, H., Allain, E.C. & Campagna, L.M. (2019). Examining the paradox of crime reporting: Are disadvantaged victims more likely to report to the police? *Law & Society Review 53*, 1305-1340.

[16] Smith, et al. (2017); Tillyer, et al (2010); Withrow (2005).

Proactive enforcement decisions, however, are another matter. Traffic violations are numerous and abound everywhere. As a result, if officers stopped every vehicle they observed committing even the slightest traffic violation, they would not have time to handle any other duties. Therefore, officers must use their discretion to triage the traffic offenses they witness and decide which they should address through a traffic stop, and which they are willing to ignore for the moment. This discretionary decision should be based on such factors as the seriousness of the offense, the seriousness of the environment (such as speeding in a school zone when school is letting out), and other pending calls for service. It is in such discretionary decisions that racial or ethnic bias may arise. Only in such discretionary decisions, where an officer has the opportunity to decide when to take enforcement action, is the opportunity to exercise bias present. Therefore, best practices in studies examining racial bias in police behavior have focused ***only*** on ***proactive*** police enforcement activities. The types of activities most commonly examined in the research have been traffic stops, criminal investigative stops, the issuance of citations, and the making of arrests.[17]

Traffic Stops – Traffic stops are situations in which a law enforcement officer stops a vehicle for the purposes of traffic safety and enforcement of a traffic statute. Although evidence of a crime may be discovered after the stop has been initiated, a traffic stop is conducted primarily for the purposes of traffic safety. In order to legally initiate a traffic stop, the law enforcement officer must have probable cause to believe that the vehicle being stopped has recently committed a violation of a traffic statute.[18] Probable cause is defined as sufficient reason, based upon known facts, to cause a reasonable person to believe that an offense has been committed. This is sufficient evidence for a law enforcement officer to make an arrest (in this case issuing a citation) without a warrant.[19] As traffic violations tend to be plentiful, the issue with regard to biased policing is whether officers are stopping a broad cross-section of the traffic law violators they witness, or are they prone to select traffic violators of a particular sex, race, or ethnicity from the variety of traffic violators visible.

Criminal Investigative Stops – Criminal investigative stops are situations in which a law enforcement officer stops a vehicle or pedestrian for the purposes of conducting further investigation of a potential criminal offense. The Fourth Amendment to the U.S. Constitution grants law enforcement officers the legal authority to seize individuals and search their belongings when probable cause exists that these individuals have committed a crime. Therefore, when a law enforcement officer observes a vehicle occupant commit a criminal act, or a credible victim or witness to a crime identifies to the officer that a vehicle occupant has committed a crime, the officer may immediately stop and detain that vehicle as part of a criminal investigation. In such a situation, the officer does not need to wait for the vehicle to first violate a traffic law before stopping it.

Law enforcement officers may also stop vehicles based on reasonable suspicion of criminal activity. The ruling in the landmark U.S. Supreme Court case *Terry v. Ohio* (1968) established that if law enforcement officers have reasonable suspicion to believe that an occupant of a vehicle has committed a violation of a criminal law, they may stop the vehicle, temporarily detain all of its

[17] Smith, et al. (2017); Tillyer, et al (2010); Withrow (2005).
[18] Fourth Amendment to the U.S. Constitution; *Delaware v. Prouse*, 440 U.S. 648 (1979); *Whren v. United States*, 517 U.S. 806 (1996).
[19] Handler, J. G. (1994). *Ballentine's Law Dictionary*. Albany, NY: Delmar.

occupants, and investigate the potential criminal violation.[20] Reasonable suspicion is a lower standard of proof than probable cause. Reasonable suspicion is defined as the suspicion that an individual is engaged in a crime based on clearly articulable facts (not a mere hunch) and a totality of the circumstances, but viewed from the officer's perspective.[21] A common example of a stop based on reasonable suspicion is the stopping of a vehicle that matches the description of one recently used in the commission of a nearby crime.

Citations – It has already been mentioned that, because traffic violations are so plentiful, law enforcement officers are permitted discretion when deciding whether or not to stop a vehicle for committing a traffic violation. Law enforcement officers also are often permitted the discretion to decide whether or not to issue a traffic citation once the vehicle has been stopped.[22] In a fair society, such discretionary decisions should be based on relevant facts about the situation, such as the seriousness of the offense (i.e., serious offenses are less deserving of leniency than minor offenses), the driver's prior driving record (i.e., drivers with a history of poor driving behavior – such as suspended drivers – are less deserving of leniency than drivers with a clean record), or the driver's remorse (i.e., drivers unwilling to acknowledge or show remorse for their violation imply they are less willing to voluntarily correct their poor driving behavior). What should not be taken into account in a free democracy, however, is the driver's sex, race, or ethnicity. Therefore, drivers of different races who are stopped for the same violations, and under the same circumstances, should receive similar outcomes (i.e., receive citations at similar rates).[23]

Arrests – As stated earlier, the Fourth Amendment to the U.S. Constitution grants law enforcement officers the legal authority to seize individuals when probable cause exists that these individuals have committed a crime. In making arrest decisions regarding criminal offenses, law enforcement officers do not have nearly as much discretion on whether or not to make an arrest as they do with simple traffic infractions. For example, law enforcement officers are unlikely to allow an individual go free with a verbal warning if there is probable cause to believe the individual committed a felony offense such as burglary, armed robbery, or murder. Therefore, disagreement exists about whether or not arrests are truly discretionary behaviors in which an officer may practice racial or ethnic bias.[24]

Nevertheless, social science research has revealed that some officer discretion is usually practiced with regard to minor misdemeanor offenses. A common example is a minor in possession of alcohol, where the officers give the minor the option to dump out the alcohol and take the minor

[20] *Terry v. Ohio*, 392 U.S. 1 (1968).
[21] Handler, J. G. (1994). *Ballentine's Law Dictionary*. Albany, NY: Delmar.
[22] Davis, K. C. (1975). *Police Discretion*. St. Paul, MN: West Publishing; Ingram, J. R. (2007). The effect of neighborhood characteristics on traffic citation practices of the police. *Police Quarterly, 10(4)*: 371-393; Johnson, R.R. (2011). Officer attitudes and management influences on police work productivity. *American Journal of Criminal Justice, 36(4)*: 293–306.
[23] Black, D. (1976). *The Behavior of Law*. New York: Academic Press; Harris, D. A. (1997). Driving while black and all other traffic offenses: the Supreme Court and pretextual traffic stops. *Journal of Criminal Law and Criminology, 87(3)*: 544-576.
[24] Goldstein, J. (1960). Police Discretion Not to Invoke the Criminal Process; Low-Visibility Decisions in the Administration of Justice. *Yale Law Journal, 69*, 543-565; Johnson, R. R., & Dai, M. (2016). Police enforcement of domestic violence laws: Supervisory control or officer prerogatives? *Justice Quarterly, 33(2)*, 185-208.

home to his or her parents without making an arrest. As a result, some researchers have examined the police behavior of arrest for evidence of how officers apply this limited discretion.[25]

In order to conduct a credible examination of racial disparities in these proactive police enforcement actions, the researcher must measure who received enforcement action from the police (i.e., stops, citations, or arrests) broken down by race / ethnicity. The data on these enforcement actions, and the measurement of the citizen's race / ethnicity, must be valid and reliable. Validity refers to how accurately a method measures what it is intended to measure. If data have high validity, this means the data correspond to real properties, characteristics, and variations in the real world.[26] This means that all of the stops, or citations, or arrests are recorded (or at least a truly random sample of sufficient size was used), not simply a nonrandom sample – as was the case with the citations examined by the *Indianapolis Star* and *Channel 8 News*. Missing data, such as officers not recording a stop of the race of the driver, weaken the validity of the data.[27]

Reliability is one indicator that a measurement has validity. Reliability is the degree to which a research method produces stable and consistent results. A specific measure is considered to be reliable if its application on the same object of measurement, over a number of times, produces the same results.[28] In regard to studies that examine potential racial bias in proactive police enforcement actions, this means the data examined must be gathered in a consistent, uniform manner, with all of the data for each stop or each citation, being gathered in the same way.[29]

2.2 Valid Benchmarks

The proactive police enforcement actions are the first major sources of data in any study examining for bias in proactive police enforcement behavior. The second major source of data required for a credible examination is a measure of the racial / ethnic proportions within the population of individuals at risk for legally and legitimately receiving the particular enforcement action being examined. These second measures are often referred to as "benchmarks", and are used as a standard for comparison to the proactive police enforcement actions to see if the enforcement actions appears biased or appropriate.[30]

For example, for police vehicle stops for the purposes of addressing traffic violations, the benchmark should be some sample that reflects the racial proportions of the drivers found on the roadways engaged in traffic violation behaviors within that jurisdiction. In other words, **stops of traffic law violators should be compared to some measure of traffic law violators**. However, for criminal arrests by the police, the benchmark should be some sample that reflects the racial proportions of the individuals engaged in crimes, ***not*** drivers involved in traffic violations. In other

[25] Goldstein, H. (1963). Police discretion: the ideal versus the real. *Public Administration Review, 23(3),* 140–148; Walker, S. E., Spohn, C. C., & DeLone, M. (1997). *The Color of Justice: Race, Ethnicity, and Crime in America*. New York: Wadsworth.
[26] Babbie, E. (2005). *The Basics of Social Research*. New York: Wadsworth; Rosenthal, J. A. (2001). *Statistics and Data Interpretation*. New York: Wadsworth.
[27] Smith, et al. (2017); Tillyer, et al (2010); Withrow (2005).
[28] Babbie, E. (2005); Rosenthal, J. A. (2001).
[29] Smith, et al. (2017); Tillyer, et al (2010); Withrow (2005).
[30] Smith, et al. (2017); Tillyer, et al (2010); Withrow (2005).

words, arrests of criminals should be compared to some measure of criminals. For post-stop outcomes, such as whether or not a citation was issued (versus only a warning given), the benchmark is often the proportion of white drivers who were stopped under the same circumstances who received a citation.[31] In other words, speeders ticketed should be compared to speeders ticketed, and red light-runners should be compared to other red light-runners.

Invalidity of Census Data – While the earliest research studies conducted during the 1960s, 1970s, and 1980s relied upon Census data as their benchmarks, for the last three decades social scientists have understood that the use of Census data is seriously flawed as a benchmark for comparison with proactive police behaviors.[32] This was the benchmark used by the *Channel 8 News* and the *Indianapolis Star*, despite the fact that back in 2006 the prestigious *Journal of the American Statistical Association* proclaimed, ***"It is widely recognized that residential population data provide poor estimates of the population at risk of a traffic stop."***[33] Regarding traffic stops, those found on the roadways within any jurisdiction are a mixture of residents of that community and people from outside the community who are visiting or traveling through the jurisdiction. The characteristics of these drivers also vary from region to region within the community, and sometimes vary by time of day with commuting patterns.[34]

As early as 1993, the courts recognized that Census statistics regarding the racial composition of a jurisdiction differed greatly from the racial composition of the drivers on the roadways within that jurisdiction. In 1993, the ACLU filed an appeal to overturn the drug trafficking convictions of Pedro Soto and ten other plaintiffs, based on the allegation they had all been victims of racial profiling by the New Jersey State Police (*State of New Jersey V. Soto*, 324 N.J. Superior Law Div. 1996). As evidence to support the claim of racial profiling, the ACLU hired John Lamberth, Ph.D. of the research firm Lamberth & Associates LLC to determine the racial composition of the traffic patterns on the segments of the New Jersey Turnpike. Specifically, he was to examine where all of the plaintiffs had been stopped for speeding, with the stops leading to the discovery of narcotics and their subsequent arrests. Dr. Lamberth and his research assistants conducted observations of drivers on this segment of the turnpike by riding in a car with the cruise control set at the posted speed limit. They recorded race of the drivers that passed their car (i.e., speeders) and the race of the drivers they themselves passed (non-speeders). They conducted these roadway observations over 21 sessions, each lasting 2.5 hours in length.[35]

Lamberth's measurements of the racial composition of the drivers on the roadway were then compared to the racial composition of the traffic stops conducted by the troopers of the New Jersey

[31] Smith, et al. (2017); Tillyer, et al (2010); Withrow (2005).
[32] Smith, et al. (2017); Tillyer, et al (2010); Withrow (2005).
[33] Grogger, J., & Ridgeway, G. (2006). Testing for racial profiling in traffic stops from behind a veil of darkness. *Journal of the American Statistical Association, 101(475)*: 878-887.
[34] Engel, R. S., & Calnon, J. M. (2004). Comparing benchmark methodologies for police-citizen contacts: traffic stop data collection for the Pennsylvania State Police. *Police Quarterly, 7(1)*: 97-125; Federal Highway Administration. (2000). *Travel Patterns of People of Color*. Washington, DC: U.S. Department of Transportation; Mauch, M. & Taylor, B. D. (1997). Gender, race, and travel behavior: analysis of household-serving travel and commuting in San Francisco Bay Area. *Transportation Research Record 1607(1)*, 147-153; Preston, V. & McLafferty, S. (2016). Revisiting gender, race, and commuting in New York. *Annals of the American Association of Geographers 106(2)*: 300-310.
[35] *State of New Jersey V. Soto*, 324 N.J. Superior Law Div. 1996.

State Police. Lamberth found of the "speeders" he and his team observed on the Turnpike between Exits 1 and 7, 15% appeared to be African-Americans, while 46% of the drivers stopped by New Jersey troopers in that region were identified as African-Americans. This comparison revealed dramatic racial disparity in the New Jersey state trooper stops involving African-American drivers on that segment of the turnpike. It also revealed, however, that the racial composition of the drivers on the turnpike did not resemble the racial composition of the Census data for that area. ***The segment of the turnpike between exits 1 and 7 ran through communities that ranged from 2% African-American, to less than 1% African-American residents (based on Census data of that time), yet the speeders on the turnpike were 15% African-American. In other words, African-American drivers were found to be between 7 and 15 times more likely to be driving on the turnpike than relying on Census data would suggest***.[36]

In another case in 1994, the National Association for the Advancement of Colored Persons (NAACP) filed suit against the Maryland State Police, alleging that the agency's state troopers engaged in racial profiling along interstate highway I-95. Representing an African-American law school student who had been stopped for speeding by troopers and subjected to a lengthy vehicle search before being let go with a warning, the NAACP also hired Lamberth Consulting LLC to assist with the case. Identical to their methods in the Soto case, Lamberth and his assistants observed drivers on the segment of I-95 between Baltimore and Philadelphia where the plaintiff had been stopped. They again defined speeders as anyone overtaking and passing the researchers' car while the research vehicle was traveling at exactly the speed limit. ***Despite the fact that the Census population statistics for the jurisdiction where this roadway segment was located was 6% African-American, Lamberth observed that 17% of all drivers on the roadway, and 18% of the speeders, were African-American drivers. In other words, the proportion of African-American drivers on the roadway was 3 times higher than the Census data population***.[37]

Traffic Stop Benchmarks – Criminologist and ACLU activist Samuel Walker proposed that an effective traffic stop benchmark must be scientifically credible, have practical utility, and have political credibility.[38] In pursuit of these ends, a number of legitimate methods have been employed to create valid benchmarks estimating the racial composition of motorists (or violators of traffic laws) on the roadways of a given jurisdiction. As just described above, one method has involved using researchers in a moving vehicle traveling at the speed limit who observe and record the race of the drivers of the other vehicles on the roadway.[39] A variation on this observation method that has been employed by others involves placing researchers at static locations, such as intersections or along major thoroughfares, to observe the races of drivers who passed their static locations.[40]

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[36] *State of New Jersey V. Soto*, 324 N.J. Superior Law Div. 1996.
[37] *Wilkins v. Maryland State Police* (CCB-93-483, 1996).
[38] Walker, S. (2001). Searching for the denominator: Problems with police traffic stop data and an early warning system solution. *Justice Research and Policy 3(1)*: 63-95.
[39] See for example: Lamberth, J. (1994). *Revised Statistical Analysis of the Incidence of Police Stops and Arrests of Black Drivers / Travelers on the New Jersey Turnpike between Exits of Interchanges 1 and 3 from Years 1988 through 1991*. West Chester, PA: American Civil Liberties Union; Lamberth, J. (1996). *Report of John Lamberth, Ph.D.* Washington, DC: American Civil Liberties Union. Unpublished report; Meehan, A. J., & Ponder, M. (2002). How roadway composition matters in analyzing police data on racial profiling. *Police Quarterly, 5(3)*: 306-333; Smith, W., Tomaskovic-Devey, D., Zingraff, M., Mason, H., Warren, P., & Wright, C. (2004). *The North Carolina Highway Traffic Study*. Washington, DC: National Institute of Justice.
[40] See for example: Lamberth, J. C. (2004). *Ann Arbor Police Department Traffic Stop Data Collection Methods and Analysis Study*. Chads Ford, PA: Lamberth Consulting LLC; Lamberth, J. C. (2017). *Grand Rapids Michigan*

Some researchers using this static point of observation method have also employed radar or laser speed timing devices to measure the speeds of the vehicles to determine the racial composition of speeding drivers.[41]

Other alternative methods have been employed to gather benchmark data on traffic law violators or driving populations. One study employed automated cameras linked electronically to radar speed timing devices or traffic signal violation detection devices. For example, one study in New Jersey used these automated devices to photograph the drivers of speeding vehicles along a stretch of highway. Teams of researchers then used the photos to determine the races of the photographed drivers.[42] Another study in Virginia used an automated red-light camera that photographed the license plates of vehicles that violated traffic signals by entering the intersection more than one second after the signal turned red. The researchers then used the vehicles' license plate numbers to identify the sex and race of the registered owner, based on the assumption that the person driving the vehicle would likely be the owner or someone of the same race as the owner.[43]

While all of these benchmarks based on roadway driver observations have greater validity than the use of Census data, they all have some limitations. All of these observation methods are very expensive, requiring many research assistants, many hours of labor, and sometimes expensive equipment, such as automated speed or red-light cameras. All of these observational methods rely on trying to visually determine the race and ethnicity of a driver passing at high speed, which may increase validity errors in proper identification. All of these methods tend to focus on only one type of traffic violation, such as speeding or running a traffic signal, rather than the diversity of traffic violations police officers encounter and enforce. Because they require observing a driver in a passing motor vehicle, all of these methods are limited to use during daylight hours on days without inclement weather. Thus they do not measure traffic patterns in inclement weather or at night.

All of these observational methods are limited to use in areas with clear lines of sight where the researchers can easily see the passing drivers, and therefore are less likely to measure traffic patterns on residential side streets or congested urban areas. Because of the need for a clear line of sight, all of these methods require that observers (or a radar camera unit) be placed in a conspicuous location within the driver's field of view, thus potentially changing the driver's behavior to drive more cautiously.

Therefore, as a more convenient and cheaper method for obtaining a benchmark, some researchers have compared the proportions of stops of the drivers during the daylight hours with the stops

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Police:Results from Stop Data Analysis Study. Chads Ford, PA: Lamberth Consulting LLC; McCabe, J. E., Kaminski, R. J., & Boehme, H. M. (2021). Racial profiling and CT motor vehicle stops: an observational study in three towns. *Police Practice and Research, 22(6)*: 1567-1584.

[41] See for example: Engel, R. S., Calnon, J. M., Tillyer, R., Johnson, R. R., Liu, L. (2005). *Pennsylvania State Police Project on Police-Citizen Contacts: Year 2 Final Report (May 2003-April 2004)*. Cincinnati, OH: University of Cincinnati; Engel, R. S., Frank, J., Tillyer, R., Klahm, C. (2006). Cleveland Division of Police Traffic Stop Data Study: Final Report. Cincinnati, OH: University of Cincinnati.

[42] Lange, J. E., Johnson, M. B., & Voas, R. B. (2005). Testing the racial profiling hypothesis for seemingly disparate traffic stops on the New Jersey turnpike. *Justice Quarterly, 22(2)*, 194-223.

[43] Herbert-Martinez, K. L., & Porter, B. E. (2006). Characterizing red light runners following implementation of a photo enforcement program. *Accident Analysis & Prevention, 38(4)*, 862-870.

made during the hours of darkness. This method, called the "veil-of-darkness" method, was first developed by the RAND Corporation. It operates on the assumption that police officers cannot easily determine the race of passing drivers during hours of darkness, thus making it difficult or impossible to stop drivers based on their races at night. The method also assumes that during daylight hours officers are more capable of determining the races of drivers prior to stop. As a result, traffic stops made during hours of darkness (when officers allegedly cannot determine the driver's race prior to stop) becomes the benchmark measure for comparison to stops made during daylight hours (when officers allegedly *can* determine the driver's race).[44] This method has since been utilized by many researchers examining for evidence of racial profiling.[45]

Finally, the most recent form of traffic benchmark to be developed has been the use of drivers involved in vehicle crashes. This method is based on the assumption that drivers involved in crashes represent a "snap shot" sample of drivers on the roadway. Using the drivers from crash reports as a traffic benchmark is less expensive than employing researchers for roadway observations as officers are already taking these crash reports as part of their normal duties. The method also has many additional benefits. While roadway observations are limited to daylight and areas with good fields of vision (such as only major thoroughfares), crashes occur everywhere across the community and occur during all hours of the day, every day of the week, and in all kinds of weather conditions. Because every crash has at least one driver at fault, they are also a good sampling of who is driving poorly or operating a vehicle with a significant equipment malfunction (i.e., taillights out, no headlights, bumper falling off, etc.). While roadway observations require determining driver race from a fast-moving vehicle, officers taking crash reports interact with the drivers face-to-face and obtain their driver's licenses. This means greater accuracy (scientific reliability and validity) in determining the driver's sex, race, and ethnicity.[46] Several studies have recently employed crash drivers as a benchmark measure of the racial composition of drivers on the roadway.[47]

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[44] Grogger, J., & Ridgeway, G. (2006). Testing for racial profiling in traffic stops from behind a veil of darkness. *Journal of the American Statistical Association, 101(475)*: 878-887.

[45] See for example: Hannon, L., Neal, M., Gustafson, A. R., (2021). Out-of-place and in-place policing: an examination of traffic stops in racially segregated Philadelphia. *Crime & Delinquency, 67(6-7)*: 868-890; Lundman, R. J., & Kowalski, B. R. (2009). Speeding while black? Assessing the generalizability of Lange et al.'s (2001, 2005) New Jersey turnpike speeding survey findings. *Justice Quarterly, 26(3)*: 504-527; Taniguchi, T. A., Hendrix, J. A., Levin-Rector, A., Aagaard, B. P., Strom, K. J., Zimmer, S. A. (2017). Extending the veil of darkness approach: an examination of racial disproportionality in traffic stops in Durham, NC. *Police Quarterly, 20(4)*: 420-448; Vito, A.G., Woodward Griffin, V., Vito, G.F. & Higgins, G.E. (2020). Does daylight matter? An examination of racial bias in traffic stops by police. *Policing: An International Journal, 43(4)*: 675-688; Wexler, N. (2020). *Testing for Police Racial Profiling Using Data on Pre-Stop Race Visibility: Evidence from Minneapolis*. Minneapolis, MN: University of Minneapolis; Withrow, B.L. (2007). *The Portland Police Bureau's Stop Data: An Independent Analysis*. Portland, OR: Portland Protective Association; Worden, R. E., McLean, S. J., Wheeler, A. P. (2012). Testing for racial profiling with the veil-of-darkness method. *Police Quarterly, 15(1)*: 92-111.

[46] Withrow, B.L. & Williams H. (2015). Proposing a benchmark based on vehicle collision data in racial profiling research. *Criminal Justice Review, 40 (3)*, 449-469.

[47] See for example: Alpert, G.P., Smith, M.R., & Dunham, R. (2004). Toward a better benchmark: Assessing the utility of not-at-fault traffic crash data in racial profiling research. *Justice Research and Policy, 6(1)*: 44-69; Dolan Consulting Group LLC (2018). *Evaluating Fairness in Traffic Stops by the Ann Arbor Police Department*. Raleigh, NC: Dolan Consulting Group; Schafer, J. & Carter, D. L. (2018). *An Assessment of the Management Analysis of Traffic Stops (MATS) Program Data for the Lansing, MI Police Department*. East Lansing, MI: Michigan State University; Withrow, B.L. & Williams H. (2015). Proposing a benchmark based on vehicle collision data in racial profiling research. *Criminal Justice Review, 40 (3)*: 449-469.

Criminal Investigative Stop Benchmarks – It is important to remind the reader, that all of the benchmarks described above only pertain to vehicle stops for traffic violations. Law enforcement officers have the legal authority to seize individuals (including stopping their cars) when probable cause exists that these individuals have committed a crime. When an officer observes a vehicle occupant commit a criminal act, or a victim or witness to a crime identifies to the officer that a vehicle occupant has committed a crime, the officer may immediately stop and detain that vehicle without the need for a traffic law violation before stopping the vehicle.[48] Law enforcement officers may also stop vehicles and question occupants based on reasonable suspicion of criminal activity, a lower standard of proof than probable cause.[49]

A common example of a stop based on reasonable suspicion is stopping a vehicle that matches the description of one recently used in the commission of a nearby crime. Imagine that an officer hears a radio broadcast that an armed robbery has just occurred at a convenience store about 20 blocks away. The radio broadcast indicates a white male in a green sweatshirt robbed the store at gunpoint and fled the scene in a dark Honda Civic or Accord that was driven by a white female accomplice. Moments later, the officer sees a navy blue Honda Accord pass by with a white male passenger and a white female driver, and the passenger of the car is wearing a green sweatshirt. As the car passes the officer, the officer sees both vehicle occupants staring at her. As the officer follows the car, she observes it make numerous turns down side streets. The passenger has turned around in his seat, watching her patrol car through the back window of the Honda.

The officer could legally stop the car at this point based on reasonable suspicion (not yet probable cause) alone, yet she may also wait until she also witnesses a traffic violation, in order to build a stronger case to justify her stop. These individuals may, or may not, be the armed robbers, but enough articulable facts exist (nervous behavior, physical description match, and vehicle match) to permit an investigative stop. The legal justification and motivation for such stops are for criminal investigative purposes – regardless of whether the officer makes the stop now or waits until she also observes a traffic violation. Therefore, these stops are unassociated with traffic violations *per se*, and strictly associated with criminal violations. As a result, those who should be legally and ethically at risk for criminal investigative stops would be those individuals found committing crimes within the jurisdiction – not the general population of persons found driving on the roadways. Therefore, a crime-specific benchmark is needed for any analysis of criminal investigative stops.

As was the case with the benchmark for traffic violation stops, U.S. Census population data is inappropriate for the same reasons. Not everyone found committing crimes within a jurisdiction resides within that jurisdiction. An unknown number of persons committing crimes in any community come from outside that community, so U.S. Census data may not reflect the sex, race, and ethnic composition of these criminal offenders. Importantly, we also know through decades of criminological research that criminal offender populations differ from the general population on many demographic measures. For example, we know that the criminal offender population, on average, has a lower education level and lower income level than the general population. We know

[48] Fourth Amendment to the U.S. Constitution; *Delaware v. Prouse*, 440 U.S. 648 (1979); *Whren v. United States*, 517 U.S. 806 (1996).
[49] *Terry v. Ohio*, 392 U.S. 1 (1968).

that criminal offenders are disproportionately male, and disproportionately between the ages of 15 and 40.[50] The offender population differs from the general population in many ways.

Other than agreement that Census data is an invalid estimate of the criminal offending population within a jurisdiction, social scientists have not come to a consensus on the best benchmark techniques for examining criminal investigative stops or arrests. One study utilized the "hit rates" – the percentage of persons within each race group that were found to possess illegal contraband – as the benchmark for criminal investigative stops.[51] Another study utilized the racial composition of crime victims as a benchmark, under the assumption that since the majority of crime is intra-racial in nature, the population of victims should represent the population of offenders. This benchmark was then compared against the racial composition of criminal investigative stops.[52]

Five studies have used crime arrest rates as the benchmark for criminal investigative stops. These researchers reasoned that the racial proportions of the persons arrested and charged with crimes under all circumstances (both proactive police arrests and reactive arrests in response to the complaint of a crime victim) approximate the racial proportions of the general criminal offending population within the jurisdiction, and therefore serve as a benchmark for investigative stops.[53] Despite its wide use, one study took issue with the criminal arrest benchmark.

If officers were to act prejudicially against a particular group in their enforcement actions, then that group would be overrepresented among arrests due to this prejudice, not necessarily because of a higher representation among offenders. Because of the possibility that officers could be biased in their contacts and their arrests, using arrests as a benchmark would present a critically important tautological error. Therefore, one study balked at the use of arrests and instead used the descriptions of suspects from crime victims as a benchmark for criminal investigative stops. This benchmark removed criminal cases in which the police proactively encountered the crime, and was limited to only cases in which a private citizen (victim or witness) reported the crime to the police, and provided a physical description of the suspect. This benchmark assumes that, when examining concerns that the police may be acting in a biased manner, non-police crime victims and witnesses would be unbiased, thus providing a description of the criminal offenders they encountered.[54] This method also relies upon official reports of crimes, not just citizen complaints

[50] Sampson, R. J., & Laub, J. H. (1995). *Crime in the Making: Pathways and Turning Points through Life*. Cambridge, MA: Harvard University Press; Wright, J. P., Tibbetts, S. G., & Diagle, L. E. (2014). *Criminals in the Making: Criminality across the Life Course*. Los Angeles: Sage.

[51] Coviello, D., & Persico, N. (2013). *An Economic Analysis of Black-White Disparities in NYPD's Stop and Frisk Program, Working Paper 18803*. Cambridge, MA: National Bureau of Economic Research.

[52] Sherman, L. W., & Kumar, S. (2021). Equal protection by race with stop and frisk: a risk-adjusted disparity (RAD) index for balanced policing. *Cambridge Journal of Evidence-Based Policing*, 5, 1–19.

[53] Fradella, H., Morrow, W., & White, M. (2020). An empirical analysis of the racial / ethnic and sex differences in NYPD stop-and-frisk practices. *Nevada Law Journal, 8*, 1-11; Gelman, A., Fagan, J. & Kiss, A. (2007). An analysis of the New York City police department's "stop-and-frisk" policy in the context of claims of racial bias. *Journal of the American Statistical Association, 102(479)*, 813-823; Levchak, P. J. (2017). Do precinct characteristics influence stop-and-frisk in New York City? A multi-level analysis of post-stop outcomes. *Justice Quarterly, 34(3)*, 377-406; Levchak, P. J. (2021). Stop-and-frisk in New York City: estimating racial disparities in post-stop outcomes. *Journal of Criminal Justice, 73*, 101784; Vartanian, A. (2020). Racial disparities in stop and frisk distributions by the Philadelphia police department. *Social Science Research Network*.

[54] Dolan Consulting Group LLC (2018). *Evaluating Fairness in Traffic Stops by the Ann Arbor Police Department*. Raleigh, NC: Dolan Consulting Group.

of "suspicious persons" or behavior. This method required that the citizen file a formal crime report.

Post-Stop Citations and Arrests – Only a few studies thus far have examined post-stop outcomes, such as examining for bias in who received a traffic citation versus only a warning, or who was placed under arrest. The reason so few studies have examined such post-stop outcomes is the difficulty in comparing similarly situated circumstances. For example, two drivers of different races could have been stopped for speeding, yet one received a citation and the other received a warning. Many factors other than racial bias may have explained such an outcome as one driver may have been traveling 10 miles-per-hour over the speed limit, while the other driver may have been traveling 30 miles-per-hour over the limit. One driver may have been intoxicated or had a suspended driver's license, while the other driver did not. Therefore, when examining differences by race / ethnicity in post-stop outcomes, it is crucial that these intervening variables are controlled by comparing similarly situated outcomes.

Of the few studies that involved post-stop analyses, all have used the treatment of white drivers as the benchmark for comparison to the treatment of other racial and ethnic groups. For example, if 20% of the white drivers stopped for having a headlight out received a citation, then one would expect that approximately 20% of similarly situated African-American, Asian, or Hispanic drivers would also have received a citation. This is based on the assumption that discriminatory racial and ethnic biases are only applied towards persons of color.

In summary, data of proactive police enforcement behaviors are useless without an appropriate and valid benchmark for comparison. Only through comparison to a benchmark measure that estimates the demographic characteristics of the population at risk for this specific enforcement action can researchers begin to examine for evidence of the disproportionate treatment of any specific group.

2.3 Control for Aggregation Bias

When the data involving proactive police behaviors and the data for the comparison benchmarks are drawn in different proportions from different subunits of a population, then the statistical problem of aggregation bias arises. Aggregation bias is defined as when the difference for the group and the individual is confounded by an ecological sampling error.[55]

For example, imagine that a study examining police bias in traffic stops by the police used a benchmark of drivers involved in crashes, but the city was divided into two districts that had very different racial demographics and traffic crash patterns. Imagine that District X had 100 crash drivers (of which 0% were African-American), and 50 drivers stopped by the police (of which 0% were African-American). In other words, 0% of the drivers stopped were African-American and 0% of the drivers in the benchmark were African-American, thus no racial disparity existed. The other district, District Y, had 50 crash drivers (of which 25, or 50%, were African-American), and

[55] Lubinski, D., & Humphreys, L. G. (1996). Seeing the forest from the trees: When predicting the behavior or status of groups, correlate means. *Psychology, Public Policy, and Law, 2(2),* 363–376; Rose, D. D. (1973). National and local forces in state politics: The implications of multi-level policy analysis. *American Political Science Review, 67(4),* 1162–1173; Rosenthal, J. A. (2001). *Statistics and Data Interpretation*. New York: Wadsworth.

100 stopped drivers (of which 50, or 50%, were African-American). In other words, 50% of the drivers stopped were African-American, and exactly 50% of the drivers in the benchmark were African-American, thus (again) no racial disparity existed. In District X there were no racial disparities as 0% of the drivers on the roadway were African-Americans and 0% of the drivers stopped there were African-Americans. Likewise, no disparity existed in District Y as 50% of the drivers and 50% of those stopped by the police were African-Americans.

The problem of aggregation bias occurs when we add all these data together (i.e., "aggregate" the data) at the citywide level. When we combine the District X and Y data together at the citywide level we find that there were 150 total crash drivers and that 25 (16.7%) of these crash drivers were African-Americans. We also find that there were 150 stopped drivers and 50 (33.3%) of these stopped drivers were African-Americans. This aggregated result falsely suggests that African-Americans were disproportionately stopped by the police as African-American drivers made up 33.3% of drivers stopped citywide, yet only 16.7% of those drivers in the benchmark citywide. But this apparent bias is false as we have just seen that there was absolutely no evidence of bias when examined at the disaggregated district level. There were simply more crashes used in the citywide benchmark that came from District X, and more stops that came from District Y.

The same problem of aggregation bias might occur if there are proportional differences regarding times of the day (i.e., more crashes / fewer stops occurring when there are fewer African-American drivers on the roadway, and fewer crashes / more stops when there are more African-American drivers on the roadway).[56] Also keep in mind that it makes simple sense that there would be more vehicle stops during periods, or in districts, of fewer crashes and calls for service. When law enforcement officers are tied up handling crashes and other calls for service, they have less free patrol time to devote to traffic enforcement duties. When there are fewer crashes and calls for service to handle, officers naturally have more free patrol time to engage in making vehicle stops to enforce the traffic laws.

As a result, most researchers understand the importance of disaggregating their examinations of proactive police behaviors by geographic locations and times of day when possible. This requires a balance between the disaggregating on the one hand, and having a statistically valid sample size of stops or benchmark cases on the other. Nevertheless, it is a best practice to disaggregate by geographic region and time of day whenever possible, and many studies have followed this practice.[57]

[56] Smith, M.R., Rojek, J.J., Petrocelli, M. & Withrow, B. (2017). Measuring disparities in police activities: a state of the art review. *Policing: An International Journal 40(2)*, 166-183; Tillyer, R., Engel, R.S. & Calnon-Cherkauskas, J. (2010). Best practices in vehicle stop data collection and analysis. *Policing: An International Journal 33(1)*, 69-92; Withrow, B. L. (2004). Driving while different: a potential theoretical explanation for race-based policing. *Criminal Justice Policy Review, 15(3)*, 344-364.

[57] See, for example: Dolan Consulting Group LLC (2018). *Evaluating Fairness in Traffic Stops by the Ann Arbor Police Department*. Raleigh, NC: Dolan Consulting Group; Engel, R. S., Calnon, J. M., Tillyer, R., Johnson, R. R., Liu, L. (2005). *Pennsylvania State Police Project on Police-Citizen Contacts: Year 2 Final Report (May 2003-April 2004)*. Cincinnati, OH: University of Cincinnati; Engel, R. S., Frank, J., Tillyer, R., Klahm, C. (2006). *Cleveland Division of Police Traffic Stop Data Study: Final Report*. Cincinnati, OH: University of Cincinnati; Lamberth, J. C. (2017). *Grand Rapids Michigan Police: Results from Stop Data Analysis Study*. Chads Ford, PA: Lamberth Consulting LLC.

2.4 Statistical Controls for Error

In statistics, sampling errors occur when the statistical characteristics of a population are estimated from a smaller sample of that population. Since a sample does not include all members of the population, the characteristics of the sample will differ from the characteristics of the true population from which the sample was drawn. By chance alone, there will be a couple of cases too many of one category, and a couple of cases too few of another when gathering a sample, even a random sample. These differences between the sample and the population are called sampling error. This has been proven so many times throughout since that sampling error holds the status of a law in statistics.[58] For example, if a researcher measures the age of a hundred individuals from a population of 329 million people in the U.S., the average age among the sample of one-hundred individuals typically would be a little different than the average age of all 329 million people in the country.

Here is a simple way to illustrate the problem of sampling error. In the U.S., 50.9% of the population is female and 49.1% is male, but pretend that we did not know this. If we took a random sample of three Americans, we would find that women make up either 0% (no females), 33.3% (one female), 66.7% (two females), or 100% (three females) of the sample. If we did this multiple times, taking samples of three people each time, because of the laws of probability and the fact the real percentage of females in the population is 50.9%, the majority of the time we would get samples with either one (33.3%) or two (66.7%) females. But notice that we could never get a sample with the true population reality of 50.9% female. That is mathematically impossible with a sample size of only three individuals. The real percentage in the population is not 33.3% female, nor is it 66.7% female, but these are as close as we can come to the true population percentage due to our sample being so small.

As sample sizes get bigger, however, we are more likely to get a result closer to the true population, but still not quite exactly because sampling error still exists. If, for example, we take a random sample of seven Americans, this would more than double the sample size in the first example. Yet we would still not find the true percentage of females in the population. With any random sample of seven individuals we would find that females make up either 0% (no females), 14.3% (1 female), 28.6% (2 females), 42.9% (3 females), 57.1% (4 females), 71.4% (5 females), 85.7% (6 females), or 100% (7 females) of the sample. Again, if we took multiple samples of seven individuals, because of the laws of probability the majority of our samples would have three females (42.9% female) or four females (57.1% female), but never the reality of 50.9% female. Even if we took samples of 100 individuals, simply due to chance we would still sometimes get samples with 48 females, 49 females, 50 females, 51 females, or 52 females – close, but still not the true percentage. If we were lucky and acquired 50 or 51 females, we still could not get exactly 50.9% females with a sample of 100 individuals.

It would take a sample sizes of at least 1,000 individuals before it would be mathematically possible to achieve the true result of 50.9% female in a sample. But due to chance alone, sometimes we would still gather samples that had a few too many, or a few too few, females to match the exact reality of 50.9% female. This inaccuracy that occurs when using samples is sampling error.

[58] Rosenthal, J. A. (2001). *Statistics and Data Interpretation*. New York: Wadsworth; Sarndal, C. E., Swenson, B., & Wretman, J. (1992). *Model Assisted Survey Sampling*. New York: Springer-Verlag.

As the proactive police stops we examine are samples, and the benchmark measures of drivers on the roadways are samples, they both have sampling error and do not exactly match the real population. Therefore, if a certain racial group makes up 26.3% of the drivers in the benchmark sample of a few hundred drivers, but that same racial group makes up 30.9% of the drivers stopped in a sample of a few hundred police stops, it is very possible that the 4.6 percentage point difference could be due to sampling error, ***not*** racial discrimination.

When examining proactive police behaviors, we utilize samples of these activities as they are not analyzed in real-time, or for infinity. For instance, researchers usually take a single year's worth of vehicle stops. These are a sample and not all of the stops that have ever occurred or ever will occur (the true population). This is a sample, as it is not the population of all stops ever made by the police department. Likewise, the benchmark data are also samples. For example, one cannot measure all of the drivers operating vehicles on all the roadways of the jurisdiction at all times. Therefore, a sample of crash drivers or observed drivers is used to estimate what the population of all drivers looks like. Since sampling always includes some level of sampling error (i.e., inaccuracy in estimating the population), one must ***always*** control for sampling error when using sample estimates. This is why scientists, including social scientists, engage in mathematical statistical analysis procedures when examining samples. They use statistical tests to determine if a difference between the outcome we found (i.e., the percentage of a racial group in the police stops), is different from the outcome in the benchmark, and whether this was simply due to sampling error or was likely a true difference (i.e., true racial disparity).[59]

The binomial test is one simple statistical test that measures the statistical significance of differences between a sample and a known population, or between two compared samples.[60] For example, when testing a sample of seven Americans from a population that is known to be 50.9% female, the binomial test would reveal that a result of 42.9% (three females) or 57.1% (four females) is not significantly different from the true measure of 50.9% female because it can estimate the amount of sampling error in the sample size.

The formula for the binomial test formula considers several things. First, it considers how far apart the sample percentage is from the known population percentage (i.e., how far apart the percentage of crash drivers that were African-Americans differs from the percentage of stopped drivers who were African-Americans). Second, it considers the size of the sample, realizing that larger samples better represent the actual population.[61] Third, the binomial test formula considers the size of the proportions involved, realizing that the smaller the proportions, the greater the proportional change with a one unit increase.[62] (For example, if a city averages 1 homicide per year and just happens to have no homicides one year, it experiences a 100% decrease in homicides even though it was only one less homicide than average. By comparison, for a city that averages 100 homicides per year, one more homicide in a given year would only equate to a 1% increase in homicides. When dealing with small units – 1 homicide versus 100 homicides – a single unit change creates a massive proportional change.)

[59] Rosenthal (2001); Sarndal et al. (1992).
[60] Rosenthal, J. A. (2001). *Statistics and Data Interpretation*. New York: Wadsworth.
[61] Lehmann, E. L., & Romano, J. P. (2005). *Testing Statistical Hypotheses, 3rd Edition*. New York: Springer; Rosenthal (2001).
[62] Lehmann & Romano (2005); Rosenthal (2001).

Fourth, the binomial formula considers the mathematical laws of probability that suggest the expected amount of sampling error in a particular sample based on all of these other elements above. The binomial test formula calculates all these pieces of information and its output is the chance (written as a proportion) that the percentage of stops and the percentage of crash drivers are roughly the same, after controlling for sampling error.[63] In other words, it reveals how confident one can be that the difference between the two compared samples is a real difference, and not simply the result of sampling error.

The binomial test is just one test used by researchers who have examined proactive police behaviors for evidence of racial or ethnic bias. There are many other statistical tests that are also available, depending on the type of analyses being conducted. The point, however, is that examining the proportions of a racial group in the percentage of stops or citations, and then comparing it to some benchmark, ***must always control for sampling error with a statistical test***.[64]

2.5 Summary

The accusations levelled against the Carmel Police Department by reporters from the *Indianapolis Star* and the *Channel 8 News I-Team* failed to adhere to any of these appropriate best practices. These journalists claimed to have consulted a "statistician", and reveal they consulted with Dr. Charles R. Epp, a full professor within the School of Public Affairs & Administration at the University of Kansas, who they claim validated their techniques. It is baffling, therefore, that they would fail to follow all of these widely accepted methods for appropriately and scientifically examining the proactive enforcement activity of members of the Carmel Police Department. Since the ACLU has been the originating source of many of these best research practices (through its three-decade collaboration with Dr. John Lamberth of Lamberth Consulting), it is also baffling that the Indiana branch of the ACLU would be so quick to condemn the Carmel Police Department based on no scientifically valid evidence.

The present study, therefore, is an effort to apply correct scientific procedures to the examination of the stops, citations, and arrests made by the officers of the Carmel Police Department. Using a sample of twelve months of data, DCG applied all of these widely accepted best scientific practices to examine these police behaviors appropriately.

[63] Lehmann & Romano (2005); Rosenthal (2001).
[64] Lehmann & Romano (2005); Rosenthal (2001).

3. METHODOLOGY

It is crucial that the reader not skip Section Two above that explains the validity of the methods described in this section, and why it is so very important that these methods be followed. The methodology followed by DCG in this report adheres to the proven best scientific practices for examinations of potential racial bias in proactive enforcement actions by police agencies.[65] Section Two explains the tremendous amount of research by many, many social scientists over several decades that have discovered the errors in the past methods of amateurs, and found scientifically sound practices to overcome these errors. Section Three will now explain how these best practices were specifically applied to the analysis of the Carmel Police Department.

In examining the data available through the Carmel Police Department, we specifically looked for patterns of disproportionately punitive treatment toward people groups commonly portrayed in the sociological literature as being marginalized by the dominant society. This generally refers to women and members of racial / ethnic minority groups.[66] Therefore we emphasized comparisons to whites and males to see if other people categories were treated more punitively (i.e., more likely to be stopped, ticketed, or arrested) than whites and males.

In doing this, we were constrained by the sex and race categories used when the official data were collected by the Carmel Police Department. For example, we recognize that there is great debate over the definition of sex and gender in the world today. However, the software systems the Carmel Police Department must use only offer the sex categories of "male" and "female" when entering descriptive data about individuals being stopped, cited, or arrested. The parameters of these various databases are determined by the federal government for crime data, state government for citation and vehicle crash data, and the Hamilton County Public Safety Communications agency for vehicle stops.

As a result, the Carmel police officers entering the data into these databases were limited to categorizing individuals by sex using the categories of "male" and "female." They were also forced to categorize individuals by race using one of the following four categories: "Alaskan Native / American Indian", "Asian / Pacific Islander", "African-American / Black", or "Caucasian / White". Ethnicity differs from race. Race is usually associated with biology and linked with physical characteristics such as skin color, hair color, eye color, hair texture, shape of the eyes, etc. Ethnicity is linked with cultural expression and identification, such as a shared language, religion, and heritage.[67] For example, an individual might be Caucasian / White in race, yet Italian in ethnicity, sharing ancestry with Italian-speaking Catholics who hold Italian cultural traditions. Within the database systems the Carmel Police Department is required to use, the only ethnicity data gathered regarded Hispanic ethnicity. The term Hispanic commonly applies to cultural and

[65] Smith, M.R., Rojek, J.J., Petrocelli, M. & Withrow, B. (2017). Measuring disparities in police activities: a state of the art review. *Policing: An International Journal 40(2)*, 166-183; Tillyer, R., Engel, R.S. & Calnon-Cherkauskas, J. (2010). Best practices in vehicle stop data collection and analysis. *Policing: An International Journal 33(1)*, 69-92; Withrow, B. L. (2005). *Racial Profiling: From Rhetoric to Reason*. Upper Saddle River, NJ: Pearson-Prentice Hall.
[66] Cudd, A. E. (2006). *Analyzing Oppression*. London: Oxford University Press; Silfen-Glasberg, D., & Shannon, D. (2010). *Political Sociology: Oppression, Resistance, and the State*. Los Angeles: Sage.
[67] U.S. Census Bureau (2021). *About the Topic of Race*. Washington, DC: U.S. Census Bureau. (https://www.census.gov/topics/population/race/about.html)

historical links to Spain and former colonies of the Spanish Empire, such as many parts of Central and South America.[68] As a result, we examined these data using the sex, race, and ethnicity categories available within the data.

3.1 Carmel Police Enforcement Action Measures

The leadership of the Carmel Police Department specifically requested that DCG examine their vehicle stops, citations, and criminal arrests to determine if there were patterns of evidence of racially biased policing on the part of their officers. Therefore, the domains that were examined began with proactive vehicle stops made by members of the Carmel Police Department. Specifically, this involved determining whether members of any demographic group were stopped by officers more often than they appeared within the population of those likely to be stopped if no bias existed. Once those stops were made, the second domain involved whether or not the individuals stopped received a traffic citation or simply received a warning. Specifically, this involved determining if drivers of each demographic group, when stopped under similar conditions, were disproportionately more likely to receive a citation than male drivers or white drivers. The final domain involved criminal arrests, which included all criminal arrests made by the Carmel Police Department and not just those resulting from vehicle stops. Specifically, this involved determining whether members of any demographic group were arrested for a crime more often than they appeared within the population of those likely to be arrested if no bias existed.

To pursue these examinations, data were retrieved from the records management systems of the Carmel Police Department for the twelve-month period spanning from July 1, 2020, through June 30, 2021. The following specific data were then retrieved and organized as described below.

Vehicle Stops – As described in Section Two above, law enforcement officers may stop vehicles based on probable cause that a vehicle has committed a violation of a traffic law (a traffic stop), or based on reasonable suspicion or probable cause that an occupant of a vehicle has engaged in a crime (a criminal investigative stop).[69] Carmel's records management system is organized by individual offenses rather than individual stops, therefore some data reorganization was required. We were able to identify individual stops by using the records system's UTT (uniform traffic ticket) number as a tracking number. When a Carmel police officer stops a vehicle, a UTT number is assigned to that stop. Then the officer records each individual offense encountered as a separate entry (regardless of whether or not a citation or warning was issued), using the same UTT number for each offense as an identifying number for the one stop.

For example, imagine an officer observed a speeding vehicle and stopped that vehicle. During the interaction of this vehicle stop, the officer did not detect any other traffic or criminal law violations, and the officer decided to issue only a written warning to the driver. In this case, there would be only one entry in the records management system, and it would be associated with its own UTT number for the stop. By contrast, imagine an officer stopped a vehicle for speeding and, as the vehicle stops, the officer noticed the vehicle's license plate was expired and one of its brake lights

[68] Fox, G. E. (1997). *Hispanic Nation: Culture, Politics, and the Constructing of Identity*. Tucson, AZ: University of Arizona Press.
[69] Fourth Amendment to the U.S. Constitution; *Delaware v. Prouse*, 440 U.S. 648 (1979); *Whren v. United States*, 517 U.S. 806 (1996); *Terry v. Ohio*, 392 U.S. 1 (1968).

was burned out. The officer decided to issue a traffic citation for the speeding violation, and also issued warnings for the expired plates and the burned-out brake light. The result in the records system would be three record entries (three rows of data) – one for the speeding violation, one for the license plate violation, and one for the brake light violation. However, all three records would share the same UTT number. This allowed us to utilize the UTT numbers to isolate individual stops.

In the Carmel records system from July 1, 2020, through June 30, 2021, there were 23,922 individual offenses recorded. As just described, however, these individual offenses needed to be reduced down to individual stops by sorting through the UTT numbers. Yet, upon closer examination of these data, it was discovered that some of the offenses recorded in the "traffic" database involved offenses not associated with proactive vehicle stops at all. Sometimes officers encountered non-traffic violations of minor city ordinance, such as dogs not on a leash or loud music complaints, and the officers issued citations or warnings for these offenses. Such circumstances were also recorded within this database.

These non-traffic circumstances were not proactive encounters as they all resulted from citizen calls for service complaining about the dog or the noise of a neighbor. Therefore, it was inappropriate to consider these cases as proactive vehicle stops. Thus they were eliminated from the data set. For example, one entry was for a citation issued for the offense "Animal Care Public Nuisance" in response to a citizen call about a dog loose in a neighborhood that had menaced children. This enforcement action was unrelated to a vehicle stop and was not a proactive encounter as it was in response to a citizen complaint. Therefore, this case was excluded. The same was done for citations issued for noise complaints that were unassociated with vehicle stops and were issued in response to neighbor complaints about loud music.

Likewise, citations and warnings issued for parking violations where no driver was present were eliminated. It would be impossible to "profile" a driver based on race if no driver was present, even if the issuance of the citation was a proactive act by the officer. Furthermore, many of these parking citations were issued in response to citizen (especially business owner) complaints. Finally, nuisance citations and warnings issued for car or business alarms that repeatedly produced false alarms and disturbed the public were also excluded as they were not proactive enforcement actions, nor were they related to a vehicle stop.

After excluding these reactive cases unrelated to vehicle stops, the UTT numbers were used to identify the total number of actual proactive vehicle stops (not total violations) that had occurred. The result was **19,349 actual individual vehicle stops** that occurred during the twelve-month period of study. These files were then examined for missing information in the variables necessary for analyses; namely driver sex, race, Hispanic ethnicity, time of stop, and district of stop. Offense data (and thus stop data) were recorded by officers through their in-car computers.

None of the proactive vehicle stops were missing the date or time of the stop, likely because this information was auto-populated into the file by the patrol vehicle's in-car computer. Another 0.7% of stops were missing the district location of the stop. As location information is also auto-populated into the data from the patrol vehicle's global positioning system (GPS), such missing data could only have resulted from technological glitches, and not officer error. Officers, however,

were the ones responsible for entering the driver sex, race, and ethnicity data. Only 0.1% of the stops were missing the driver's sex, and only 1.3% of the stops were missing the driver's race, both of which would have been due to officer data entry failures. As Hispanic ethnicity is categorized as "yes" or "no", all stops were treated as "non-Hispanic" unless the officer specifically indicated the driver was of Hispanic ethnicity. As a result, no cases were missing data regarding ethnicity.

Overall, the proportion of missing data (0.1% to 1.3% depending on the variable) was very small, and lower than what DCG has encountered in the past with other law enforcement agencies. Nevertheless, as a result of the missing data that did exist, the analyses in this report will rarely total up to the full 19,349 stops because only data with the necessary relevant variables were analyzed in each step.

Unfortunately, a major issue was discovered to exist when attempting to differentiate between traffic stops and criminal investigative stops. As a client of the Hamilton County Public Safety Communications agency, which provides emergency dispatch services for numerous area law enforcement, fire, and EMS agencies across the county, the Carmel Police Department must use the computer-aided dispatch (CAD) software program selected by that agency. This CAD software program for the in-car computers provides no way for officers to differentiate between stops that were conducted purely for traffic enforcement reasons, and stops that were criminal investigative in nature. The drop-down menu only offers the option of "vehicle stop" to record the incident. Other agencies DCG has dealt with in the past did have the option to select a "criminal investigative stop" category which allowed parsing out these stops from the traffic stops and comparing them against a criminal offender population benchmark. Frustratingly, this was not possible with Carmel without conducting interviews with each of the officers to recall the details of 19,349 vehicle stops. This was cost and time prohibitive.

This matters tremendously as each type of stop is traditionally compared to a different benchmark (driver population for traffic stops, and criminal offender population for criminal investigative stops). Although it violated the best practices of social science research to examine both traffic and criminal investigative stops together, the research team had no other option because of the software utilized by the Hamilton County Public Safety Communications agency. Therefore, as will be described below, "vehicle stops" were compared to both crash driver and criminal offender benchmarks. This was far from a perfect solution, yet it was the only solution available given the circumstances.

Because of this weakness, we also decided to conduct a second analysis of the stops using the "veil-of-darkness" benchmarking method as an additional check. Both the vehicle stops made during daylight hours, and those made during hours of darkness, would have been a mixture of traffic stops and criminal investigative stops. Therefore, the circumstances (with regard to criminal or traffic reasons for stop) would have been relatively similar between the benchmark (stops during darkness) and the stop measure (stops during daylight).

Post-Stop Citations – The leadership of the Carmel Police Department asked DCG to examine post-stop citations to determine if any racial or ethnic group received more punitive enforcement

action than that received by males or whites. As described in Section Two of this report, in order to do this, one needs to compare similarly-situated individuals.

First, it is important to consider offenses with similar offense seriousness. For example, running a red light traffic signal at a busy intersection or speeding through a school zone during school hours are much more serious offenses than an expired license plate or a single burned-out taillight. As a result, the two serious moving violations would be more likely to result in the issuance of a traffic citation, and the two minor violations are more likely to result in only a warning. If a driver of one race was stopped for racing through a red light at a busy intersection, and a driver of a different race was stopped for having one of two taillights burned out, it is likely these two drivers would receive different outcomes with regards to a citation. Nevertheless, this difference in outcomes would have nothing to do with the drivers' races as they were involved in very different situations. It is extremely necessary to compare stops for the same offense under similar circumstances – something the *Indianapolis Star* and *Channel 8 News I-Team* failed to do.

There is also the issue of multiple-offense stops. For example, two drivers may both be stopped for having a headlight out. While this may be the only violation for one of the drivers, the second driver may be intoxicated and have a suspended driver's license. Obviously, such differences in circumstances will legitimately result in different outcomes for the two drivers despite their being stopped for the same reason. The intoxicated and suspended driver will likely be cited, placed in custody under arrest, and have his or her vehicle impounded. The other driver will likely only receive a warning and a verbal cautioning to have the headlight replaced. The different outcomes would have nothing to do with driver race or sex, only different circumstances of seriousness.

In order to conduct an appropriate analysis, therefore, it was necessary first to isolate stops that involved one, and only one, offense. Once these single-offense stops were isolated, stops for the same offense were then compared with one another. Of the 19,349 individual vehicle stops, 16,376 (84.6%) involved only one violation. The remaining 2,973 multi-violation stops that were not tested (only 15.4% of all stops), involved between two and ten violations each, with a mean of 3.5 violations discovered per stop. Each of these stops varied from the next in terms of combinations of types of violations encountered, numbers of violations encountered, and seriousness of circumstances. As a result, it was not possible to gather a sufficient sample of comparable stops for each patrol district to analyze properly with comparisons across multiple racial groups for the multiple-violation stops.

What ***was*** clear, though, was that most of the multiple-violation stops involved drivers with very serious violations. Of the multiple-violation stops, 51.5% of the drivers stopped had a suspended or revoked driver's license, or they had never ever received a driver license. Furthermore, 21.9% of the multiple-violation drivers were found to either be driving while intoxicated, or had committed a crime, such as driving a stolen car, leaving the scene of an accident, fleeing from the police, or having outstanding warrants for their arrests.

The 16,376 one-violation stops were found to have involve 175 different specific violations of traffic laws. The vast majority of these different violations, however, occurred less than ten times in the data, making it difficult to find comparable stops for persons of each race category, much less to do so in a disaggregated fashion for each of the six patrol districts across the city. Examples

include stops for a leaky load (i.e., material flying out of the back of a vehicle), operating a vehicle with a missing rear bumper, or pulling a trailer without proper safety chains. Such violations were encountered, but so very infrequently that there were few other example stops to which they could be compared.

Therefore, among the one-violation stops we only examined post-stop citation decisions for the five most common reasons for stop across the city. These five most common reasons for stop were:
1.) Speeding (10,439 stops)
2.) Expired license plate (2,355 stops)
3.) Improper headlights (1,363 stops)
4.) None or improper tail lights (1,277 stops)
5.) Failure to signal lane change or intent to turn (643 stops)
These five reasons for stop totaled 16,077 of the one-violation stops, making up 98.2% of the 16,376 one-violation stops by Carmel officers. The remaining 299 one-violation stops were spread across 170 other traffic violation categories. This prevented the comparison of similar offense cases with any hope of racial diversity among the drivers stopped for any other types of violations other than the five listed above.

Arrests – The leadership of the Carmel Police Department requested that DCG examine their criminal arrests to determine if evidence existed of disproportionately punitive treatment of any particular racial group. Data on criminal arrests were obtained from the Carmel Police Department's booking records management system. These included both custodial arrests in which the arrestee was physically transported to a jail for booking, and summons arrests where an individual was issued a summons to appear in court on the criminal charge, but was not booked into jail. This also included all criminal arrests made by the Carmel Police Department, not just those linked to traffic stops.

Juvenile records under Indiana law are a sensitive issue that carry extra protections and confidentiality. Therefore, our analysis of arrests was limited to the use of data on arrests of adults. As was the case with the vehicle stop data, each line of data was an individual offense, not an individual arrestee or criminal case. For example, imagine an armed robbery that involved two robbers and one of the robbers was also found to be a felon illegally in possession of a firearm and had an active warrant out for his arrest for another crime. In such a case there would be one criminal case number (for the robbery incident), and two arrestees (the two robbers). But there could be four lines of data in the database because of the four separate criminal charges (armed robbery charge for suspect one, and an armed robbery charge, felon in position of a gun charge, and a warrant charge for suspect two).

So despite the database revealing 1,573 separate criminal charges, a detailed examination of each case revealed these charges only involved **1,351 actual individuals arrested** for a misdemeanor or felony criminal charge from July 1, 2020, through June 30, 2021. These arrests were then compared against a benchmark measure that estimated the criminal offending population active within the borders of Carmel.

3.2 Carmel Benchmark Measures

As described earlier in Section Two of this report, scholars and researchers have realized that different proactive police behaviors require different benchmark measures to reflect the population legitimately at risk of receiving a specific police enforcement action. As a result, each of the police behaviors examined here – stops, citations, and arrests – needed its own appropriate benchmark measure for comparison.

Vehicle Stops – DCG has a pattern or practice of using crash drivers as an estimate of the driving population. As explained in Section Two, U.S. Census population data ***do not*** represent the sex, race, or ethnic demographic characteristics of the driving population within any geographic region. This has been widely acknowledged by researchers for more than two decades now.[70] DCG has found the previously validated benchmark of crash drivers to be an economical and sound method for estimating the demographic characteristics of the driving population in an area – the persons at risk of being stopped for committing a violation of the traffic laws.[71]

Therefore, data was accessed on the sex, race, and Hispanic ethnicity of the drivers involved in all motor vehicle crashes handled by the Carmel Police Department from July 1, 2020, through June 30, 2021. This was a total of 2,845 drivers. An examination of these drivers further revealed how inappropriate U.S. Census population data are for estimating the demographic characteristics of the drivers on the roadways in any specific region. As Figure 3.1 below reveals, **of the 2,845 drivers who were involved in vehicle crashes within the borders of Carmel, only a third (33.6%) were residents of Carmel. This means that two-thirds (66.4%) of the drivers who were traveling the roadways of Carmel were not from Carmel, and therefore not included in Carmel's U.S. Census statistics**.

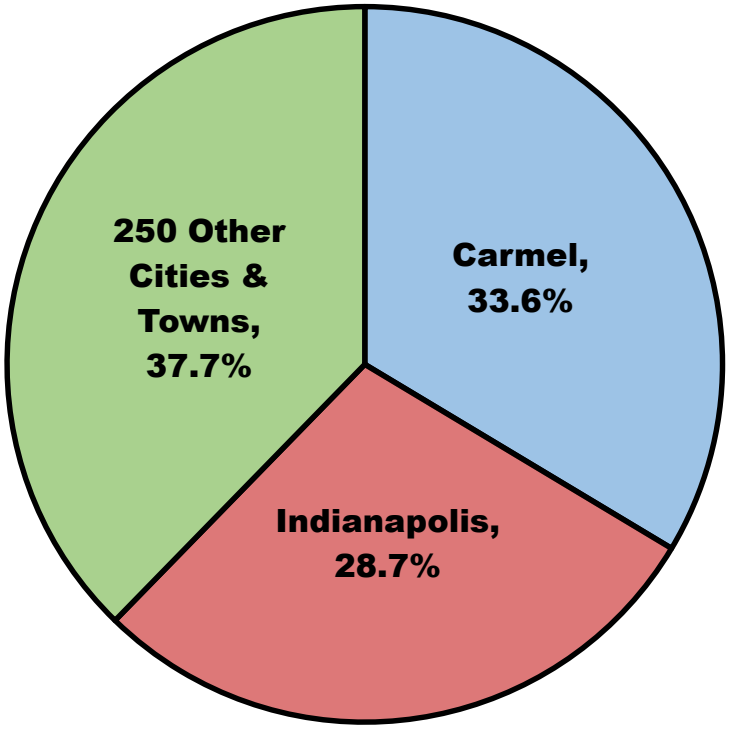
The drivers who were traveling the roadways within Carmel and had crashes represented residents from 252 different cities and towns, across 31 different U.S. states and one Canadian province. This clearly demonstrates that the overwhelming majority of drivers traveling within Carmel are

[70] Engel, R. S., & Calnon, J. M. (2004). Comparing benchmark methodologies for police-citizen contacts: traffic stop data collection for the Pennsylvania State Police. *Police Quarterly, 7(1)*, 97-125; Federal Highway Administration. (2000). *Travel Patterns of People of Color*. Washington, DC: U.S. Department of Transportation; Grogger, J., & Ridgeway, G. (2006). Testing for racial profiling in traffic stops from behind a veil of darkness. *Journal of the American Statistical Association, 101(475)*, 878-887; Mauch, M. & Taylor, B. D. (1997). Gender, race, and travel behavior: analysis of household-serving travel and commuting in San Francisco Bay Area. *Transportation Research Record 1607(1)*, 147-153; Preston, V. & McLafferty, S. (2016). Revisiting gender, race, and commuting in New York. *Annals of the American Association of Geographers 106(2)*, 300-310; Smith, M.R., Rojek, J.J., Petrocelli, M. & Withrow, B. (2017). Measuring disparities in police activities: a state of the art review. *Policing: An International Journal 40(2)*, 166-183; Tillyer, R., Engel, R.S. & Calnon-Cherkauskas, J. (2010). Best practices in vehicle stop data collection and analysis. *Policing: An International Journal 33(1)*, 69-92; Withrow, B. L. (2005). *Racial Profiling: From Rhetoric to Reason*. Upper Saddle River, NJ: Pearson-Prentice Hall.

[71] Alpert, G.P., Smith, M.R., & Dunham, R. (2004). Toward a better benchmark: Assessing the utility of not-at-fault traffic crash data in racial profiling research. *Justice Research and Policy, 6(1)*: 44-69; Dolan Consulting Group LLC (2018). *Evaluating Fairness in Traffic Stops by the Ann Arbor Police Department*. Raleigh, NC: Dolan Consulting Group; Schafer, J. & Carter, D. L. (2018). *An Assessment of the Management Analysis of Traffic Stops (MATS) Program Data for the Lansing, MI Police Department*. East Lansing, MI: Michigan State University; Withrow, B.L. & Williams H. (2015). Proposing a benchmark based on vehicle collision data in racial profiling research. *Criminal Justice Review, 40 (3)*: 449-469.

people from other communities. The Indianapolis metropolitan area is the thirty-third largest metro area in the nation, attracting people from far and wide for business and leisure. The metro area is crisscrossed with major interstate highways, such as I-64, I-65, I-69, I-70, US-31, US-40, and US-421. There is a reason the official slogan of the State of Indiana is the "Crossroads of America" – because it is. It should be no surprise, then, that the driving population within Carmel, through which several major highways pass, is more driverse than the population of Carmel itself.

Figure 3.1 Residence Location of the 2,845 Drivers in Crashes within Carmel



The sex composition of these drivers differed significantly from the Carmel census population. According to the U.S. Census Bureau, the population of Carmel in 2020 was 48.5% male and 51.5% female.[72] In contrast, the drivers involved in crashes within Carmel were 54.9% male and 45.1% female. This was consistent with the National Highway Traffic Safety Administration (NHTSA) research that reveals men, on average, drive more often, and for greater distances, than do women. In 2019, the NHTSA nationwide estimate was that males made up around 57% of all the drivers on the roadways.[73] This is one of the reasons men, on average, generally pay higher auto insurance rates than women. Therefore, the results for Carmel that males are disproportionately represented among drivers is not surprising.

[72] U.S. Census Bureau, 2021 (https://www.census.gov/quickfacts/carmelcityindiana).
[73] National Highway Traffic Safety Administration (2021). *Traffic Safety Facts Annual Report, 2019*. Washington, DC: National Highway Traffic Safety Administration (https://cdan.nhtsa.gov/tsftables/tsfar.htm#).

Likewise, the race and ethnic composition of the drivers found within Carmel differed markedly from the Census population for the city. According to the U.S. Census Bureau, the population of Carmel during 2020 was 0.5% Alaskan Native / American Indian, 10.3% Asian / Pacific Islander, 2.7% African-American / Black, 83.4% Caucasian / White, and 3.1% all other races (including multiracial).[74] In comparison, the crash drivers in Carmel were 0.5% Alaskan Native / American Indian, 5.7% Asian / Pacific Islander, 12.5% African-American / Black, and 81.3% Caucasian / White. **African-American representation among drivers involved in crashes within Carmel was 363% higher than the African-American representation among the residents of Carmel**. On the other hand, Asian / Pacific Islanders were only half as likely to be among the crash drivers as compared to their representation in the population of Carmel.

According to the U.S. Census Bureau, the resident population of Carmel in 2020 consisted of only 3.7% people of Hispanic ethnicity, but Hispanics made up 5.7% of the drivers involved in crashes within Carmel. **Hispanic representation among drivers involved in crashes within Carmel was 54% higher than the Hispanic representation among the residents of Carmel**. The driving population within Carmel is clearly very different from the resident population in terms of sex, race, and ethnicity. This reveals the absurdity of the use of U.S. Census statistics as a benchmark, as was incorrectly used by the *Indianapolis Star* and the *Channel 8 News I-Team*. The greater diversity of the Carmel driving population should also come as no surprise as the employment, shopping and recreation opportunities the city offers draws people from around the metro area.

If the vehicle stop data we had obtained had been data for traffic stops only, the crash driver benchmark would have been sufficient for a valid comparison. Unfortunately, as described in the section above, it was impossible to differentiate between traffic stops and criminal investigative stops. Research has revealed that the vast majority of the driving population engages in minor traffic violations from time to time.[75] As such, a benchmark that simply measures the drivers on the roadways (such as the crash drivers benchmark does) would be sufficient to approximate those at legitimate risk for experiencing a traffic stop. But the majority of the driving population is ***not*** likely to engage in criminal behavior.

We know through decades of criminological research that criminal offender populations differ from the general population on many demographic measures. For example, we know that the criminal offender population, on average, has a lower education and income level than the general population. We know that criminal offenders are disproportionately male, and disproportionately between the ages of 15 and 40.[76] Furthermore, an unknown number of persons committing crimes in any community come from outside that community, as was the case with the majority of drivers coming from outside of the Carmel community, so U.S. Census data for Carmel again does not

[74] U.S. Census Bureau, 2021 (https://www.census.gov/quickfacts/carmelcityindiana).
[75] Blanchard, R. A., Myers, A. M., & Porter, M. M. (2010). Correspondence between self-reported and objective measures of driving exposure and patterns in older drivers. *Accident Analysis & Prevention, 42(2)*, 523–529; Miller, K. (2009). Race, driving, and police organization: Modeling moving and nonmoving traffic stops with citizen self-reports of driving practices. *Journal of Criminal Justice, 37(6)*, 564-575; Stinchcombe, A., & Gagnon, S. (2013). Aging and driving in a complex world: Exploring age differences in attentional demand while driving. *Transportation Research: Traffic Psychology and Behaviour, 17*, 125–133.
[76] Sampson, R. J., & Laub, J. H. (1995). *Crime in the Making: Pathways and Turning Points through Life*. Cambridge, MA: Harvard University Press; Wright, J. P., Tibbetts, S. G., & Diagle, L. E. (2014). *Criminals in the Making: Criminality across the Life Course*. Los Angeles: Sage.

reflect the sex, race, and ethnic composition of these criminal offenders. When the population legitimately at risk for criminal investigative stops is different than the driving population, then a different benchmark is required for stops of a criminal investigatory nature. What is needed is a benchmark that estimates the demographic characteristics of the segment of society that is engaged in crime within the borders of Carmel.

As was described earlier in Section Two, most previous studies have used arrested individuals as the benchmark representing the criminal offender population. The DCG staff has been uncomfortable with that benchmark method as it inherently carries a tautological issue. If the police engage in biased enforcement against a particular racial group (which is what we are trying to determine), then that group would be disproportionately stopped and arrested. This bias would therefore create an overrepresentation of that racial group among the arrested offenders and would bias arrested offenders as a benchmark. It would be more trustworthy, therefore, to employ a measure of the criminal offender population that is not determined by police officers.

As a result, it has been DCG's practice to rely upon the descriptions of criminal offenders provided by non-police individuals. We utilized the physical descriptions of criminal suspects that were provided by crime victims, and witnesses to crimes, who were not police officers.[77] Such data were available through reviewing the electronic records of crimes reported to the Carmel Police Department by members of the public. From July 1, 2020, through June 30, 2021, non-police witnesses and victims who reported crimes that took place within Carmel provided physical descriptions for 2,236 criminal suspects. These descriptions, provided by private citizens describing the people who stole from them, threatened them, physically assaulted them, or destroyed their property, served as our benchmark estimate of the characteristics of the criminal offending segment of the population operating within Carmel. It should also be noted that these descriptions were not merely "suspicious persons." Each of these descriptions was associated with the filing of a formal police report of a verifiable crime.

Despite the fact the U.S. Census Bureau population for Carmel in 2020 was 48.5% male, 71.4% of the criminal suspects described by the general public were male. This was consistent with the research literature within the field of criminology that reveals men, on average, engage in crime (especially violent crime) at much higher rates than do women.[78] Therefore, it was not surprising that males made up a disproportionate percentage of the criminal offending population active within Carmel.

While the U.S. Census population of Carmel in 2020 was 0.5% Alaskan Native / American Indian, only 0.1% of the criminal suspects described to the police were described as Alaskan Natives or American Indians. While the U.S. Census population of Carmel in 2020 was 10.3% Asian / Pacific Islander, only 1.7% of the criminal suspects described to the police were described as Asians or Pacific Islanders. **While the U.S. Census population of Carmel in 2020 was only 2.7% African-American / Black, 34.9% of the criminal suspects described to the police by members of the**

[77] Dolan Consulting Group LLC (2018). *Evaluating Fairness in Traffic Stops by the Ann Arbor Police Department*. Raleigh, NC: Dolan Consulting Group.
[78] Sampson, R. J., & Laub, J. H. (1995). *Crime in the Making: Pathways and Turning Points through Life*. Cambridge, MA: Harvard University Press; Wright, J. P., Tibbetts, S. G., & Diagle, L. E. (2014). *Criminals in the Making: Criminality across the Life Course*. Los Angeles: Sage.

public were described as African-Americans or Black. While Caucasians / Whites constituted 83.4% of the Census population of Carmel, only 63.4% of the suspects described to the police were Caucasian / White.

According to the U.S. Census Bureau, the resident population of Carmel in 2020 was 3.7% people of Hispanic ethnicity, but 13.8% of the criminal suspects within Carmel were described as of Hispanic ethnicity. Hispanics were represented among the criminal suspects almost four times higher than their representation among the population of residents of Carmel. The criminal population operating within Carmel is clearly very different from the resident population in terms or sex, race, and ethnicity.

According to the victims and witnesses of crimes that occurred within Carmel, African-Americans were represented among the offenders thirteen times higher than their representation among the residents of Carmel. Conversely, Asians / Pacific Islanders were about six times *less* likely to be among the criminal suspects as compared to their representation in the population of Carmel. Again, it would be inaccurate and scientifically unprofessional to compare arrest statistics to the census population of Carmel. The small segment of the metro area population that chooses to engage in crime within Carmel has very different demographic proportions that those of the residents of Carmel population as a whole.

Figure 3.2 Comparison by Sex of Vehicle Stop Benchmarks to the Census Population

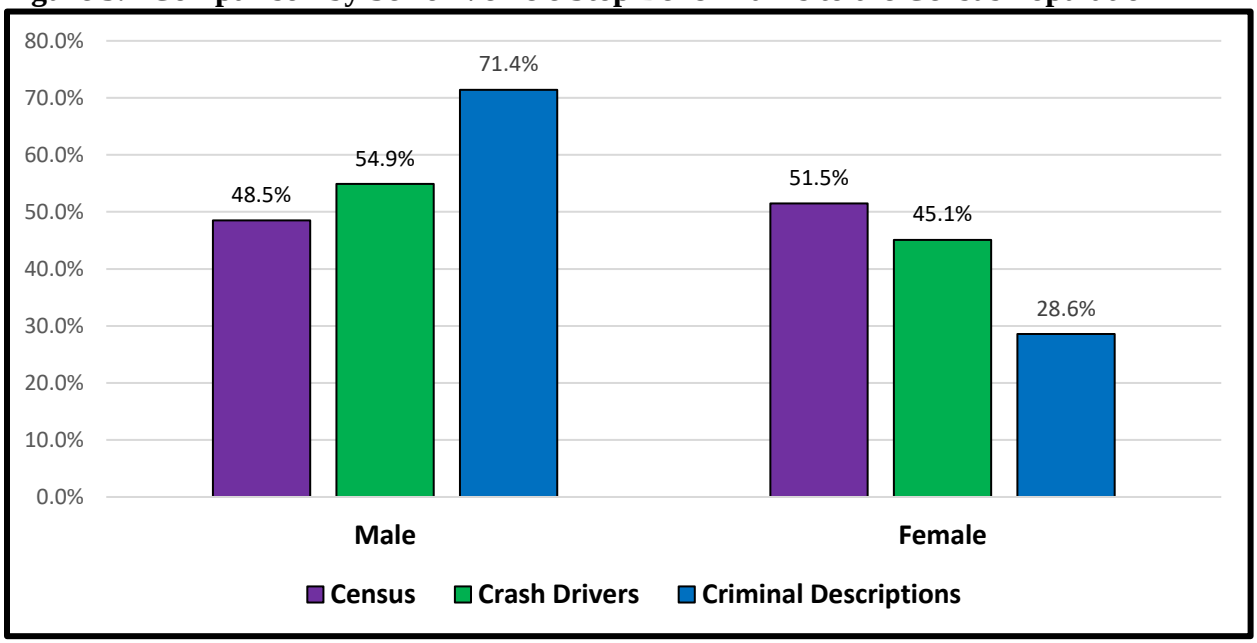


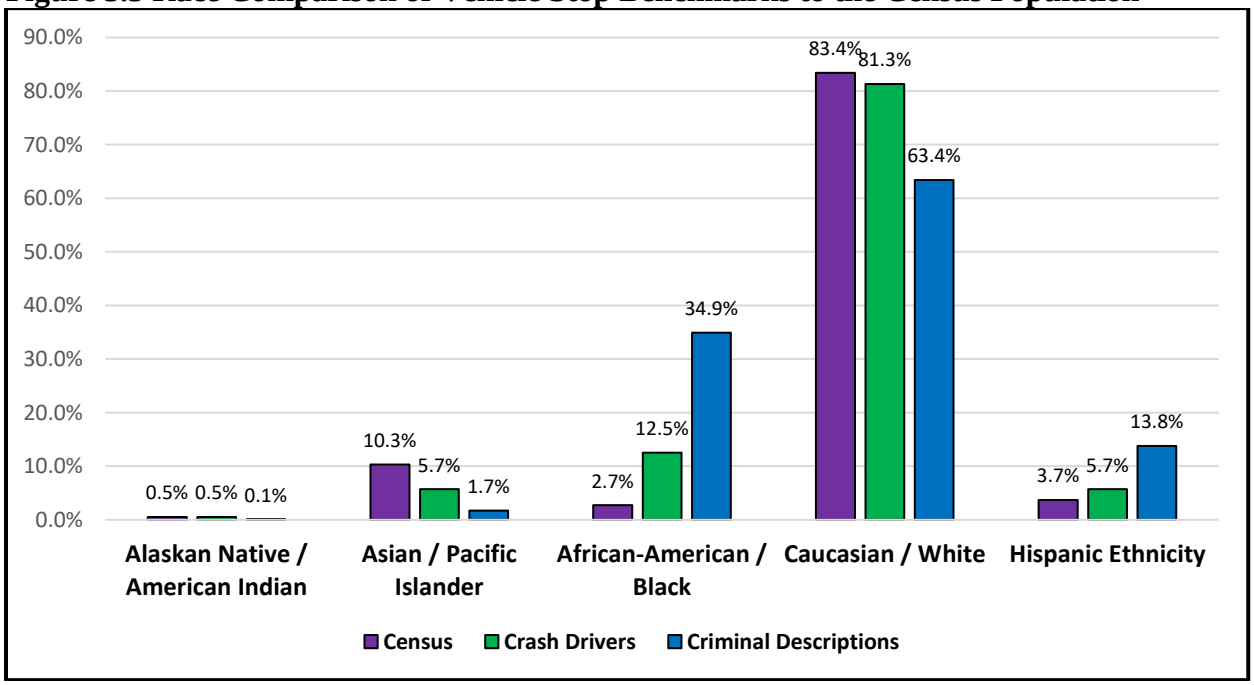
Figure 3.2 is a bar graph displaying male and female proportions of the U.S. Census population of residents of Carmel, compared with the drivers in crashes within Carmel, and the descriptions of criminal suspects reported to the Carmel Police Department. This visual aid helps illustrate how dramatically the Census population used by the *Indianapolis Star* and the *Channel 8 News I-Team*

differs from the real population of drivers and criminal offenders encountered within the boundaries of Carmel.

Likewise, Figure 3.3 compares the racial and ethnic proportions of the U.S. Census resident population for Carmel, the drivers involved in crashes within Carmel, and the criminal suspect descriptions reported by the public within Carmel. Again, the differences between the Census resident population and those driving or committing crimes within Carmel are most striking, especially for the category of African-American / Black. As decades of prior social science research has already demonstrated, U.S. Census population data does not resemble the driving populations or criminal offending populations within a specific jurisdiction.

As stated earlier, we were unable to separate out traffic stops (for which crash drivers are an appropriate benchmark) from criminal investigative stops (for which criminal suspects are an appropriate benchmark). We therefore used both benchmarks, with the assumption that the real benchmark percentages for both types of police stops combined fell somewhere in-between the traffic (crash driver) and criminal (suspect description) benchmarks.

Figure 3.3 Race Comparison of Vehicle Stop Benchmarks to the Census Population



Because it was impossible to perfectly match the right kinds of stops with their appropriate benchmarks, the DCG team decided to also utilize another analysis method found among the research best practices for examining patterns of bias in police proactive behavior. In order to be as comprehensive as possible, we elected to apply the veil-of-darkness benchmark method used in many previous studies. As described in Section Two of this report, the veil-of-darkness method uses police vehicle stops conducted during hours of darkness (when officers cannot easily determine the races of drivers prior to stop) as the benchmark for comparison to police vehicle

stops that occurred during hours of daylight (when it is theoretically easier for officers to determine the races of drivers prior to stop).

Replicating the methods of the previous research teams that have utilized this method, we examined the time and date of each stop to classify the stop as either occurring during darkness or light. Following the precedent set by other researchers, we classified stops as occurring during darkness if they occurred more than thirty minutes after official sunset, but before thirty minutes prior to official sunrise.[79] This method produced a benchmark of 7,003 vehicle stops during hours of darkness (the benchmark), and 12,346 vehicle stops during hours of light. We then compared the daylight stops to the benchmark of stops made during hours of darkness.

Post-Stop Citations – As we explained above, in order to compare drivers under similar circumstances, we examined stops involving only one traffic violation, and only stops involving the five most common traffic violations encountered (which constituted 98.2% of the one-violation stops). Each of these five types of violations was analyzed separately. As the benchmark for each of these categories of stops, we used the outcomes for male drivers and white drivers, under the assumption that if bias existed it would be applied toward women and persons of color. The percentage of drivers of each demographic category who received a citation was then compared to the percentage of male or white drivers who received a citation under similar circumstances. The assumption for this sort of comparison was that if officers are not biased, men and women should receive citations at a similar rate for similar offenses. Furthermore, if officers are not biased, then persons of color should receive citations at a similar rate as whites for similar offenses.

Criminal Arrests – The criminal arrest data described earlier were compared to a benchmark that represented the criminal offender population operating within the boundaries of Carmel. This analysis method should not be confused with the methodology used to examine disparity in the citation decision. With citations, we already have a sample of people who have been stopped for having committed a traffic violation. We can then use that sample to see if people who are guilty of committing the same violation under the same circumstances were treated relatively equally. With the criminal arrest data, we **do not** have a sample of persons caught committing a crime from which we can see which ones were arrested and which were allowed to go free. In our data, we only have a sample of the persons who were all actually arrested.

This is much more similar to the vehicle stop data. We do not have a sample of people the police observed committing a traffic violation, from which we can see who was stopped and who was

[79] See for example: Hannon, L., Neal, M., Gustafson, A. R., (2021). Out-of-place and in-place policing: an examination of traffic stops in racially segregated Philadelphia. *Crime & Delinquency, 67(6-7)*: 868-890; Lundman, R. J., & Kowalski, B. R. (2009). Speeding while black? Assessing the generalizability of Lange et al.'s (2001, 2005) New Jersey turnpike speeding survey findings. *Justice Quarterly, 26(3)*: 504-527; Taniguchi, T. A., Hendrix, J. A., Levin-Rector, A., Aagaard, B. P., Strom, K. J., Zimmer, S. A. (2017). Extending the veil of darkness approach: an examination of racial disproportionality in traffic stops in Durham, NC. *Police Quarterly, 20(4)*: 420-448; Vito, A.G., Woodward Griffin, V., Vito, G.F. & Higgins, G.E. (2020). Does daylight matter? An examination of racial bias in traffic stops by police. *Policing: An International Journal, 43(4)*: 675-688; Wexler, N. (2020). *Testing for Police Racial Profiling Using Data on Pre-Stop Race Visibility: Evidence from Minneapolis*. Minneapolis, MN: University of Minneapolis; Withrow, B.L. (2007). *The Portland Police Bureau's Stop Data: An Independent Analysis.* Portland, OR: Portland Protective Association; Worden, R. E., McLean, S. J., Wheeler, A. P. (2012). Testing for racial profiling with the veil-of-darkness method. *Police Quarterly, 15(1)*: 92-111.

allowed to continue on driving. We only have data on those who were stopped. So just as the stop data were compared to a benchmark estimating the proportions of the sexes and races of the motoring population, the arrest data were compared to a benchmark estimating the proportions of the sexes and races of the criminal offending population.

As discussed in detail above, the segment of the population engaged in crime is known to differ in many ways from the general population. Likewise, as was the case with drivers, an unknown percentage of the individuals actively engaging in crime within Carmel are not from Carmel. These facts identify the need for a benchmark that estimates the sex, race, and ethnicity proportions of the individuals engaging in crimes within Carmel for a fair benchmark to compare against the arrests made by members of the Carmel Police Department. As is the pattern or practice for DCG, we utilized the criminal suspect descriptions mentioned earlier as the benchmark for comparison to arrests. As described earlier, this benchmark comes from members of the public who have witnessed, or become the victims of, real crimes committed within Carmel during the same 12-month period of this study.

3.3 Control for Aggregation Bias

As described earlier in Section 2 of this report, when the data involving proactive police behaviors, and the data for the comparison benchmarks, are drawn in different proportions from different subunits of a sample, then the statistical problem of aggregation bias arises.[80] As a result, most researchers understand the importance of disaggregating their examinations of proactive police behaviors by geographic locations and times of day. This requires a balance between the disaggregating on the one hand, and having a statistically usable sample size of stops or benchmark cases on the other. Nevertheless, it is a best practice to disaggregate by geographic region whenever possible, and many studies have followed this practice.[81]

Figure 3.4 below is a district map of the city of Carmel. In order to evenly distribute the workload across the officers working on any shift, allow officers to take responsibility for a specific segment of the community, and employ community-specific policing strategies based on the unique needs of different neighborhoods, the Carmel Police Department has divided the city into six patrol districts. These districts are labeled by the law enforcement communications phonetic alphabet: Adam, Baker, Charles, David, Edward, and Frank. The geographic size of each district was determined by population density and volume of calls for service, with areas of denser population and more calls being ascribed smaller areas. This allows officers to have more time to devote

[80] Lubinski, D., & Humphreys, L. G. (1996). Seeing the forest from the trees: When predicting the behavior or status of groups, correlate means. *Psychology, Public Policy, and Law, 2(2)*, 363–376; Rose, D. D. (1973). National and local forces in state politics: The implications of multi-level policy analysis. *American Political Science Review, 67(4)*, 1162–1173; Rosenthal, J. A. (2001). *Statistics and Data Interpretation*. New York: Wadsworth.

[81] See, for example: Dolan Consulting Group LLC (2018). *Evaluating Fairness in Traffic Stops by the Ann Arbor Police Department*. Raleigh, NC: Dolan Consulting Group; Engel, R. S., Calnon, J. M., Tillyer, R., Johnson, R. R., Liu, L. (2005). *Pennsylvania State Police Project on Police-Citizen Contacts: Year 2 Final Report (May 2003-April 2004)*. Cincinnati, OH: University of Cincinnati; Engel, R. S., Frank, J., Tillyer, R., Klahm, C. (2006). *Cleveland Division of Police Traffic Stop Data Study: Final Report*. Cincinnati, OH: University of Cincinnati; Lamberth, J. C. (2017). *Grand Rapids Michigan Police: Results from Stop Data Analysis Study*. Chads Ford, PA: Lamberth Consulting LLC.

attention to these areas of greatest need. Dividing up the city in this manner, with different officers assigned to each district, produces more efficient all-around police services and response times.

Figure 3.4 Carmel Police District Map

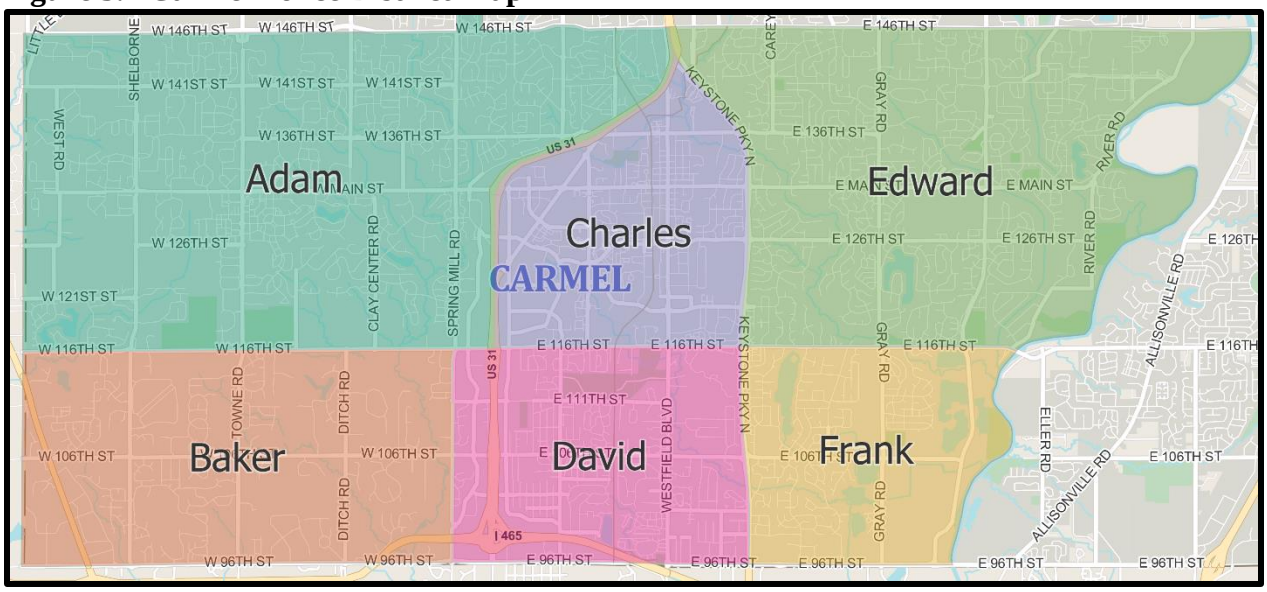
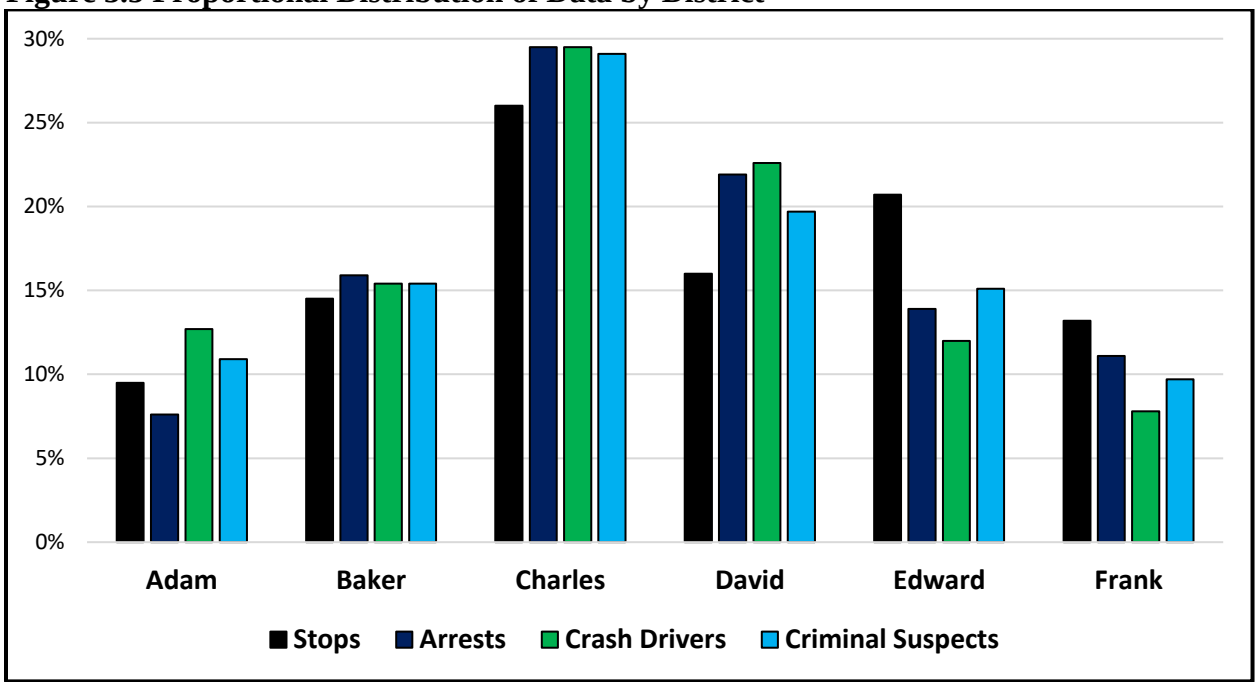


Figure 3.5 below, however, reveals the distributions of data for our study across these districts. As Figure 3.5 reveals, the proportions of the enforcement actions, and the proportions of the benchmarks, do not match across districts.

For example, compare the proportions of the vehicle stops within each district with the proportions of crash drivers or criminal suspects that were used as benchmarks to compare against these stops. While only 16% of the stops occurred within David District, 23% of the crash drivers and 20% of the criminal suspect descriptions came from David District. Conversely, Edward District made up 20% of the vehicle stop data, but only 12% of the crash benchmark data and 15% of the suspect description benchmark data. If the crash drivers and criminal suspects encountered within David District differed markedly from those in Edward District, for example, these benchmark cases would skew a citywide benchmark for the stops in Edward District.

This graph reveals a great likelihood of aggregation bias within our citywide data. As a result, we followed best practices and analyzed all of our data at the district level. In light of Figure 3.5, it would have been irresponsible to have done otherwise and reported the data at the citywide level. Such an analysis, as was the case with the analysis by the *Indianapolis Star* and the *Channel 8 News I-Team*, would have included aggregation bias error and produced false results.

Figure 3.5 Proportional Distribution of Data by District



3.4 Binomial Statistical Test

As explained earlier in Section 2, when examining the proportions of a racial group in the percentage of stops or citations, and then comparing it to some benchmark based on another sample, one must always control for sampling error with a statistical test.[82] Sampling errors occur when the statistical characteristics of a population are estimated from a sample of that population. Since a sample does not include all members of the population, the characteristics of the sample will differ from the characteristics of the true population from which the sample was drawn. These differences between the sample and the population is sampling error.[83]

Recall the illustrative example we gave earlier about measuring the female representation in the U.S. using only small samples. In the U.S., 50.9% of the population is female, and 49.1% is male. If we took a random sample of three Americans, we would find that women make up either 0% (no females), 33.3% (one female), 66.7% (two females), or 100% (three females) of the sample. If we did this multiple times, taking samples of three people each time, because of the laws of probability and the real percentage of females in the population, the majority of the time we would get samples with one (33.3%) or two (66.7%) females. Obviously, this does ***not*** mean that the percentage of females in the U.S. population is 33.3% or 66.7%. It simply means our sample was not large enough to mathematically calculate the true percentage of 50.9%, and that by random chance we had one more or one less female in our sample. Because all of our benchmarks are

[82] Rosenthal, J. A. (2001). *Statistics and Data Interpretation*. New York: Wadsworth; Sarndal, C. E., Swenson, B., & Wretman, J. (1992). *Model Assisted Survey Sampling*. New York: Springer-Verlag.
[83] Ibid.

samples (i.e., not the whole population of all drivers in Carmel or all criminal offenders operating in Carmel), we will have the same phenomenon occur in our present study.

For example, only 0.5% of the drivers in our benchmark of 2,845 crash drivers were Alaskan Native / American Indian. Yet these 2,845 crashes occurred across six different patrol districts. Because of aggregation bias, we must examine each district independently. Say that these crash drivers are divided evenly across the six districts, which would result in each district receiving a sample of 474 crash drivers to use as a benchmark. Is it possible for Alaskan Natives / American Indians to make up exactly 0.5% of 474 crash drivers? Multiplying 474 by 0.5% (474 x .005) results in 2.37 drivers. It is impossible to have 2.37 drivers, so the closest we can come is 2 drivers or 3 drivers. If it is 3 drivers, then the Alaskan Native / American Indian drivers now make up 0.63% of the drivers in the crash driver benchmark, higher than the true proportion of 0.5%. But this is only because the sample is not mathematically large enough to produce an outcome of exactly 0.5%. It would take a sample size of more than 1,000 crash drivers before it would even be mathematically possible to achieve the true result of 0.5% drivers.

Additionally, what if, by random chance alone and not racial bias, only one more Alaskan Native / American Indian driver was in the sample? Purely by random chance, which is a common occurrence when drawing random samples, the percentage of Alaskan Native / American Indian drivers in the sample would now be 0.84%, almost twice as much as 0.5%. Due to chance alone, we always get sampling error. We will always gather samples that have a couple too many, or a couple too few of any group to match the exact percentages in true population of drivers on the roadways of Carmel. Therefore, since sampling always includes some level of sampling error, one must ***always*** control for sampling error when using sample estimates.

This is why scientists, including social scientists, engage in mathematical statistical analysis procedures when examining samples. They use statistical tests to determine if a difference between the outcome we found (i.e., the percentage of a racial group in the police stops), and our benchmark measure was simply due to sampling error, or was likely a true difference (i.e., true racial disparity).[84]

To do this, we utilized the binomial statistical test. The binomial test measures the statistical significance of differences between a sample and a known population, or between two compared samples.[85] For example, when testing a sample of seven Americans from a population that is known to be 50.9% female, the binomial test can reveal that a result of 42.9% (three females) or 57.1% (four females) is not significantly different from the true measure of 50.9% female, because the binomial test can estimate the amount of sampling error in the sample.

The formula for the binomial test is as follows:

$$p = \sum_{i \in \mathcal{I}} \Pr(X = i) = \sum_{i \in \mathcal{I}} \binom{n}{i} \pi_0^i (1 - \pi_0)^{n-i}$$

[84] Rosenthal (2001); Sarndal et al. (1992).
[85] Rosenthal, J. A. (2001). *Statistics and Data Interpretation*. New York: Wadsworth.

This formula considers several things. First, it considers how far apart the sample percentage is from the known population percentage (i.e., how far apart the percentage of crash drivers that were African-Americans differs from the percentage of stopped drivers who were African-Americans). Second, it considers the size of the sample, realizing that larger samples better represent the actual population. Third, the binomial test formula considers the size of the proportions involved, realizing that the smaller the proportions, the greater the proportional change that will result with a one unit increase.[86] (For example, if a city averages 1 fatal car crash per year and just happens to have no fatal car crashes in one particular year, it experiences a 100% decrease in fatal crashes even though it was only one less fatality than average. By comparison, for a city that averages 100 fatal car crashes per year, one more fatality in a given year would only equate to a 1% increase in fatalities. When dealing with small numbers, a single unit change creates a massive proportional change.) Fourth, the binomial formula considers the mathematical laws of probability that suggest the expected amount of sampling error in a particular sample based on all of these other elements above.

The binomial test formula calculates all these pieces of information and its output is the chance (written as a proportion) that the percentage of stops and the percentage of crash drivers are roughly the same, after controlling for sampling error.[87] In other words, it reveals how confident one can be that the difference between the two compared samples is a real difference, and not simply the result of sampling error.

In terms of that confidence, social scientists often set one of three thresholds of confidence: 95% confident, 99% confident, or 99.9% confident. In the social science research, which of these three confidence levels is selected is usually determined arbitrarily based on the researcher's preference. We, however, wished to pursue a balanced fairness for both those accusing the Carmel Police Department, and for the officers being accused. Therefore, we selected the middle value – 99% confidence. This means we accept that the percentage of a group found in the police activity is truly different from the percentage of the group in the benchmark when the binomial test result shows 99% confidence in this claim. As the output number of the binomial test is a proportional likelihood (*p*) that the two percentages (stops and benchmark) likely are basically *the same*, and any observed differences are because of sampling error, we are seeking a *p* score of equal to, or less than, .01 (1.0%). A *p*-value of .01 means we are at least 99% sure the difference is not due to sampling error.

In other words, if the binomial is 99% confident that the two percentages are different, even after controlling for sampling error, then we accept that disparity (either stopped more often or less often than should have been the case) exists. Again, recall that this level of surety is level of confidence commonly applied in the social sciences. Furthermore, as the reputations of the personnel of the Carmel Police Department are at stake, it is only fair that any accusations of disparity be backed up by a high level of confidence.

[86] Lehmann & Romano (2005); Rosenthal (2001).
[87] Lehmann & Romano (2005); Rosenthal (2001).

3.5 Summary

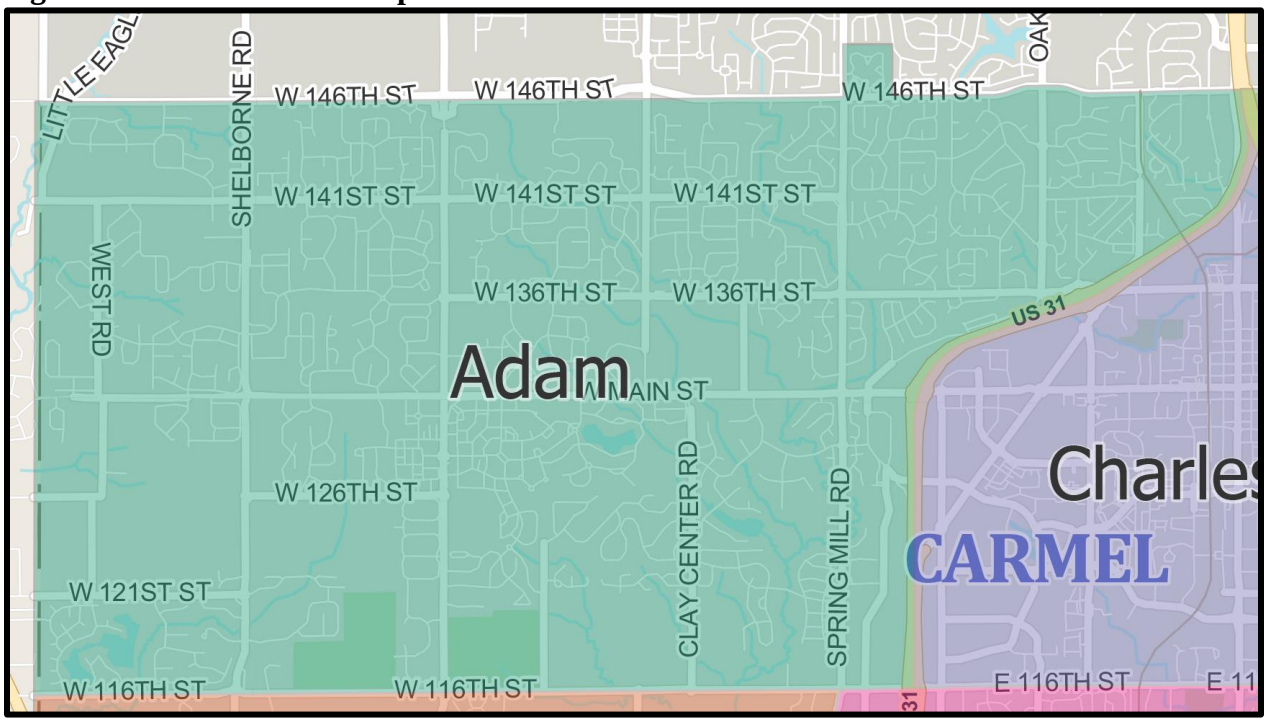
In review, we gathered data on three types of proactive police activities – vehicle stops, citations, and criminal arrests. We also gathered data on various benchmark measures – drivers in crashes, stops made during hours of darkness, citations issued to male drivers and white drivers, and criminal suspect descriptions provided by members of the public. We disaggregated these data by each of the six patrol districts across Carmel and analyzed each district separately in order to control for aggregation bias. Within each district, we compared vehicle stops (a combination of unknown proportions of traffic stops and criminal investigative stops) to benchmarks of crash drivers and criminal offender suspect descriptions. We compared vehicle stops made during hours of daylight with vehicle stops made during hours of darkness. All of these comparisons were used to determine if any sex or racial / ethnic group was stopped disproportionately more often than these benchmarks would have predicted.

For the examination of citations, we examined the five most common traffic offenses encountered within the data. We compared stops of males and stops of whites to stops of females and stops of other races and Hispanic ethnicity to see if any group was disproportionately more likely to receive a citation for committing the same offense under similar circumstances. We examined the arrest data and compared it to the criminal suspect description benchmark to determine if any group was arrested disproportionately more often than they exist among the offender population benchmark. Finally, in all of these comparisons we statistically controlled for the influence of sampling error through the use of the binomial proportional test.

4. ADAM DISTRICT

Adam District is the northwestern most district within Carmel. It is nestled between Zionsville to the west, unincorporated Washington Township to the north, Charles District to the east, and Baker District to the south. Its northern boundary is West 146th Street from the Zionsville / Boone County line to U.S. 31. Its western boundary is Southbound U.S. 31, from 146th Street in the north, down to 116th Street in the south. Its southern boundary is West 116th Street from U.S. 31 to the Zionsville / Boone County line. Adam district is the largest district in size, being roughly 15 square miles in area. It covers the largest land area because it has the lowest crime rate and call for service volume among the six districts.

Figure 4.1 Adam District Map



Adam District is predominantly residential, being mostly composed of single-family houses, parks (Coxhall Garden Park, West Park, and Carmel Clay Community Soccer Complex), and schools, such as Clay Center Elementary, College Wood Elementary School, West Clay Elementary School, and Creekside Middle School. Its eastern edge, however, is heavily commercialized with shopping plazas, restaurants, hotels, and office complexes. This section also includes the IU Health Center North Hospital and many associated medical offices. These locations bring to the area many people who do not reside within Adam District. These include the teachers and staff of the schools, individuals coming to utilize the parks, customers of the businesses within the district, and patients and staff of the medical facilities.

The most common issues reported to the police within this district included family disturbances, neighbor disturbances, minor traffic accidents, speeding driver complaints, and criminal mischief (such as vandalism or other minor property damage). For the commercial segment near Southbound U.S. 31, the most common police complaints involved theft (including shoplifting), property damage, mental health crises, and fraud / deception (such as credit card fraud, forged checks, or identity theft).

4.1 Vehicle Stops

Data were available regarding 1,829 vehicle stops made by the Carmel Police Department within Adam District. For benchmark comparisons, data were available for 362 drivers involved in crashes, and 229 descriptions of criminal suspects, from within Adam District for the 12-month period of study. We compared these stops against both of these benchmarks, and compared daylight stops with stops during hours of darkness. First we conducted these comparisons by sex, then we repeated the process for comparisons by race and Hispanic ethnicity.

4.1.1 Driver Sex

During the 12-month period of study, 1,829 vehicle stops (combined traffic stops and criminal investigative stops) took place within Adam District in which the driver's sex was recorded by the officer; 1,000 of these stops involved male drivers and 829 involved female drivers. During that same period, 362 drivers were involved in crashes within Adam District, who served as the benchmark for the driving population estimate in Adam District during that same time. Of these crash drivers, 182 were male and 180 were female. Finally, descriptions of a total of 229 criminal suspects were provided to the police by members of the public reporting crimes that had occurred within Adam District. Of these, 149 suspects were described as male, and 80 described as female.

As the Carmel Police Department stops contained a mixture of traffic stops and criminal investigative stops of unknown proportions, it was necessary to compare these vehicle stops against both benchmarks, under the assumption the correct (unknown) benchmark should lie somewhere between these two other benchmarks.

Table 4.1 below reveals the analysis of the stopped drivers in Adam District, by sex, using the crash driver benchmark. The first column of data reveals the stopped drivers (both percentage and raw number of stopped drivers), separated by sex. The next column of data reveals the crash driver benchmark data (both percentages and raw numbers of drivers), separated by sex. The raw numbers of crash drivers (182 males and 180 females) shows how small the benchmark sample is, meaning notable levels of sampling error, especially when estimating out beyond the decimal point. The next column is the raw percentage-point difference between the stops and the benchmark, followed by a column containing the *p*-value output from the binomial test. Recall that unless this value is equal to, or less than, .01, we can assume that the percentage difference between the drivers stopped and the benchmark was due to sampling error and not a true difference.

As Table 4.1 reveals, 54.7% of the drivers stopped in Adam District were male, and 50.3% of the drivers involved in crashes within Adam District were male. These two percentage values were already relatively close (a difference of only 4.4 percentage points). Furthermore, the binomial test result of $p = .032$ in the second to the last column confirms that this difference is within the bounds

of sampling error, after controlling for the differences in percentages, the sample sizes, and the laws of probability. Therefore, as was revealed in the final column, there was no statistically significant difference between the stops of male drivers and the crash driver benchmark. There was no evidence to suggest that males were more or less likely to be stopped in Adam District when compared to this benchmark designed specifically for examining stops of a solely traffic enforcement nature.

Our focus, however, was the female drivers, but we found the same result for this group. No evidence of disparity in female driver stops was revealed with this benchmark. While 45.3% of the stops involved female drivers, and 49.7% of crash drivers were females, the difference was within the margin of error for sampling error.

Table 4.1 Adam District Vehicle Stops by Sex (Crash Driver Benchmark)

Sex	Stopped Drivers (number)	Benchmark Crash Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	54.7% (1,000)	50.3% (182)	+4.4	.032	No – no disparity.
Female	45.3% (829)	49.7% (180)	-4.4	.032	No – no disparity.

Next, we examined stops by sex using the criminal suspect description benchmark. Table 4.2 reveals the details of that analysis. In this analysis we found that while 54.7% of stopped drivers in Adam District were male, 65.1% of the criminal suspects reported to the police by members of the public in that district were described as male. This was a difference of 10.4 percentage points and, based on the sample size and the laws of probability, was not within the bounds of sampling error. As the binomial test *p*-value equaled .001 (i.e., less than .01), the difference between the stops and the benchmark was a true difference, not a result of sampling error. Male drivers were less likely to be stopped than one would expect when using the criminal offender benchmark designed for comparison to solely criminal investigative stops.

Table 4.2 Adam District Vehicle Stops by Sex (Criminal Suspect Benchmark)

Sex	Stopped Drivers (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	54.7% (1,000)	65.1% (149)	-10.4	.001	Yes, but ***less*** likely to be stopped than expected.
Female	45.3% (829)	34.9% (80)	+10.4	.001	Yes. More likely to be stopped than expected.

Conversely, female drivers were more likely to be stopped than expected when compared to the criminal suspect benchmark. Of the stopped drivers, 45.3% were female, while 34.9% of criminal

suspects within Adam District were described as female. The difference of 10.4 percentage points was statistically significant.

The reader should be reminded, however, that the vast criminological research has consistently revealed that crimes (especially violent crimes) are disproportionately committed by males.[88] Consequently, a benchmark designed to measure the criminal offender population (rather than the driving population) will have higher male representation. The driving population is not nearly so skewed towards males.[89] As we suspect that a majority of these vehicle stops were traffic stops by nature, this difference in criminal offending behavior can explain this disparity.

The reader should remember that the vehicle stops being examined were a mixture of unknown proportions of traffic violation stops (appropriate for a crash driver benchmark) and criminal investigative stops (appropriate for a criminal suspect description benchmark). Each of the two benchmarks utilized was designed for only one of these types of stops. We expected that the true benchmark for these combined stops would reside somewhere between the crash driver benchmark and the criminal suspect benchmark. Therefore, we used these two benchmarks as boundaries for the true (unknown) benchmark for a combined sample of traffic violation stops and criminal investigative stops.

Table 4.3 Adam District Vehicle Stops by Sex using Benchmark Boundaries

Sex	Crash Drivers Benchmark	Actual Stopped Drivers	Criminal Suspect Benchmark	Within boundaries?
Male	50.3%	54.7%	65.1%	**Yes – No Disparity.**
Female	49.7%	45.3%	34.9%	**Yes – No Disparity.**

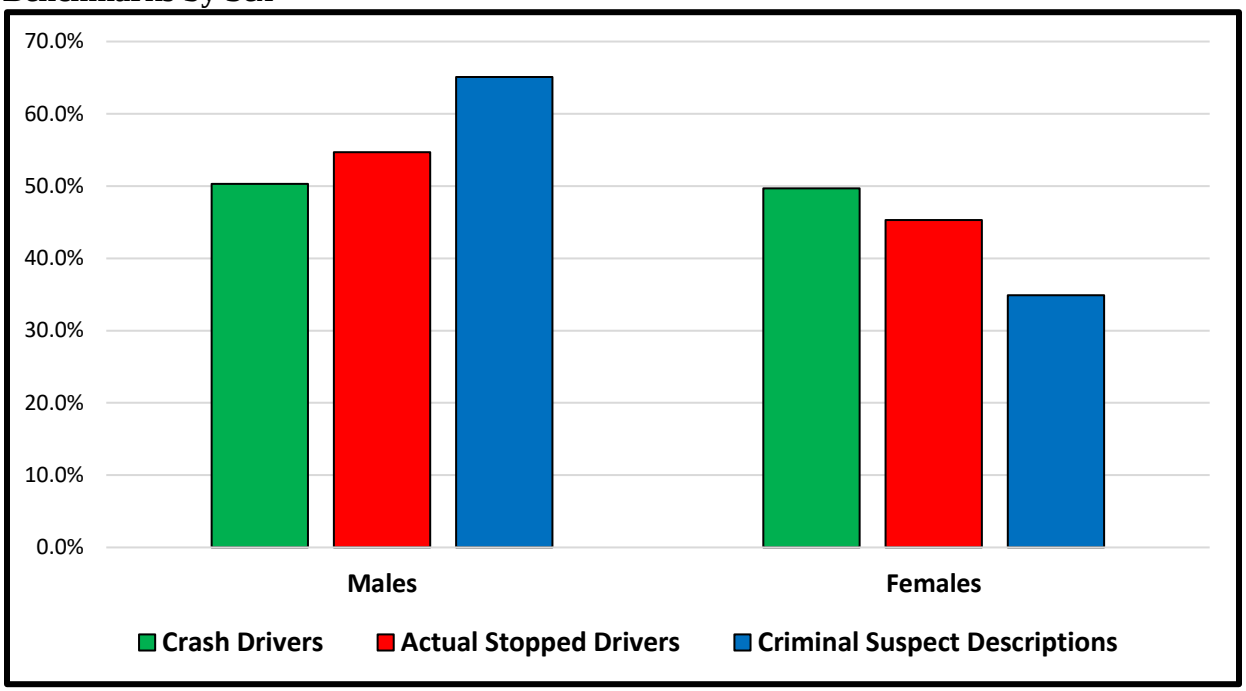
Table 4.3 above illustrates that when these two benchmarks are utilized as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops, we found no evidence of disparity by sex within Adam District. The proportion of male drivers stopped fits neatly between the proportion of males revealed within the crash driver benchmark and the criminal suspect descriptions benchmark.

The benchmark boundaries for the stops of males were 50.3% (crash drivers) and 65.1% (criminal suspects), with a midpoint of 57.5%. The actual stop percentage of males was 54.7%, within these two benchmark boundaries and slightly less than the midpoint. The benchmark boundaries for the stops of females were 49.7% (crash drivers) and 34.9% (criminal suspects), with a midpoint of 42.3%. The actual stop percentage of females was 45.3%, within these two benchmark boundaries and slightly more than the midpoint. Figure 4.2 below serves as a useful visual illustration of how neatly the stop percentages for each sex fits between the two benchmark boundaries for each sex.

[88] Sampson, R. J., & Laub, J. H. (1995). *Crime in the Making: Pathways and Turning Points through Life*. Cambridge, MA: Harvard University Press; Wright, J. P., Tibbetts, S. G., & Diagle, L. E. (2014). *Criminals in the Making: Criminality across the Life Course*. Los Angeles: Sage.

[89] National Highway Traffic Safety Administration (2021). *Traffic Safety Facts Annual Report, 2019*. Washington, DC: National Highway Traffic Safety Administration (https://cdan.nhtsa.gov/tsftables/tsfar.htm#).

Figure 4.2 Adam District Vehicle Stops Compared to Crash Driver and Criminal Suspect Benchmarks by Sex



We also utilized the veil-of-darkness benchmark method to compare stops made during hours of daylight and darkness. During daylight it was assumed to be easier to determine the sex of the driver prior to stop. Stops made during hours of darkness, it was assumed, occur when it was harder to determine driver characteristics prior to stop and less likely for officers to discriminate based on driver characteristics. A total of 1,331 vehicle stops occurred during daylight hours, defined as between 30 minutes before official sunrise and 30 minutes after official sunset. An additional 498 vehicle stops occurred during the remaining hours of the day that were classified as darkness. Table 4.4 below reveals the details of this veil-of-darkness analysis by sex for Adam District.

As Table 4.4 reveals, when using the veil-of-darkness method, females were stopped more often than expected. While 47.8% of the drivers who were stopped during the daylight hours were female, only 38.8% of the drivers stopped during hours of darkness were female. Even after controlling for sampling error, the binomial test found this difference to be statistically significant with a *p*-value of less than .01 (actually the *p*-value was less than .001, but the computer software used to calculate the binomial test only reported to three places past the decimal point).

One possible counter explanation that could be offered for this disparity would be the suggestion that females are less likely than males to drive at night. To respond to the counter claim, we examined our crash driver data by daylight and darkness. In Adam District, we found that females made up 50.2% of crash drivers during daylight hours, and 48.5% of crash drivers during hours of darkness. This was a difference of only 1.7 percentage points and the binomial test revealed that this difference was within the margin for sampling error (p = .159). Therefore, we found

insufficient evidence that this argument was true to the degree that it could have produced a statistically significant difference between stops made during hours of light and darkness. Women were not more or less likely to drive during darkness or daylight within Adam District during the period of study. In other words, the evidence suggested that during hours of daylight, officers may be electing to stop female drivers more often than male drivers.

Table 4.4 Adam District Vehicle Stops by Sex (Veil of Darkness Benchmark)

Sex	Daylight Stopped Drivers (number)	Benchmark Darkness Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	52.2% (695)	61.2% (305)	-9.0	< .001	Yes, but ***less*** likely to be stopped during hours of daylight.
Female	47.8% (636)	38.8% (193)	+9.0	< .001	Yes. More likely to be stopped during hours of daylight.

In actual human terms, however, how great was this disparity? There were 1,331 drivers stopped during daylight. Female drivers constituted 38.8% of drivers stopped during hours of darkness, when the opportunity for bias in stops is less present. If 38.8% of the daylight stops had been female drivers, this would have amounted to 516 female drivers stopped during daylight. As it was, 636 female drivers were stopped during daylight, a difference of 120 drivers. By this estimate, during the 12-month period of study there were, on average, 10 more female drivers stopped (and 10 fewer male drivers stopped) each month than would have been predicted by the darkness benchmark.

In summary, our analysis revealed somewhat mixed results regarding the stopping of female drivers within Adam District for this period of study. Utilizing the crash driver benchmark and criminal suspect benchmarks as boundaries for the true (unknown) benchmark for the combination of traffic violation and criminal investigative stops revealed no vehicle stop disparities by sex. (The crash driver benchmark alone even failed to reveal any statistically significant stop disparity by sex, suggesting that traffic offense stops constituted the majority of stops within Adam district.) Finally, the veil-of-darkness benchmark method suggested that females were disproportionately more likely to be stopped during hours of daylight (when it is assumed to be easier to determine driver characteristics prior to stop). This was a difference that could not be explained by an argument that females were less likely to drive during hours of darkness within Adam District. Female drivers were found to drive at similar proportions from daylight to darkness. This finding suggested an estimated ten more stops than expected occurred each month within Adam District.

4.1.2 Driver Race and Ethnicity

During the 12-month period of study, 1,805 vehicle stops took place within Adam District in which the driver's race and ethnicity were recorded by the officer. During that same period, race and ethnicity data were available for 362 drivers involved in crashes within Adam District. These crash drivers served as a driving population benchmark estimate. Descriptions of a total of 229 criminal suspects were provided to the police by members of the public reporting crimes that had occurred within Adam District, serving as a criminal offender population benchmark.

Again, as the Carmel Police Department stops contained a mixture of traffic stops and criminal investigative stops of unknown proportions, it was necessary to compare these stops against both benchmarks, under the assumption that the correct (unknown) benchmark would lie somewhere between these two benchmark measures.

Table 4.5 below reveals the analysis of the stopped drivers within Adam District, by race and Hispanic ethnicity, using the crash driver benchmark. The first column of data reveals the stopped drivers (both percentage and raw number of stopped drivers), separated by race and Hispanic ethnicity. As this table reveals, 0.6% of the drivers stopped by the Carmel Police Department in Adam District were Alaskan Native / American Indian, 7.8% were Asian / Pacific Islander, 12.5% were African-American, and 79.1% were Caucasian / White. Of all these stops of individuals of various races, 4.5% were Hispanic in ethnicity.

Table 4.5 Adam District Vehicle Stops by Race / Ethnicity (Crash Driver Benchmark)

Race or Ethnicity	Stopped Drivers (number)	Benchmark Crash Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.6% (11)	1.1% (4)	-0.5	.175	No – no disparity.
Asian / Pacific Islander	7.8% (140)	6.4% (23)	+1.4	.177	No – no disparity.
African-American / Black	12.5% (226)	9.1% (33)	+3.4	.027	No – no disparity.
Caucasian / White	79.1% (1,428)	83.4% (302)	-4.3	.023	No – no disparity.
Hispanic Ethnicity	4.5% (81)	3.3% (12)	+1.2	.192	No – no disparity.

The next column of data reveals the crash driver benchmark data (both percentages and raw numbers of drivers), separated by race and Hispanic ethnicity. As shown, 1.1% of the crash drivers in Adam District were Alaskan Native / American Indian, 6.4% were Asian / Pacific Islander, 9.1% were African-American, and 83.4% were Caucasian / White. Of all these individuals of various races, 3.3% were Hispanic in ethnicity.

As with the driver sex comparison above, the binomial statistical test was used to determine if any differences between the stop percentages and the crash driver benchmark percentages were true differences, or likely simply a result of sampling error. The reader should especially note the small percentage differences between the stops and the benchmark for each racial group. All differences were small, the greatest difference being only 4.3 percentage points. The reader should also note the small number of actual stops or crash drivers from which to calculate percentages in many of the demographic categories. For instance, among the crash drivers there were only 4 Alaskan Native / American Indian drivers, 12 Hispanic drivers, 23 Asian / Pacific Islander drivers, and 33

African-American / Black drivers. The inclusion of only one more Alaskan Native / American Indian among the crash drivers, by chance alone, would have raised the representation of that group by 25%. Therefore, it was no surprise that the binomial test found all of the minor percentage differences between the stops and the crash driver benchmark to be within the margin of sampling error. None of the races or ethnicity examined within this table were found to be statistically significantly different from the benchmark percentages.

Next, we examined stops by race and ethnicity using the criminal suspect description benchmark within Adam District. Table 4.6 reveals the details of that analysis. In this analysis we found that within Adam District, 0.0% of the criminal suspects described by members of the public were Alaskan Native / American Indian. Only 4.8% of the criminal suspects were described as Asian / Pacific Islander, another 32.3% were described as African-American / Black, 62.9% were described as Caucasian / White, and 8.3% were described as Hispanic in ethnicity.

Table 4.6 Adam District Vehicle Stops by Race / Ethnicity (Criminal Suspect Benchmark)

Race or Ethnicity	Stopped Drivers (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.6% (11)	0.0% (0)	+0.6	.115	No – no disparity.
Asian / Pacific Islander	7.8% (140)	4.8% (11)	+3.0	.051	No – no disparity.
African-American / Black	12.5% (226)	32.3% (74)	-19.8	< .001	Yes, but ***less*** likely to be stopped than expected.
Caucasian / White	79.1% (1,428)	62.9% (144)	+16.2	< .001	Yes. More likely to be stopped than expected.
Hispanic Ethnicity	4.5% (81)	8.3% (19)	-3.9	.006	Yes, but ***less*** likely to be stopped than expected.

Again, the raw numbers of cases were very small in the benchmark sample (such as zero suspects for Alaskan Natives / American Indians, 11 suspects for Asians / Pacific Islanders, and 19 suspects for Hispanics). Some of the percentage point differences between the stops and the benchmark, however, were very large, such as 19.8 percentage points for African-Americans and 16.2 percentage points for Caucasians / Whites. As a result, the binomial test revealed that the disparity between the stops and the benchmark was so great for African-Americans, whites, and Hispanics that these were outside the margin for sampling error.

However, the reader should note that this disparity for African-Americans and Hispanics was disproportionately ***low***, not high. The percentage of African-American drivers or Hispanic drivers being stopped was ***less*** than expected by the benchmark – not more likely to be stopped. Only 12.5% of the drivers stopped by the Carmel Police Department within Adam District were African-American / Black, but approximately a third (32.3%) of the criminal suspects described to the

police by members of the pubic within Adam District were reported as being African-American / Black. Accordingly, African-Americans were stopped 19.8 percentage points ***less*** often than expected based on this benchmark measure.

Similarly, while 8.3% of the criminal suspects described to the police by members of the pubic within Adam District were reported as being Hispanic, only 4.5% of the drivers stopped by the police within Adam District were Hispanic. When using criminal suspect descriptions as a benchmark, the only racial demographic group disproportionately stopped more often than expected was Caucasian / White drivers, ***not*** persons of color.

The reader should remember, however, that the vehicle stops being examined were a mixture of unknown proportions of traffic violation stops (appropriate for a crash driver benchmark) and criminal investigative stops (appropriate for a criminal suspect description benchmark). Each of the two benchmarks utilized was designed for only one of these types of stops. We expected that the true benchmark for these combined stops would reside somewhere between the crash driver benchmark and the criminal suspect benchmark. Therefore, we used these two benchmarks as boundaries for the true (unknown) benchmark for a combined sample of traffic violation stops and criminal investigative stops.

Table 4.7 Adam District Vehicle Stops by Race / Ethnicity using Benchmark Boundaries

Race or Ethnicity	Crash Drivers Benchmark	Actual Stopped Drivers	Criminal Suspect Benchmark	Within boundaries?
Alaskan Native / American Indian	1.1%	0.6%	0.0%	**Yes – No Disparity.**
Asian / Pacific Islander	6.4%	7.8%	4.8%	No, but within margin of sampling error.
African-American / Black	9.1%	12.5%	32.3%	**Yes – No Disparity.**
Caucasian / White	83.4%	79.1%	62.9%	**Yes – No Disparity.**
Hispanic Ethnicity	3.3%	4.4%	8.3%	**Yes – No Disparity.**

Table 4.7 above illustrates that when these two benchmarks are utilized as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops, we found no evidence of stop disparity within Adam District for Alaskan Native / American Indian, African-American, Caucasian / White, or Hispanic drivers. The proportion of drivers stopped for each of these racial and ethnic categories fit neatly between the proportion of these groups revealed within the crash driver benchmark and the criminal suspect descriptions benchmark. The benchmark boundaries for the stops of Alaskan Native / American Indian drivers were 1.1% (crash drivers) and 0.0% (criminal suspects), with a midpoint of 0.6%. The actual stop percentage for this race group was 0.6%, within these two benchmark boundaries and exactly at the midpoint.

The benchmark boundaries for the stops of African-American / Black drivers were 9.1% (crash drivers) and 32.3% (criminal suspects), with a midpoint of 20.7%. The actual stop percentage for African-Americans was 12.5%, within these two benchmark boundaries and below the midpoint.

The benchmark boundaries for the stops of white drivers were 83.4% (crash drivers) and 62.9% (criminal suspects), with a midpoint of 73.2%. The actual stop percentage for whites was 79.1%, within these two benchmark boundaries. The benchmark boundaries for the stops of Hispanic ethnicity drivers were 3.3% (crash drivers) and 8.3% (criminal suspects), with a midpoint of 5.8%. The actual stop percentage for Hispanics was 4.4%, within these two benchmark boundaries and below the midpoint.

The exception, however, was the stops of Asian / Pacific Islander drivers. The benchmark boundaries for the stops of Asian / Pacific Islander drivers were 6.4% (crash drivers) and 4.8% (criminal suspects), with a midpoint of 5.6%. The actual stop percentage for this race group was 7.8%, higher than either benchmark boundary. Nevertheless, the percentage difference for this group was within the margin of sampling error when compared to each benchmark individually (revealed within Tables 4.5 and 4.6). This suggested that even though the percentage of Asian / Pacific Islander drivers stopped within Adam District was higher than their percentages within both benchmarks, the extent it exceeded the upper benchmark boundary was still within the margin of sampling error.

Figure 4.3 Adam District Vehicle Stops Compared to Crash Driver and Criminal Suspect Benchmarks

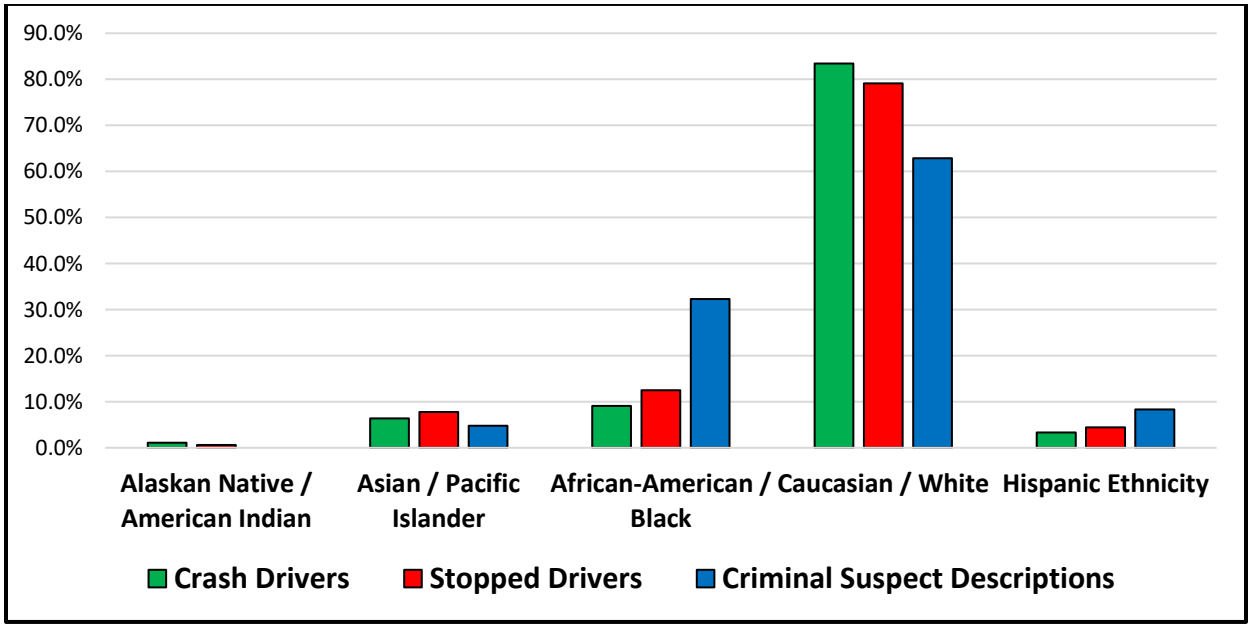


Figure 4.3 above serves as a good visual representation of the findings contained in Table 4.7. Figure 4.3 compares the stops within Adam District to each of these two benchmarks by race. With the exception of Asian / Pacific Islander drivers, the percentage of drivers stopped for all other racial groups and Hispanic ethnicity was easily observed to be between the percentages for that race found within each of the two benchmarks. The only exception was the stops of Asian / Pacific Islander drivers who were stopped slightly more often than either benchmark. But Figure 4.2 illustrates well the minor size of this difference.

As with the comparisons by driver sex, we also utilized the veil-of-darkness benchmark method. We examined stops made during hours of daylight, when it was assumed to be easier to determine the race of the driver prior to stop, and compared these with stops made during hours of darkness, when it was assumed to be harder to determine driver's characteristics prior to stop. A total of 1,316 vehicle stops occurred during daylight hours, and 489 vehicle stops occurred during the hours classified as darkness. Table 4.7 reveals the details of this veil-of-darkness analysis by race and ethnicity for Adam District.

Table 4.7 reveals that, during daylight hours, 0.7% of vehicle stops involved Alaskan Native / American Indian drivers, 7.7% Asian / Pacific Islander drivers, 10.8% African-American / Black drivers, 80.9% Caucasian / White drivers, and 4.0% Hispanic ethnicity drivers. During hours of darkness, when it was assumed to be harder to stop drivers based on their characteristics, 0.4% of vehicle stops involved Alaskan Native / American Indian drivers, 8.0% Asian / Pacific Islander drivers, 17.2% African-American / Black drivers, 74.4% Caucasian / White drivers, and 5.6% Hispanic ethnicity drivers. In most cases, the percentage point differences between the daylight and darkness stops were very small, such as 0.3 percentage points for Alaskan Natives / American Indians, and Asians / Pacific Islanders.

Table 4.8 Adam District Vehicle Stops by Race / Ethnicity (Veil of Darkness Benchmark)

Race or Ethnicity	Daylight Stopped Drivers (number)	Benchmark Darkness Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.7% (9)	0.4% (2)	+0.3	.334	No – no disparity.
Asian / Pacific Islander	7.7% (101)	8.0% (39)	-0.3	.434	No – no disparity.
African-American / Black	10.8% (142)	17.2% (84)	-6.4	< .001	Yes, but ***less*** likely to be stopped during daylight hours.
Caucasian / White	80.9% (1,064)	74.4% (364)	+6.5	< .001	Yes. More likely to be stopped during daylight hours.
Hispanic Ethnicity	4.0% (53)	5.6% (28)	-1.6	.047	No – no disparity.

The percentage point differences for African-Americans and Caucasian / Whites, however, were larger. The binomial statistical test revealed that for African-Americans and whites, the daylight and darkness stop percentages were statistically different. When compared to stops during darkness, Caucasian / White drivers were disproportionately more likely to be stopped (as compared to other races) during hours of daylight when the officers could more easily determine the driver's race before stopping. However, African-American / Black drivers were actually less likely to be stopped in comparison to other races during hours of daylight when it was easier to determine driver race prior to the stop. This suggested that officers might be electing to stop white drivers more often and electing to stop African-American drivers less often.

A counter argument could be offered that African-Americans were simply less likely to be driving during hours of daylight, and more likely to be driving during hours of darkness, thus suggesting that they are overrepresented among stops made at night. The same logic would suggest that Caucasian / White drivers were less likely to be driving during hours of darkness, and more likely to be driving during hours of daylight, thus causing them to be overrepresented in stops during hours of daylight.

To explore these counter-claims, we examined our crash driver data by daylight and darkness. When examining all of the crash drivers for Adam District, we found that during daylight hours, 9.1% of the crash drivers were African-American / Black. During hours of darkness, again exactly 9.1% of crash drivers were African-American / Black. This suggested that the proportion of drivers on the roadway that are African-American / Black within Adam District did not differ between hours of darkness and daylight. This counter-claim to explain why African-American drivers were stopped less often during daylight was false. The evidence suggested that officers tended to stop African-American drivers ***less often*** than expected during daylight hours when it is easier to determine the race of the driver prior to stop.

We also found that during daylight 80.8% of the crash drivers were Caucasian / White, and during darkness 84.2% of the crash drivers were Caucasian / White. The binomial test for this difference produced a *p*-value of .154, thus indicating this difference was within the margin of sampling error, meaning there was no statistically significant difference between the proportions of white drivers on the roadway during daylight versus darkness. This counter-claim for why white drivers were stopped more often in Adam District during daylight hours was false. The evidence suggested that officers tended to stop white drivers **more often** than expected during daylight when it is easier to determine the race of the driver prior to stop.

In actual human terms, however, how great was this disparity of white drivers? There were 1,316 drivers stopped during daylight. White drivers constituted 74.4% of drivers stopped during hours of darkness, when the opportunity for bias in stops was less present. If 74.4% of the daylight stops had been white drivers, this would have amounted to 979 drivers stopped during daylight. As it was, 1,064 white drivers were stopped during daylight, a difference of 85 drivers. By this estimate, during the 12-month period of study there were, on average, 7 more white drivers stopped each month than would have been predicted by the darkness benchmark.

4.1.3 Vehicle Stops Summary

In summary, the majority of our analyses revealed that female drivers were not disproportionately stopped within Adam District during the period of study. The percentage of stops involving female drivers was within the boundaries of the crash driver and criminal suspect benchmarks. In fact, the percentage of stopped drivers who were female was statistically the same as the percentage of crash drivers who were female. When examining by daylight and darkness, however, there was evidence to suggest that female drivers may be disproportionately selected by officers for vehicle stops during daylight hours when they can more easily determine the driver's characteristics. During hours of darkness, when it was much harder to select drivers by their characteristics, the proportion of female drivers stopped declined. This difference was not explained by differences in

the driving population by sex from daylight to darkness. This disparity averaged out to about ten more stops of female drivers every month than expected.

Our analyses also revealed little evidence that persons of color were disproportionately stopped within Adam District during the period of study. With the exception of Asian / Pacific Islander drivers, the percentage of stops involving each racial or ethnic group was within the boundaries of the crash driver and criminal suspect benchmarks. Stops of Asian / Pacific Islander drivers were slightly outside of these boundaries, but two binomial tests revealed the difference was within the margin of sampling error. When examining by daylight and darkness, however, there was evidence to suggest that white drivers may be disproportionately selected by officers for vehicle stops during daylight hours, when they can more easily determine the driver's characteristics. During hours of darkness, when it was much harder to select drivers by their characteristics, the proportion of stopped white drivers declined. This difference was not explained by differences in the driving population by sex from daylight to darkness. This disparity averaged about seven more stops of white drivers every month than expected.

The exact opposite result was found for African-American and Hispanic drivers. There was evidence to suggest that officers may have chosen to avoid selecting African-American or Hispanic drivers for vehicle stops during daylight hours when they could more easily determine the driver's characteristics. During hours of darkness, when it was much harder to select drivers by their characteristics, the proportion of these groups stopped increased. Therefore, in terms of race or ethnicity, only white drivers were found to be disproportionately stopped within Adam District, and only during daylight hours. The analyses of stops produced no evidence that African-Americans, or other persons of color, were disproportionately stopped. In fact, some of the evidence suggested greater leniency towards person of color with regard to vehicle stops within Adam District.

4.2 Post-Stop Citations

Next, we examined equity in the treatment of drivers after they had already been stopped. Specifically, ***all other things being equal***, are people of different demographic groups treated similarly in terms of the likelihood of receiving a traffic citation after being stopped for a traffic violation? As described in Sections Two and Three of this report, in order to do this, one needs to compare similarly-situated individuals. It is necessary to consider offenses with similar offense seriousness. If a driver of one race was stopped for a minor violation, and a driver of a different race was stopped for a serious violation, then it is likely these two drivers would receive different outcomes with regards to a citation. This difference in outcomes would have nothing to do with the drivers' races as they were involved in very different situations regarding seriousness of offense. Likewise, there is also the issue of multiple-offense stops. If a driver of one race was stopped for a committing one traffic violation, and a driver of a different race was stopped for committing several traffic violations, then it is likely these two drivers would receive different outcomes with regards to a citation(s). These differences in outcomes, again, would have nothing to do with the drivers' races as they were simply involved in very different behavioral situations.

In order to conduct an appropriate analysis, therefore, it was necessary first to isolate stops that involved one, and only one, offense. Such an analysis still does not control for all legitimate

differences between stop outcomes that might be unrelated to driver sex or race. For example, one driver may have had a lengthy record of poor driving, while another driver may have had a clean driving record. One driver may have been travelling 15 miles-per-hour over the speed limit, while another may have been traveling 30 miles-per-hour over the limit. One driver may have been polite or civil, while another may have been verbally abusive towards the officer. All of these differences might influence the officer's decision to issue a citation. Nevertheless, with the data available, this was the best analysis that could be performed.

Once these single-offense stops were isolated, stops for the same reason were then compared with one another to control for seriousness of offense. Of the 1,841 individual vehicle stops that occurred within Adam District, 1,565 (85.0%) involved only one traffic violation. The remaining 276 multi-violation stops that were not tested, involved two or more violations each. Each of these multi-violation stops varied from the next in terms of combinations of types of violations encountered, numbers of violations encountered, and seriousness of circumstances. As a result, it was not possible to gather a sufficient sample of similarly comparable cases to analyze properly and make comparisons across multiple racial groups.

As a result, and as we discussed earlier, we only examined post-stop citations for the five most common reasons for stop across the city. These five most common reasons for stop were; 1.) Speeding; 2.) Expired license plate; 3.) Improper headlights; 4.) None or improper taillights; and 5.) Failure to signal lane change or intent to turn. These five reasons for stop totaled 1,280 stops within Adam District, making up 82.3% of the 1,565 one-violation stops by Carmel officers within that district, and 69.5% of all stops within Adam District. Each of these five types of violations was analyzed separately.

As the benchmark for each of these categories of stops, we used the outcomes for male drivers (the percentage of males stopped for that violation that received a citation) as the benchmark for stops of female drivers. The percentage of females stopped for that violation who received a citation was compared to the same circumstance for males to see if females were treated more punitively than males. For the examination by race and Hispanic ethnicity, we used the outcome for white drivers as the benchmark for comparison to all other racial categories and Hispanic ethnicity. The assumption for this sort of comparison was that if officers were not biased, men and women would receive citations at a similar rate for similar offenses. Furthermore, if officers were not biased, then persons of color would receive citations at a similar rate as whites for similar offenses.

4.2.1 Driver Sex

Speeding offenses were examined first. Speeding was by far the most common reason for stop within Carmel, and within Adam District. Adam District had 1,029 one-violation vehicle stops for speeding that contained data on the driver's sex. Of these stops, 52.1% (536) involved a male driver. Of these 536 speeding stops of male drivers, 72 (13.4%) resulted in the issuance of a traffic citation, while the remaining 454 resulted in the issuance of only a warning. This percentage served as the benchmark measure in Adam District for stops of female drivers for speeding. Table 4.9 displays the details of that analysis.

In Adam District, there were 493 one-violation stops for speeding involving female drivers, 67 (13.6%) of which received a traffic citation for that offense. Obviously, because the percentage of

males cited and the percentage of females cited were almost identical (a difference of only 0.2 percentage points), the binomial test indicated that the difference of two-tenths of a percent was well within the margin for sampling error. This outcome revealed that males and females were cited equally when stopped for speeding within Adam District during this period of analysis.

Table 4.9 Adam District Female Speeding Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	13.6% (493 / 67)	13.4% (536 / 72)	+0.2	.471	No – no disparity.

Next, we examined stops for having an expired license plate. There were 77 one-violation vehicle stops within Adam District for having an expired license plate. Of these stops, 54.6% (42) involved a male driver. Of these 42 expired license plate stops of male drivers, 6 stops (14.3%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure in Adam District for stops of female drivers for having an expired license plate. Table 4.10 displays the details of that analysis.

Of Adam District's one-violation vehicle stops, there were only 35 female drivers stopped for having an expired license plate, 8 (22.9%) of which received a traffic citation for that offense. Although this differs by 8.6 percentage points from the percentage of male drivers who received a citation, one needs to keep in mind the very small samples involved here. With a sample of only 35 stops, every one-unit increase in citations issued results in an increase of the citation rate by 2.9 percentage points. Sampling error means that a few cases in the sample will differ from the population simply due to chance alone. That is why the binomial test *p*-value was greater than .01, meaning that the difference between the male and female citation rates were within the margin of sampling error and not statistically significantly different. This outcome suggested that males and females were cited equally when stopped for driving with expired license plates within Adam District during this period of analysis.

Table 4.10 Adam District Female Expired Plates Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	22.9% (35 / 8)	14.3% (42 / 6)	+8.6	.117	No – no disparity.

The third offense we examined was stops for having improper headlights, usually meaning having either a burned-out headlight or failing to use one's headlights when required by law. Among the one-violation stops within Adam District there were 82 vehicle stops for improper headlights. Of these stops, 65.9% (54) involved a male driver. Of these 54 improper headlight stops of male

drivers, none (0.0%) resulted in the issuance of a traffic citation, as all resulted in the issuance of only a warning. This percentage served as the benchmark measure in Adam District for stops of female drivers for having only an improper headlight. Table 4.11 displays the details of that analysis.

Table 4.11 Adam District Female Improper Headlights Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (28 / 0)	0.0% (54 / 0)	0.0	.972	No – no disparity.

Of the one-violation stops within Adam District, there were only 28 female drivers stopped for having an improper headlight, none of which (0.0%) received a traffic citation for that offense. This was exactly the same percentage as the male drivers who received a citation for this offense within Adam District. This outcome revealed that males and females were cited equally when stopped for operating with an improper headlight.

The fourth offense we examined was stops for having improper taillights. Again, this usually involved having a burned-out taillight or failing to use one's lights when required by law. There were 71 single-violation stops within Adam District for improper taillights. Of these stops, 53.5% (38) involved a male driver. Of these 38 improper taillight stops of male drivers, none (0.0%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure in Adam District for stops of female drivers for having an improper taillight. Table 4.12 displays the details of that analysis.

Table 4.12 Adam District Female Improper Taillights Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (33 / 0)	0.0% (38 / 0)	0.0	.968	No – no disparity.

Among the one-violation stops within Adam District, there were 33 female drivers stopped for having an improper taillight, none of which (0.0%) received a traffic citation for that offense. This was exactly the same percentage as the male drivers who received a citation for this offense within Adam District. This outcome revealed that males and females were cited equally when stopped for operating with an improper taillight. There was no evidence of disparity in the treatment of female drivers in this regard within Adam District for this offense.

The final offense examined was stops for failure to signal. This traffic violation generally involved failing to use one's turn signal when either changing lanes or turning. Of the one-violation stops

within Adam District, only 21 were for failing to signal. Of these stops, 66.7% (14) involved a male driver. Of these 14 failure to signal stops of male drivers, none (0.0%) resulted in the issuance of a traffic citation, and all resulted in the issuance of only a warning. This percentage served as the benchmark measure in Adam District for stops of female drivers for failing to signal properly. Table 4.13 displays the details of that analysis.

Table 4.13 Adam District Female Failure to Signal Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (7 / 0)	0.0% (14 / 0)	0.0	.993	No – no disparity.

Among the single-violation stops within Adam District, there were only 7 female drivers stopped for failing to signal, none of which (0.0%) received a traffic citation for that offense. This was the exact same percentage as the male drivers who received a citation for this offense within Adam District. This outcome revealed that males and females were cited equally when stopped for failing to signal.

4.2.2 Driver Race and Ethnicity

Next we turned to examining citation rates within Adam District based on driver race or Hispanic ethnicity. As with the sex analysis, we began with examining speeding offenses. Within Adam District there were 1,013 one-violation vehicle stops for speeding that contained data on the driver's race and Hispanic ethnicity. Of these one-violation speeding stops, 78.6% (796) involved a Caucasian / White driver. Of these 796 speeding stops of Caucasian / White drivers, 107 (13.4%) resulted in the issuance of a traffic citation, while the remaining 689 resulted in the issuance of only a warning. This percentage served as the benchmark measure in Adam District for speeding stops of drivers for other races and Hispanic ethnicity. Table 4.14 displays the details of that analysis.

Among Adam District's one-violation stops, there were only 5 Alaskan Native / American Indian drivers stopped for speeding, none of which (0.0%) received a traffic citation for that offense. This citation rate of 0.0% was 13.4 percentage points lower than the citation rate for Caucasian / White drivers. Despite the small sample of only five drivers within this race category, this difference was so pronounced that the binomial test indicated it was beyond the margin of sampling error. Therefore, the evidence here revealed that when compared to Caucasian / White drivers, Alaskan Native / American Indian drivers were statistically ***less*** likely to be cited (not more likely to be cited) when stopped for speeding within Adam District. Therefore, no evidence was revealed that Alaskan Native / American Indian drivers were more likely to be cited than white drivers stopped for speeding under similar circumstances.

Table 4.14 Adam District Speeding Stops Citations by Race / Ethnicity

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (5 / 0)	13.4% (796 / 107)	-13.4	< .001	Yes, but ***less*** likely to be cited than whites.
Asian / Pacific Islander	16.9% (83 / 14)	13.4% (796 / 107)	+3.5	.217	No – no disparity.
African-American / Black	10.9% (129 / 14)	13.4% (796 / 107)	-2.5	.241	No – no disparity.
Hispanic Ethnicity	22.2% (45 / 10)	13.4% (796 / 107)	-8.8	.071	No – no disparity.

There were 83 Asian / Pacific Islander drivers stopped for speeding, 14 of which (16.9%) received a traffic citation for that offense. The binomial test indicated that the percentage of Asian / Pacific Islander drivers cited for speeding, and the percentage of Caucasian / White drivers cited for speeding, were similar enough to be within the margin of sampling error. Therefore, no evidence of disparity in the treatment of Asian / Pacific Islander drivers with regard to speeding citations within Adam District was revealed.

The same was true for African-American / Black drivers. There were 129 African-American / Black drivers stopped for speeding, 14 of which (10.9%) received a traffic citation for that offense. The binomial test indicated that the percentage of African-American / Black drivers cited for speeding, and the percentage of Caucasian / White drivers cited for speeding (13.4%), were similar enough to be within the margin of sampling error. Therefore, the evidence suggested no disparity in the treatment of African-American / Black drivers with regard to speeding citations within Adam District.

There were only 45 drivers of Hispanic ethnicity stopped for speeding, 10 of which (22.1%) received a traffic citation for that offense. It is important to note that when dealing with such a small sample as 45 cases, a single additional citation issued, or not issued, simply by random chance sampling error, equates to an increase or decrease to the citation rate of as much as 2.2 percentage points. This is why the binomial test result indicated that the percentage of Hispanic ethnicity drivers cited for speeding, and the percentage of Caucasian / White drivers cited for speeding, were similar enough to be within the margin of sampling error. Therefore, the results suggested no evidence of disparity in the treatment of Hispanic ethnicity drivers with regard to speeding citations within Adam District.

Expired plate stops were examined next. There were 76 one-violation vehicle stops within Adam District for having an expired license plate. Of these stops, 77.6% (59) involved a Caucasian / White driver. Of these 59 expired license plate stops of Caucasian / White drivers, 11 stops (18.6%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure in Adam District for the expired license plate stops of drivers of other races and Hispanic ethnicity. Table 4.15 displays the details of that analysis.

Among the one-violation stops within Adam District, there were no Alaskan Native / American Indian drivers stopped for having an expired license plate, and therefore none received a traffic citation for that offense. As there were no cases, no binomial test could be performed, nor was one needed. It would not be possible to issue citations disproportionately to any group that was not stopped at all. Therefore, no evidence of disparity in the treatment of Alaskan Native / American Indian drivers was revealed with regard to expired license plate citations within Adam District.

Table 4.15 Adam District Expired Plates Stops Citations by Race / Ethnicity

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	18.6% (59 / 11)	-18.6	----	No – no disparity. None were stopped.
Asian / Pacific Islander	25.0% (8 / 2)	18.6% (59 / 11)	+6.6	.455	No – no disparity.
African-American / Black	11.1% (9 / 1)	18.6% (59 / 11)	-7.5	.480	No – no disparity.
Hispanic Ethnicity	0.0% (6 / 0)	18.6% (59 / 11)	-18.6	< .001	Yes, but ***less*** likely to be cited than whites.

There were only 8 Asian / Pacific Islander drivers stopped for an expired license plate, 2 of which (25.0%) received a traffic citation for that offense. As before, with such a small sample of only 8 stops, one less citation simply by chance due to sampling error changes the citation percentage by as much as 12.5 percentage points. This is why it should be no surprise the binomial test indicated that the percentage of Asian / Pacific Islander drivers cited for expired license places, and the percentage of Caucasian / White drivers cited for the same offense, were similar enough to be within the margin of sampling error. Therefore, the findings suggested no evidence of disparity in the treatment of Asian / Pacific Islander drivers with regard to expired license plate citations within Adam District.

Likewise, the same was true for African-American / Black drivers stopped only for an expired license plate within Adam District. There were 9 African-American / Black drivers stopped for expired license plates, and only one (11.1%) received a traffic citation for that offense. This was a citation rate ***lower*** than the citation rate for white drivers. Nevertheless, the binomial test indicated that the percentage of African-American / Black drivers cited for this offense (11.1%), and the percentage of Caucasian / White drivers cited for this offense (13.4%), were similar enough to be within the margin of sampling error. Therefore, no evidence of disparity in the treatment of African-American / Black drivers was revealed with regard to expired license plate citations within Adam District.

There were only 6 drivers of Hispanic ethnicity stopped for having an expired license plate, none of which (0.0%) received a traffic citation for that offense. This citation rate of 0.0% was 13.4 percentage points ***lower*** than the citation rate for Caucasian / White drivers. Despite the small sample of only 6 drivers within the Hispanic ethnicity category, this difference was so pronounced that the binomial test indicated it was beyond the margin of sampling error. Therefore, the evidence

here revealed that when compared to Caucasian / White drivers, Hispanic ethnicity drivers were ***less*** likely to be cited than white drivers when stopped for an expired license plate within Adam District.

The third offense examined was stops for having improper headlights. There were 80 one-violation vehicle stops within Adam District for an improper headlights violation. Of these stops, 81.3% (65) involved a Caucasian / White driver. Of these 65 improper headlight stops of Caucasian / White drivers, none (0.0%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure within Adam District for one-violation stops involving an improper headlight when examining the citation rates for other races and Hispanic ethnicity. Table 4.16 displays the details of that analysis.

In Adam District's one-violation stops, there were only 2 Alaskan Native / American Indian drivers stopped for having an improper headlight, and none received a traffic citation for that offense. This is the exact same percentage of Caucasian / White drivers that were cited for this offense, so no evidence of disparity in the treatment of Alaskan Native / American Indian drivers was revealed with regard to improper headlight citations within Adam District. Likewise, there were only 5 Asian / Pacific Islander drivers stopped for having an improper headlight, and none received a traffic citation for that offense. No evidence of disparity in the treatment of Asian / Pacific Islander drivers was revealed with regard to improper headlight citations within Adam District.

Table 4.16 Adam District Improper Headlights Stops Citations by Race / Ethnicity

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (2 / 0)	0.0% (65 / 0)	0.0	.948	No – no disparity.
Asian / Pacific Islander	0.0% (5 / 0)	0.0% (65 / 0)	0.0	.915	No – no disparity.
African-American / Black	0.0% (8 / 0)	0.0% (65 / 0)	0.0	.932	No – no disparity.
Hispanic Ethnicity	0.0% (3 / 0)	0.0% (65 / 0)	0.0	.947	No – no disparity.

The same was also true for African-American / Black drivers. There were only 8 African-American / Black drivers stopped for having an improper headlight, and none received a traffic citation for that offense. This was the exact same percentage of Caucasian / White drivers that were cited for this offense, so no evidence of disparity in the treatment of African-American / Black drivers was revealed with regard to improper headlight citations within Adam District. This was likewise the case with Hispanic ethnicity drivers. There were only 3 Hispanic ethnicity drivers stopped for having an improper headlight, and none received a traffic citation for that offense, so no evidence of disparity in the treatment of Hispanic ethnicity drivers was revealed with regard to improper headlight citations within Adam District.

The fourth offense examined was stops for having improper taillights. Among the one-violation stops within Adam District, there were 68 vehicle stops for improper taillights only. Of these stops, 83.8% (57) involved a Caucasian / White driver. Of these 57 improper taillight stops of Caucasian / White drivers, none (0.0%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure in Adam District for one-violation stops involving an improper taillight when examining the citation rates for other races and Hispanic ethnicity. Table 4.17 displays the details of that analysis.

Among the one-violation stops within Adam District, there were no Alaskan Native / American Indian drivers stopped for an improper taillight violation, and therefore none received a traffic citation for that offense. As there were no cases, no binomial test could be performed, nor was one needed. It would not be possible to issue citations disproportionately to any group that was not stopped at all. Therefore, no evidence of disparity in the treatment of Alaskan Native / American Indian drivers was revealed with regard to improper taillight citations within Adam District.

Among the one-violation stops within Adam District, there were only 7 Asian / Pacific Islander drivers stopped for an improper taillight. None of these drivers (0.0%) received a traffic citation for that offense. This was the exact same percentage of Caucasian / White drivers that were cited for this offense, so no evidence of disparity in the treatment of Asian / Pacific Islander drivers was revealed.

Table 4.17 Adam District Improper Taillights Stops Citations by Race / Ethnicity

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	0.0% (57 / 0)	0.0	---	No – no disparity. None were stopped.
Asian / Pacific Islander	0.0% (7 / 0)	0.0% (57 / 0)	0.0	.993	No – no disparity.
African-American / Black	0.0% (4 / 0)	0.0% (57 / 0)	0.0	.996	No – no disparity.
Hispanic Ethnicity	0.0% (5 / 0)	0.0% (57 / 0)	0.0	.995	No – no disparity.

The exact same was true for African-American / Black drivers. There were 4 African-American / Black drivers stopped for only having an improper taillight, and none received a traffic citation for that offense. This was the exact same percentage of Caucasian / White drivers that were cited for this offense, so no evidence of disparity in the treatment of African-American / Black drivers was revealed with regard to improper taillight citations within Adam District. This was the case with Hispanic ethnicity drivers as well, as only 5 Hispanic ethnicity drivers were stopped for having an improper taillight, and none received a traffic citation for that offense.

The final offense we examined was stops for failure to signal, and there were 21 one-violation vehicle stops within Adam District for failing to signal. Of these stops, 66.7% (14) involved a Caucasian / White driver. Of these 14 failure to signal stops of Caucasian / White drivers, none

(0.0%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure for drivers of other races and Hispanic ethnicity. Table 4.18 displays the details of that analysis.

Table 4.18 Adam District Failure to Signal Stops Citations by Race / Ethnicity

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	0.0% (14 / 0)	0.0	---	No – no disparity. None were stopped.
Asian / Pacific Islander	0.0% (3 / 0)	0.0% (14 / 0)	0.0	.997	No – no disparity.
African-American / Black	0.0% (4 / 0)	0.0% (14 / 0)	0.0	.996	No – no disparity.
Hispanic Ethnicity	0.0% (0 / 0)	0.0% (14 / 0)	0.0	---	No – no disparity. None were stopped.

Among the one-violation stops within Adam District, there were no Alaskan Native / American Indian drivers stopped for a failure to signal violation. Therefore, none received a traffic citation for that offense. It would not be possible to issue citations disproportionately to any group that was not stopped at all. Therefore, no evidence of disparity in the treatment of Alaskan Native / American Indian drivers was revealed with regard to failure to signal violation citations within Adam District. Likewise, there were no Hispanic ethnicity drivers stopped for a failure to signal violation. As there were no cases, it would not be possible to issue citations disproportionately to a group that was not stopped at all. Therefore, no evidence of disparity in the treatment of Hispanic ethnicity drivers was revealed with regard to failure to signal violation citations within Adam District.

There were 3 stops of Asian / Pacific Islander drivers for failure to signal, and none of these drivers (0.0%) received a traffic citation for that offense. This was the exact same percentage of Caucasian / White drivers that were cited for this offense, so no evidence of disparity in the treatment of Asian / Pacific Islander drivers was revealed. The exact same was true for African-American / Black drivers. Only 4 African-American / Black drivers were stopped and none received a traffic citation. This was the exact same percentage of Caucasian / White drivers that were cited for this offense, so no evidence of disparity in the treatment of African-American / Black drivers was revealed with regard to failure to signal violation citations within Adam District.

4.2.3 Post-Stop Citations Summary

We found no evidence that the Carmel Police Department disproportionally issued citations to female drivers or drivers who were persons of color, once the type, seriousness, and number of traffic violations committed was properly controlled. When stops of similar type and seriousness were compared, there was no evidence female drivers received traffic citations at a higher rate than male drivers. Furthermore, there was no evidence that drivers who were persons of color receive citation at a higher rate than white drivers. In fact, Alaskan Native / American Indian drivers stopped for speeding were less likely to be cited than were white drivers, and Hispanic drivers

stopped for expired plates were less likely to be cited than were white drivers. We found no evidence of punitively disparate treatment against female drivers, or drivers who were persons of color, in the citations issued by the Carmel Police Department within Adam District.

4.3 Criminal Arrests

We examined the criminal arrests made by the Carmel Police Department to determine if evidence existed of disproportionately punitive treatment of females or any particular racial / ethnic group. Data on criminal arrests of adults were obtained from the Carmel Police Department's booking records management system and disaggregated by district. Within Adam District from July 1, 2020, through June 30, 2021, there were 94 individuals arrested for criminal offenses.

These arrests were then compared against the benchmark measure that estimated the criminal offending population active within the borders of Carmel by district. As discussed in detail earlier, the segment of the population engaged in crime is known to differ in many ways from the general population. Likewise, as was the case with drivers, an unknown percentage of the individuals actively engaging in crime within Carmel are not from Carmel. These facts identify the need for a benchmark that estimated the sex, race, and ethnicity proportions of the individuals engaging in crimes within Carmel. We utilized the criminal suspect descriptions mentioned earlier as the benchmark for comparison to these arrests. As before, this benchmark came from members of the public who witnessed, or became the victims of, real crimes committed within Carmel during the 12-month period of this study. As explained earlier regarding vehicle stops, there were 229 criminal suspect descriptions received from members of the public within Adam District during this period of evaluation. Arrests were compared to this suspect description benchmark and analyzed by the individual arrestee's sex, race, and Hispanic ethnicity.

4.3.1 Arrestee Sex

The results of the arrest analysis by sex is displayed in Table 4.19 below. Of the 94 individuals arrested within Adam District during the period of study, 66 (70.2%) were male. Among the 229 benchmark criminal suspect descriptions received from the public within Adam District, 149 (65.1%) were male. The arrests differed from the benchmark by 5.1 percentage points, and the raw numbers of cases were small. As a result, the output of the binomial test was greater than .01, revealing the difference between the arrests and the benchmark for males was within the margin for sampling error. Males were not disproportionately arrested more often after controlling for the characteristics of the offender population.

Table 4.19 Adam District Criminal Arrests by Sex Comparison

Sex	Arrested Individuals (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	70.2% (66)	65.1% (149)	+5.1	.053	No – no disparity.
Female	29.8% (28)	34.9% (80)	-5.1	.053	No – no disparity.

The same was true for females. While 28 (29.8%) of the arrested individuals were female, 80 (34.9%) of the criminal suspects were female. This was a difference of 5.1 percentage points. This difference, however, was within the margin of sampling error. As a result, we found no evidence to suggest that females were disproportionately arrested when compared to a benchmark measure of the criminal offender population active within Adam District.

4.3.2 Arrestee Race and Ethnicity

The analyses of arrests by race and Hispanic ethnicity are presented in Table 4.20 below. Of the 94 individuals arrested within Adam District during the period of study, none (0.0%) were Alaskan Natives / American Indians. Likewise, none of the persons described in the criminal suspect descriptions from within Adam District were Alaskan Natives / American Indians. As a result, there was no evidence that individuals of this race category were arrested at all in Adam District, much less at a disproportionate rate.

Only 4 (4.3%) of the individuals arrested within Adam District were Asians / Pacific Islanders. This compared very similarly to the Asian / Pacific Islander representation among the criminal suspect descriptions benchmark. Only 4.8% of the criminal suspect descriptions involved an Asian / Pacific Islander individual. The binomial test revealed that this difference of only 0.5 percentage points was well within the margin for sampling error. Thus, there was no evidence to suggest that Asians / Pacific Islanders were disproportionately arrested within Adam District.

Table 4.20 Adam District Criminal Arrests by Race / Ethnicity Comparison

Race or Ethnicity	Arrested Individuals (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0)	0.0% (0)	0.0	---	No – no disparity
Asian / Pacific Islander	4.3% (4)	4.8% (11)	-0.5	.527	No – no disparity
African-American / Black	27.7% (26)	32.3% (74)	-4.6	.198	No – no disparity
Caucasian / White	68.1% (64)	62.9% (144)	+5.2	.175	No – no disparity
Hispanic Ethnicity	11.7% (11)	8.3% (19)	+3.4	.547	No – no disparity

Twenty-six (27.7%) of the 94 arrested individuals within Adam District were African-Americans, and 32.3% of the criminal suspect descriptions within Adam District were also members of that racial group. African-American arrests were 4.6 percentage points ***lower*** than the benchmark percentage for this race category. Nevertheless, the binomial test revealed that this was within the margin for sampling error, thus there was no evidence to suggest that African-Americans were disproportionately arrested within Adam District.

Conversely, Caucasian / Whites constituted 68.1% of the arrested individuals, yet only 62.9% of the suspects described in the benchmark. This difference, however, was also within the margin of sampling error, suggesting that white individuals were also arrested at similar proportions as they were represented among the offender population. Finally, Hispanic ethnicity individuals comprised 11.7% of the arrested persons, and 8.3% of the criminal suspects in the benchmark measure for Adam District. As was the case for all of the other groups, this difference was within the margin of sampling error, revealing Hispanic individuals were also arrested at similar rates to their representation within Adam District's offender population.

4.3.3 Criminal Arrests Summary

Comparisons by sex within Adam District revealed that females and males were arrested at percentages fairly equal to the percentages of the sexes within the criminal suspect benchmark for Adam District. Likewise, all of the racial groups examined, and Hispanic ethnicity, were arrested at similar proportion as they were represented within the criminal suspect description benchmark. We found no evidence to suggest any sex, race, or ethnic group was disproportionately arrested within Adam District when compared to the offender population active within Adam District.

4.4 Adam District Summary

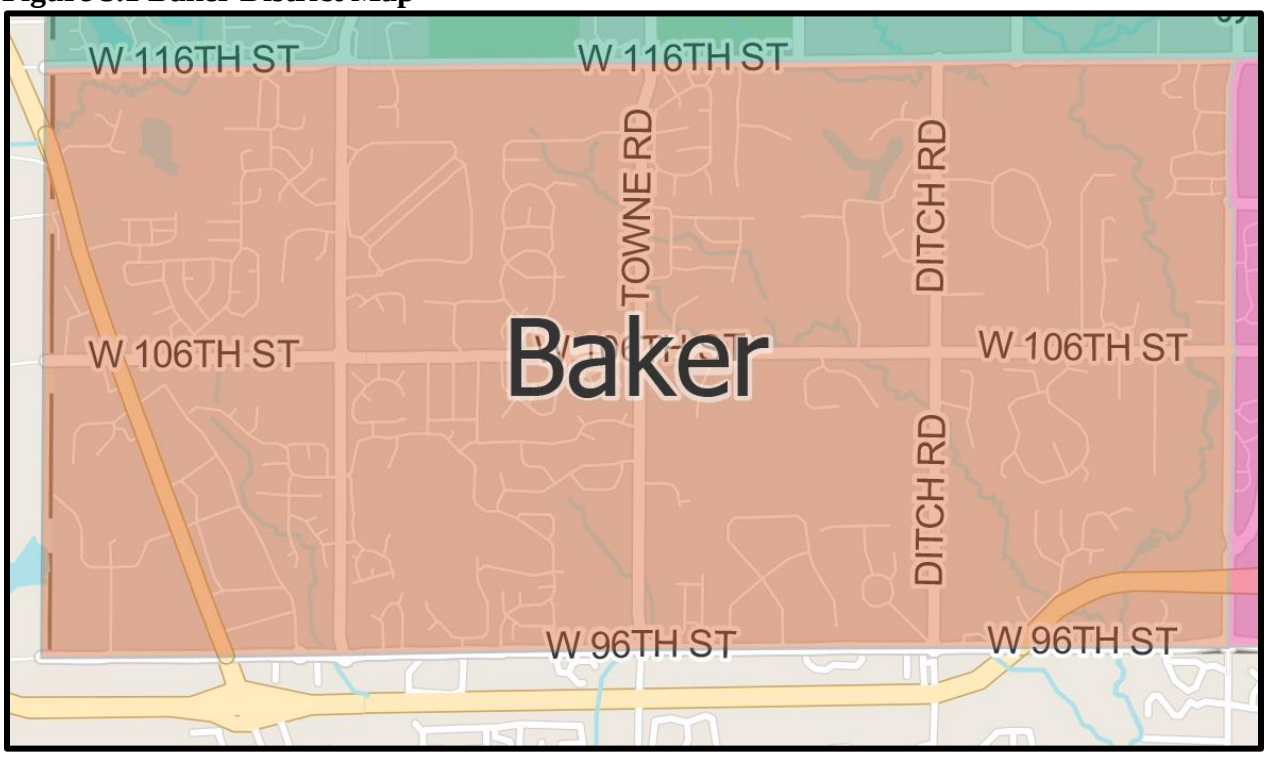
Regarding vehicle stops (a combination of traffic offense and criminal investigative stops) within Adam District, we found that the percentage of stopped drivers that were female was within the boundaries of the two vehicle stops benchmarks – crash drivers and criminal suspect descriptions. This revealed no evidence that female drivers were disproportionately more likely to be stopped than expected. The same was true for male drivers. Part of our analysis, however, suggested that female drivers were disproportionately stopped within Adam District during hours of daylight, when the driver's characteristics are more discernable prior to stop. We found no evidence that the Carmel Police Department disproportionally issued citations to female drivers within Adam District, once the type, seriousness, and number of traffic violations committed were properly controlled. When stops of similar type and seriousness were compared, there was no evidence female drivers received traffic citations at a higher rate than male drivers. Examination of arrests by sex within Adam District also revealed that females and males were arrested at percentages equal to the percentages of the sexes within the criminal suspect benchmark for Adam District.

Our analyses revealed no evidence that persons of color were disproportionately stopped, cited, or arrested within Adam District during the period of study. Regarding vehicle stops (a combination of traffic offense and criminal investigative stops) within Adam District, we found that the percentage of stopped drivers for each race and ethnic group was within the boundaries of the two vehicle stops benchmarks – crash drivers and criminal suspect descriptions. The only evidence found of a racial or ethnic group being disproportionately stopped more often was white drivers during hours of daylight. All other groups were stopped, cited, and arrested within the parameters of the benchmarks used, or were ***less*** likely to be stopped than expected, not more likely.

5. BAKER DISTRICT

Baker District is the southwestern most district within Carmel. It is nestled between Zionsville to the west, Adam District to the north, David District to the east, and Indianapolis / Marion County to the south. Its northern boundary is West 116th Street from Zionsville to Spring Mill Road. Its western boundary is Spring Mill Road, from 116th Street in the north, down to 96th Street in the south. Its southern boundary is West 96th Street (the Marion County Line) from Spring Hill Road to the Zionsville / Boone County line. Baker district is the third largest district in size, being roughly 8 square miles in area (approximately 4 miles east to west, and 2 miles north to south). Baker is the district with the third call for service volume among the six districts.

Figure 5.1 Baker District Map



Baker District is a mixture of residential and commercial districts. Its residential components include a mixture of single-family houses, condominiums, and apartment complexes. Its commercial regions are concentrated in the eastern and western ends of the district. The commercial area in the west centers on a two-mile stretch of highway U.S. 421 that houses several large box stores, restaurants, hotels, and office complexes. This stretch of US 421 also connects to a major interchange with interstate highway I-465 just 500 feet south of Baker District's southern border. The eastern end of Baker District includes a one-mile stretch of I-465, and the major interchange between I-465 and U.S. 31 lies approximately a tenth of a mile to the east of Baker District. In proximity to this second interchange, a number of office buildings, restaurants, stores, and hotels are found along Baker District's extreme eastern border. Baker District contains

University High School, Towne Meadow Elementary School, and two major golf courses, Crooked Stick Golf Club and Twin Lakes Golf Club. Baker District also contains several large centers of religious worship, such as College Park Church, Congregation Shaarey Tefilla, Holy Trinity Greek Orthodox Cathedral, and the Indianapolis Indian Temple.

All of the geographical features described above attract large numbers of people to Baker District from outside the area on a weekly basis. While 66.3% of the drivers involved in crashes citywide were not Carmel residents, 76.9% of the crash drivers within Baker District were not Carmel residents. In fact, across the six patrol districts, Baker District had the highest proportion of non-residents among its crash drivers. Baker District had the third highest crime rate among the six districts. The most common issues reported to the police within Baker District included theft (including shoplifting), fraud / deception (such as credit card fraud, forged checks, or identity theft), drunken driving, drug offenses, and hit-and-run accidents.

5.1 Vehicle Stops

Data were available regarding 2,786 vehicle stops made by the Carmel Police Department within Baker District. For benchmark comparisons, data were available for 438 drivers involved in crashes, and 323 descriptions of criminal suspects, from within Baker District for the 12-month period of study. We compared the stops against both of these benchmarks, and compared daylight stops with stops during hours of darkness. First we conducted these comparisons by sex, then we repeated the process for comparisons by race and Hispanic ethnicity.

5.1.1 Driver Sex

During the 12-month period of study, 2,776 vehicle stops (combined traffic stops and criminal investigative stops) took place within Baker District in which the driver's sex was recorded by the officer; 1,653 of these stops involved male drivers, and 1,123 involved female drivers. During that same period, 438 drivers were involved in crashes within Baker District, who served as the benchmark for the driving population estimate. Of these crash drivers, 249 were male and 189 were female. Descriptions by sex for a total of 323 criminal suspects were provided to the police by members of the public reporting crimes that had occurred within Baker District. Of these, 225 were male and 98 were female.

Table 5.1 below reveals the analysis of the stopped drivers in Baker District, by sex, using the crash driver benchmark. Recall that the first column of data reveals the stopped drivers (both percentage and raw number of stopped drivers), separated by sex. The next column of data reveals the benchmark crash driver data (both percentages and raw numbers of drivers), separated by sex. The next column is the raw percentage-point difference between the stops and the benchmark, followed by a column containing the *p*-value output from the binomial test. Recall that unless this value was equal to, or lower than, .01, we can assume that the difference between the drivers stopped and the benchmark was due to sampling error.

Table 5.1 revealed that 59.4% of the drivers stopped in Baker District were male, and 56.8% of the drivers involved in crashes within Baker District were male. These two percentage values were already relative close (a difference of only 2.6 percentage points). The binomial test result of p = .150 confirmed that this difference was within the bounds of sampling error, based on the

differences in percentages, the sample sizes, and the laws of probability. Therefore, as was revealed in the final column, there was no statistically significant difference between the stops of male drivers and the benchmark measure of male drivers. Therefore, there is no evidence to suggest that males were more or less likely to be stopped in Baker District as compared to the benchmark of crash drivers discovered on the roadways. The same was true for female drivers, as 40.6% of the vehicle stops involved female drivers, and 43.2% of crash drivers were females. This difference was within the margin of error for sampling error. Therefore, based on the crash driver benchmark, no evidence was revealed that female drivers were disproportionately more likely to be stopped within Baker District during the period of study.

Table 5.1 Baker District Vehicle Stops by Sex (Crash Driver Benchmark)

Sex	Stopped Drivers (number)	Benchmark Crash Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	59.4% (1,653)	56.8% (249)	+2.6	.150	No – no disparity.
Female	40.6% (1,132)	43.2% (189)	-2.6	.150	No – no disparity.

Next, we examined stops by sex using the criminal suspect description benchmark. Table 5.2 reveals the details of this analysis. We found that while 59.4% of stopped drivers in Baker District were male, 69.7% of the criminal suspects reported to the police by members of the public were described as male. This was a difference of 10.3 percentage points and, based on the sample size and the laws of probability, was not within the bounds of normal sampling error. The binomial test *p*-value was less than .001 (i.e., less than .01). Based on the criminal suspect benchmark, males were less likely to be stopped than expected.

Table 5.2 Baker District Vehicle Stops by Sex (Criminal Suspect Benchmark)

Sex	Stopped Drivers (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	59.4% (1,653)	69.7% (225)	-10.3	< .001	Yes, but ***less*** likely to be stopped than expected.
Female	40.6% (1,132)	30.3% (98)	+10.3	< .001	Yes. More likely to be stopped than expected.

As the percentage of females in these stops was simply the reciprocal of the stops for males, this meant that females were more likely to be stopped than expected, when based on this criminal offender benchmark. We found 40.6% of the drivers stopped in Baker District were female, and only 30.3% of the criminal suspects reported to the police were female, a difference of 10.3 percentage points that was a statistically significant difference.

The reader should remember, however, that the vehicle stops being examined were a mixture of unknown proportions of traffic violation stops (appropriate for a crash driver benchmark) and criminal investigative stops (appropriate for a criminal suspect description benchmark). Each of the two benchmarks utilized was designed for only one of these types of stops. We expected that the true benchmark for these combined stops would reside somewhere between the crash driver benchmark and the criminal suspect benchmark. Therefore, we used these two benchmarks as boundaries for the true (unknown) benchmark for a combined sample of traffic violation stops and criminal investigative stops.

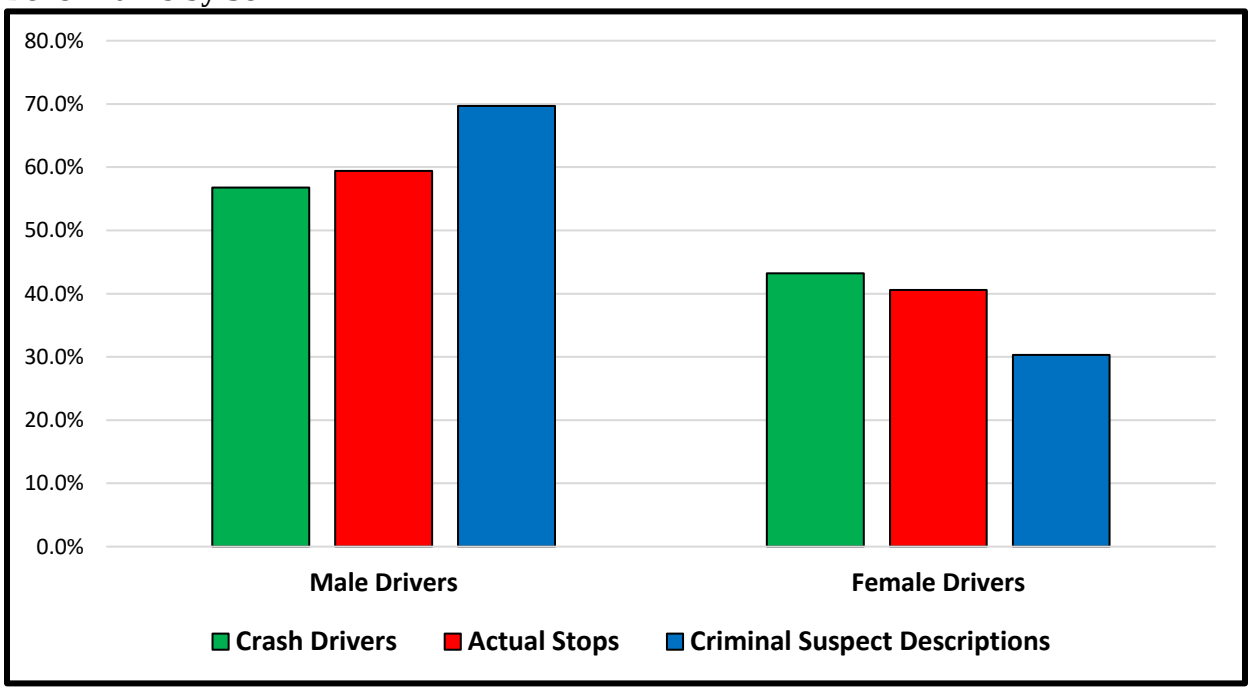
Table 5.3 Baker District Vehicle Stops by Sex using Benchmark Boundaries

Sex	Crash Drivers Benchmark	Actual Stopped Drivers	Criminal Suspect Benchmark	Within boundaries?
Male	56.8%	59.4%	69.7%	**Yes – No Disparity**
Female	43.2%	40.6%	30.3%	**Yes – No Disparity**

Table 5.3 above illustrates that when these two benchmarks were utilized as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops, we found no evidence of disparity by sex within Baker District. The proportion of male drivers stopped fits neatly between the proportion of males revealed within the crash driver benchmark and the criminal suspect descriptions benchmark. Likewise, the proportion of female drivers stopped fits neatly between the proportion of females revealed within the crash driver benchmark and the criminal suspect descriptions benchmark.

The benchmark boundaries for the stops of male drivers were 56.8% (crash drivers) and 69.7% (criminal suspects), with a midpoint of 63.3%. The actual stops of male drivers was 59.4%, between these two boundaries and below the midpoint. The benchmark boundaries for the stops of female drivers were 43.2% (crash drivers) and 30.3% (criminal suspects), with a midpoint of 36.8%. The actual stops of female drivers was 40.6%, between these two boundaries and a little above the midpoint. This demonstrated no disparity by sex existed within the Baker District stops. Figure 5.2 below serves as a visual illustration of the data in Table 5.3. This bar graph illustrates how well the proportions of female and male stops reside between the two benchmark measure extremes.

Figure 5.2 Baker District Vehicle Stops Compared to Crash Driver and Criminal Suspect Benchmarks by Sex



We also utilized the veil-of-darkness benchmark method. We examined the stops made during hours of daylight, when it was assumed to be easier to determine the sex and race of the driver prior to stop. We compared these stops with stops made during hours of darkness, when it was assumed to be harder to determine driver characteristics prior to stop. A total of 1,375 vehicle stops occurred during daylight hours (defined as between 30 minutes before sunrise and 30 minutes after sunset). An additional 1,410 vehicle stops occurred during the remaining hours of the day that were classified as darkness. Table 5.4 reveals the details of this veil-of-darkness analysis by sex for Baker District.

Table 5.4 Baker District Vehicle Stops by Sex (Veil of Darkness Benchmark)

Sex	Daylight Stopped Drivers (number)	Benchmark Darkness Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	55.7% (766)	62.9% (887)	-7.2	< .001	Yes, but *less* likely to be stopped than expected.
Female	44.3% (609)	37.1% (523)	+7.2	< .001	Yes. More likely to be stopped than expected.

As Table 5.3 reveals, females were stopped more often than expected. While 44.3% of the drivers stopped during the daylight hours were female, only 37.1% of the drivers stopped during hours of darkness were female. Even after controlling for sampling error, the binomial test found this

difference to be statistically significant with a *p*-value of less than .01 (actually the *p*-value was even less than .001). Likewise, male drivers made up 62.9% of stops during darkness, yet this dropped to only 55.7% of stops during daylight.

A counter explanation could be that females were less likely than males to drive at night within Baker District. To respond to this counter-claim, we examined our crash driver data by daylight and darkness. When examining crash drivers within Baker District, we found that females made up 44.2% of crash drivers during daylight hours, and 37.8% of crash drivers during hours of darkness. While the percentage for daylight crashes was 4.4 percentage points higher, the binomial test revealed that this difference was within the margin for sampling error ($p = .162$). Therefore, we found insufficient evidence that this argument was true to the degree that it could produce a statistically significant difference between female stops made during hours of daylight and darkness.

In actual human terms, however, how great was this disparity? There were 1,375 drivers stopped during daylight. Female drivers constituted 37.1% of drivers stopped during hours of darkness, when the opportunity for bias in stops was less present. If 37.1% of the daylight stops had been female drivers, this would have amounted to 510 female drivers stopped during daylight. As it was, 609 female drivers were stopped during daylight, a difference of 99 drivers. By this estimate, during the 12-month period of study there were, on average, 8 more female drivers stopped (and 8 fewer male drivers stopped) each month than would have been predicted by the darkness benchmark.

5.1.2 Driver Race and Ethnicity

During the 12-month period of study, 2,740 vehicle stops took place within Baker District in which the driver's race and ethnicity was recorded by the officer. During that same period, race and ethnicity data was available for 438 drivers involved in crashes within Baker District to serve as a traffic benchmark estimate. Descriptions of 323 criminal suspects within Baker District served as a criminal offender population benchmark. Remember that the Carmel Police Department stops contained a mixture of traffic stops and criminal investigative stops of unknown proportions, thus both benchmarks were used.

Table 5.5 below reveals the analysis of the stopped drivers in Baker District, by race and Hispanic ethnicity, using the crash driver benchmark. As this table reveals, 1.0% of the drivers stopped by the Carmel Police Department within Baker District were Alaskan Natives / American Indians, as were 0.5% of the crash drivers. The binomial test revealed that this minor difference of 0.5 percentage points was within the margin of sampling error. Likewise, 4.4% of the drivers stopped were Asians / Pacific Islanders, as were 5.9% of the crash drivers. Asian / Pacific Islander drivers were stopped 1.5 percentage points less often than expected, yet this difference too was within the margin of sampling error. Neither of these two racial groups were disproportionately stopped.

Stops of African-Americans, however, showed a different result. While 16.9% of the crash drivers were African-American / Black, 30.7% of the stopped drivers were African-American / Black. The binomial test confirmed that this difference of 13.8 percentage points was a statistically significant difference not explained away by sampling error. This meant that, when based only on a benchmark that estimated the driving population within Baker District, African-American / Black

drivers were disproportionately more likely to be stopped by the police than would be expected by this benchmark. Conversely, while 76.7% of the crash drivers in Baker District were Caucasian / White, only 63.9% of stopped were Caucasian / White, a difference of 12.8 percentage points. This statistically significant difference reveals that white drivers were less likely to be stopped in Baker District than would have been expected based on only the crash driver benchmark that did not account for criminal investigative stops.

Table 5.5 Baker District Vehicle Stops by Race / Ethnicity (Crash Driver Benchmark)

Race or Ethnicity	Stopped Drivers (number)	Benchmark Crash Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	1.0% (27)	0.5% (2)	+0.5	.186	No – no disparity.
Asian / Pacific Islander	4.4% (121)	5.9% (26)	-1.5	.078	No – no disparity.
African-American / Black	30.7% (841)	16.9% (74)	+13.8	< .001	Yes. More likely to be stopped than expected.
Caucasian / White	63.9% (1,751)	76.7% (336)	-12.8	< .001	Yes, but ***less*** likely to be stopped than expected.
Hispanic Ethnicity	7.9% (221)	6.4% (28)	+1.5	.139	No – no disparity.

Regarding stops of Hispanic ethnicity drivers, 7.9% of vehicle stops involved Hispanic drivers, and 6.4% of crash drivers were Hispanic, a difference of only 1.5 percentage points. The binomial test revealed that this difference was within the margin of sampling error, thus no disparity was revealed for stops of Hispanic drivers with this benchmark.

Next, we examined stops by race and ethnicity using the criminal suspect description benchmark within Baker District. Table 5.6 reveals the details of that analysis. In this case, no disparity was revealed with regards to stops of Alaskan Native / American Indian drivers or Hispanic drivers. Alaskan Native / American Indian drivers made up 1.0% of the stops and 0.3% of the criminal suspect benchmark, with a minor difference of 0.7 percentage points that proved to be within the margin of sampling error. While Hispanic individuals made up 9.9% of the criminal suspect benchmark, Hispanic drivers constituted 7.9% of the drivers stopped. This was 2.0 percentage points less than expected, but within the margin of sampling error.

Asian and white drivers, however, were disproportionately more likely to be stopped than expected when based on this criminal offending population benchmark measure. Asians / Pacific Islanders made up 4.4% of the drivers stopped, but only 1.5% of the criminal suspect descriptions in the benchmark, a difference that could not be explained away by sampling error. Similarly, Caucasian / White drivers made up 63.9% of the drivers stopped, but only 43.7% of the criminal suspect

descriptions in the benchmark. Again, this was a difference that could not be explained away by sampling error.

Table 5.6 Baker District Vehicle Stops by Race / Ethnicity (Criminal Suspect Benchmark)

Race or Ethnicity	Stopped Drivers (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	1.0% (27)	0.3% (1)	+0.7	.621	No – no disparity
Asian / Pacific Islander	4.4% (121)	1.5% (5)	+2.9	.004	Yes. More likely to be stopped than expected.
African-American / Black	30.7% (841)	54.5% (176)	-23.8	< .001	Yes, but ***less*** likely to be stopped than expected.
Caucasian / White	63.9% (1,751)	43.7% (141)	+20.2	< .001	Yes. More likely to be stopped than expected.
Hispanic Ethnicity	7.9% (221)	9.9% (32)	-2.0	.111	No – no disparity

Interestingly, while African-American / Black drivers were disproportionately more likely to have been stopped based on the crash driver benchmark, the exact opposite was true when compared to the criminal suspect benchmark. While African-Americans made up 30.7% of the drivers stopped within Baker District, more than half (54.5%) of the criminal suspects described to the police by members of the public within Baker District described the suspect as being African-American or black. The reader should pause to consider that large percentage. Despite a resident population that is only 2.7% African-American, more than half of the individuals observed committing crimes within Baker District were described by members of the public as being African-American.

The reader should remember, however, that the vehicle stops being examined were a mixture of unknown proportions of traffic violation stops (appropriate for a crash driver benchmark) and criminal investigative stops (appropriate for a criminal suspect description benchmark). Each of the two benchmarks utilized was designed for only one of these types of stops. We expected that the true benchmark for these combined stops would reside somewhere between the crash driver benchmark and the criminal suspect benchmark. Therefore, we used these two benchmarks as boundaries for the true (unknown) benchmark for a combined sample of traffic violation stops and criminal investigative stops.

Table 5.7 below illustrates that when these two benchmarks are utilized as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops, we found no evidence of stop disparity within Baker District for drivers of any race category or Hispanic ethnicity. With the exception of Alaskan Native / American Indian drivers, the proportions of each racial and ethnic group's stopped drivers fit neatly between the proportion of these drivers revealed within the crash driver benchmark and the criminal suspect descriptions benchmark.

Table 5.7 Baker District Vehicle Stops by Race / Ethnicity using Benchmark Boundaries

Race or Ethnicity	Crash Drivers Benchmark	Actual Stopped Drivers	Criminal Suspect Benchmark	Within boundaries?
Alaskan Native / American Indian	0.5%	1.0%	0.3%	No, but within margin of sampling error.
Asian / Pacific Islander	5.9%	4.4%	1.5%	**Yes – No Disparity**
African-American / Black	16.9%	30.7%	54.5%	**Yes – No Disparity**
Caucasian / White	76.7%	63.9%	43.7%	**Yes – No Disparity**
Hispanic Ethnicity	6.4%	7.9%	9.9%	**Yes – No Disparity**

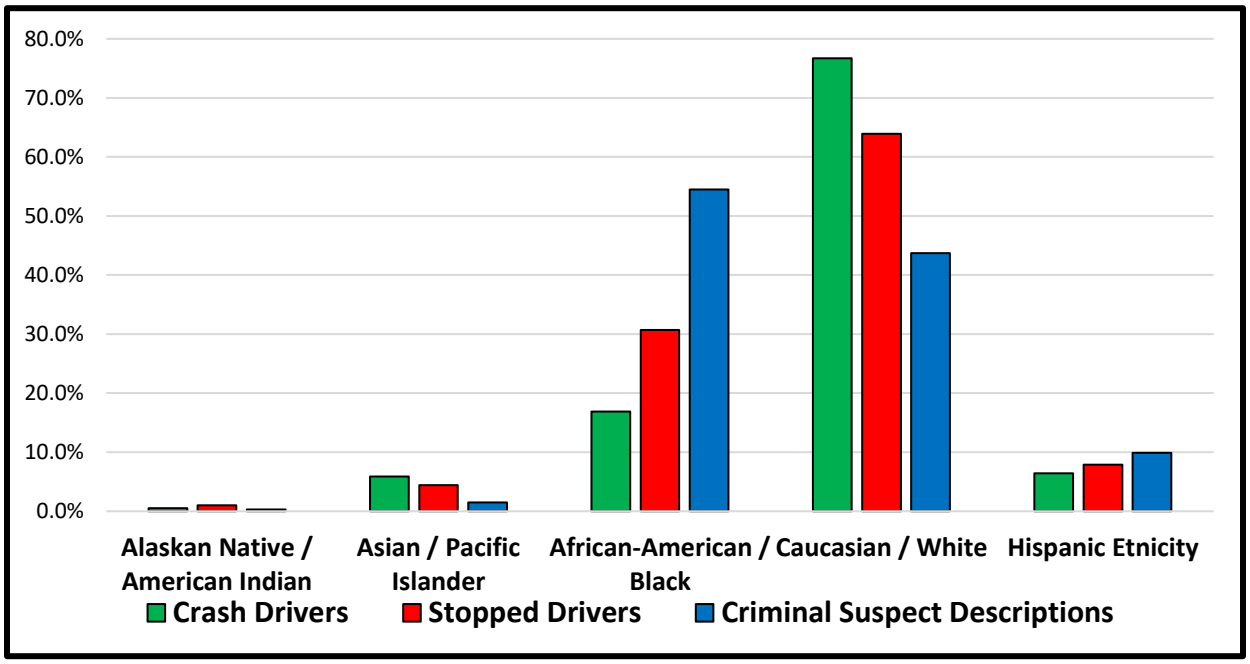
For example, the benchmark boundaries for the stops of Asian / Pacific Islander drivers were 5.9% (crash drivers) and 1.5% (criminal suspects), with a midpoint of 3.7%. The actual stops of Asian / Pacific Islander drivers was 4.4%, between these two boundaries and slightly above the midpoint. The benchmark boundaries for the stops of African-American drivers were 16.9% (crash drivers) and 54.5% (criminal suspects), with a midpoint of 35.7%. The actual stops of African-American drivers was 30.7%, between these two boundaries and below the midpoint. The benchmark boundaries for the stops of white drivers were 76.7% (crash drivers) and 43.7% (criminal suspects), with a midpoint of 60.2%. The actual stops of male drivers was 59.4%, between these two boundaries and slightly below the midpoint.

The only exception was stops of Alaskan Native / American Indian drivers. The benchmark boundaries for the stops of these drivers were 0.5% (crash drivers) and 0.3% (criminal suspects), with a midpoint of 0.4%. The actual stops of Alaskan Native / American Indian drivers was 1.0%, less than a percentage point above either of these two boundaries. Furthermore, the percentage difference for this group was within the margin of sampling error when compared to each benchmark individually (see Tables 5.5 and 5.6). Therefore this disparity was within the margin for sampling error, thus no disparity existed for Alaskan Natives / American Indians either.

Figure 5.3 below serves as a visual representation of the findings contained in Table 5.7. Figure 5.3 is a bar graph comparing the stops within Baker District to each of these two benchmarks by race. The percentage of drivers stopped for Asian / Pacific Islander, African-American / Black, Caucasian / White, and Hispanic ethnicity drivers were indeed between the percentages for each race or ethnic found within each of the two benchmarks. The graph also reveals just how minor the percentage difference was for the Alaskan Native / American Indian drivers.

Therefore, when using these two benchmarks as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops, we find no evidence that drivers of any specific race, or Hispanic ethnicity drivers, were disproportionately more likely to be stopped within Baker District during the period of study.

Figure 5.3 Baker District Vehicle Stops Compared to Crash Driver and Criminal Suspect Benchmarks



We next utilized the veil-of-darkness benchmark method. We examined stops made during hours of daylight, when it was assumed to be easier to determine the race of the driver prior to stop. We then compared these daylight stops to stops made during hours of darkness, when it was assumed to be harder to determine driver characteristics prior to stop. A total of 1,365 vehicle stops occurred during daylight hours, and 1,375 vehicle stops occurred during the hours classified as darkness. Table 5.8 reveals the details of this veil-of-darkness analysis by race and ethnicity for Baker District.

Table 5.8 reveals that during the daylight hours, when it is assumed to be easier to identify the race of the driver prior to stop, 0.5% of vehicle stops involved Alaskan Native / American Indian drivers. During hours of darkness, when it is harder to determine the characteristics of the drivers prior to stop, 1.5% of the drivers stopped were Alaskan Natives / American Indians. This 1.0 percentage point difference and the binomial test outcome both revealed that this difference was within the margin of sampling error, showing no racial disparity. Likewise, there was no disparity found for Hispanic ethnicity drivers. Hispanic ethnicity drivers constituted 8.4% of stops during daylight, and 7.4% of stops during darkness, a difference of 1.0 percentage points that was within the margin of sampling error.

Statistically significant disparities were revealed, however, for Asian / Pacific Islander drivers, African-American / Black drivers, and Caucasian / White drivers. Both Asian / Pacific Islander drivers and Caucasian / White drivers were statistically more likely to be stopped during hours of daylight, when their identities were more visible prior to stop. During daylight hours, Asian / Pacific Islander drivers made up 5.3% of vehicle stops, but during darkness this fell to 3.5% of

stops, a difference of only 1.8 percentage points. Because of the larger sizes of the samples in this district, this 1.8 percentage point difference could not be explained away by sampling error.

Table 5.8 Baker District Vehicle Stops by Race / Ethnicity (Veil of Darkness Benchmark)

Race or Ethnicity	Daylight Stopped Drivers (number)	Benchmark Darkness Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.5% (7)	1.5% (20)	-1.0	.138	No – no disparity.
Asian / Pacific Islander	5.3% (73)	3.5% (48)	+1.8	.001	Yes. More likely to be stopped than expected.
African-American / Black	24.6% (336)	36.7% (505)	-12.1	< .001	Yes, but ***less*** likely to be stopped than expected.
Caucasian / White	69.5% (949)	58.3% (802)	+11.2	< .001	Yes. More likely to be stopped than expected.
Hispanic Ethnicity	8.4% (116)	7.4% (104)	+1.0	.106	No – no disparity.

A counter explanation could be that Asian / Pacific Islander drivers were more likely to drive during daylight and less likely to drive at night within Baker District. To respond to this counter claim, we examined our crash driver data by daylight and darkness. When examining crash drivers within Baker District, we found that Asian / Pacific Islander drivers made up 6.3% of crash drivers during daylight hours, and 4.1% of crash drivers during hours of darkness. This difference of 2.2 percentage points ***was*** statistically significant as the binomial test result (p = .008) was less than .01. Therefore, we found evidence to support the argument that Asian / Pacific Islanders actually were a smaller proportion of the drivers on the roadway after dark within Baker district, thus likely explaining why their proportion of stops was much smaller during hours of darkness.

During daylight hours, Caucasian / White drivers made up 69.5% of vehicle stops, but during darkness this fell to 58.3% of stops, a difference of 11.2 percentage points that the binomial test confirmed could not be explained by sampling error. We examined if white drivers were more likely to drive during daylight, and less likely to drive at night, within Baker District. When examining crash drivers within Baker District, we found that white drivers composed 78.3% of crash drivers during daylight hours, and only 68.9% of crash drivers during hours of darkness. The binomial test result of p = < .001 revealed that this difference of 9.4 percentage points could not be explained by sampling error. Therefore, we also found evidence to support the argument that white drivers are a smaller proportion of the drivers after dark. This likely explained why the proportion of white drivers stopped during darkness was smaller than the proportion of white drivers stopped during daylight hours within Baker District.

The veil-of-darkness method also revealed that African-American / Black drivers were significantly less likely (not more likely) to be stopped than expected. During daylight hours,

African-American / Black drivers made up 24.6% of vehicle stops, but 36.7% of stops during darkness, when it is harder to determine the driver's race before the stop. This was a difference of 12.1 percentage points, that the binomial test confirmed could not be explained by sampling error. We examined if African-American drivers were less likely to drive during daylight, and more likely to drive at night within Baker District. We found evidence that this was in fact the case. Within Baker District, we found that African-American drivers composed 14.8% of crash drivers during daylight hours, and 27.0% of crash drivers during darkness. The binomial test result of $p = < .001$ revealed that is difference of 12.2 percentage points could not be explained by sampling error. Therefore, we found evidence to support the argument that African-American drivers were stopped at greater proportions during hours of darkness, and smaller proportions during daylight hours, because they made up a larger proportion of the driving population during nighttime hours within Baker District.

Therefore the veil-of-darkness disparities revealed within Baker District regarding Asian / Pacific Islander, African-American, and white drivers within Baker district were explained by differences in driving patterns, ***not*** officer bias. Asian / Pacific Islander and white drivers made up greater percentages of the driving population during hours of daylight within Baker District, and smaller proportions of the driving population after dark. Conversely, African-American drivers made up smaller percentages of the driving population during hours of daylight within Baker District, and larger proportions of the driving population after dark.

5.1.3 Vehicle Stops Summary

In summary, the majority of our analyses revealed that female drivers were not disproportionately stopped within Baker District during the period of study. The percentage of stops involving female drivers was within the boundaries of the crash driver and criminal suspect benchmarks. In fact, the percentage of stopped drivers who were female was statistically the same as the percentage of crash drivers who were female. When examining by daylight and darkness, however, there was evidence to suggest that female drivers may have been disproportionately selected by officers for vehicle stops during daylight hours when they could more easily determine the driver's characteristics. During hours of darkness, when it was much harder to select drivers by their characteristics, the proportion of female drivers stopped declined.

We found no evidence to support the argument that this was because female drivers made up a larger proportion of the drivers during daylight. Our crash driver sample revealed that the proportion of drivers on the roadway within Baker district who were female did not differ significantly from daylight to darkness. Therefore, the evidence suggested that officers within Baker District disproportionately stopped female drivers during daylight hours at a rate of about eight more stops than expected each month.

Our analyses also revealed no evidence that persons of color were disproportionately stopped within Baker District during the period of study. The percentage of stops involving each racial or ethnic group was within the boundaries of the crash driver and criminal suspect benchmarks, or within the margin of sampling error. When examined by daylight and darkness, we initially found that Asian / Pacific Islander and white drivers were disproportionately more likely to be stopped during daylight hours, and African-American drivers were disproportionately less likely to be stopped during daylight hours. However, an examination of crash drivers by daylight and darkness

hours revealed that these differences could be explained by traffic differences by time of day. White and Asian / Pacific Islander drivers made up larger proportions of the driving population within Baker District during daylight hours, and African-American drivers increased proportionally after dark. Therefore, in terms of race or ethnicity, our analyses of stops produced no evidence that African-Americans, or other persons of color, were disproportionately stopped within Baker District.

5.2 Post-Stop Citations

We examined equity in the treatment of drivers (in terms of citations) after they had already been stopped. As described in earlier sections of this report, we considered stops with similar offense seriousness and number of offenses committed. Once these one-violation stops were isolated, stops for the same reason were then compared with one another. Of the 2,786 individual vehicle stops that occurred within Baker District, 2,004 (71.9%) involved only one traffic violation. As before, we only examined post-stop citations for the five most common reasons for stop across the city: 1.) Speeding; 2.) Expired license plate; 3.) Improper headlights; 4.) None or improper taillights; and 5.) Failure to signal lane change or intent to turn. These five reasons for stop totaled 1,785 of the one-violation stops within Baker District, making up 64.1% of all stops within Baker District, and 89.1% of the one-violation stops within Baker District.

As the benchmark for each of these categories of stops, we used the outcomes for male drivers as the benchmark for stops of female drivers. The percentage of females cited for that violation was compared to the males to see if females were treated more punitively than males. For the examination by race and Hispanic ethnicity, we used the outcome for white drivers as the benchmark for comparison to all other racial categories and Hispanic ethnicity. The assumption for this comparison was that if officers were not biased, males and females would receive citations at a similar rate for similar offenses, and persons of color would receive citations at a similar rate as whites for similar offenses.

5.2.1 Driver Sex

Speeding offenses were examined first. Speeding was by far the most common reason for stop within Baker District with 939 one-violation vehicle stops for speeding that contained data on the driver's sex. Of these stops, 56.4% (530) involved a male driver. Of these 530 speeding stops of male drivers, 111 (20.9%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure in Baker District for stops of female drivers for speeding. Table 5.9 displays the details of that analysis.

In Baker District, there were 409 female one-violation stops for speeding, 53 (13.0%) of which received a traffic citation. Compared to the 20.9% percentage of males cited, female drivers were cited 7.9 percentage points less often. The binomial test indicated that this difference could not be explained away by sampling error. Females were cited for speeding within Baker District ***less*** often than were male drivers during this period of analysis. Female drivers appear to have been treated more leniently than male drivers with regard to speeding citations.

Table 5.9 Baker District Speeding Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	13.0% (409 / 53)	20.9% (530 / 111)	-7.9	< .001	Yes, but ***less*** likely to be cited than males.

Next, we examined stops for having an expired license plate. There were 321 one-violation vehicle stops within Baker District for having an expired license plate. Of these stops, 59.2% (190) involved a male driver. Of these 190 expired license plate stops of male drivers, 25 stops (13.2%) resulted in the issuance of a traffic citation, while the remaining 165 resulted in the issuance of only a warning. This percentage served as the benchmark measure in Baker District for stops of female drivers for having an expired license plate. Table 5.10 below displays the details of that analysis.

Table 5.10 Baker District Expired Plates Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	14.5% (131 / 19)	13.2% (190 / 25)	+1.3	.367	No – no disparity.

Of Baker District's one-violation vehicle stops, there were 131 female drivers stopped for having an expired license plate, 19 (14.5%) of which received a traffic citation for that offense. This differed from the percentage of male drivers cited by only 1.3 percentage points, and the binomial test confirmed that this difference was within the margin of sampling error. No evidence of disparity between the sexes existed with regard to citations for expired license plate stops within Baker District.

Improper headlight stops were next, the analysis of which is displayed in Table 5.11. Among the one-offense stops, there were 270 vehicle stops within Baker District for improper headlights. Of these stops, 65.2% (176) involved a male driver. Of these 54 improper headlight stops of male drivers, none (0.0%) resulted in the issuance of a traffic citation, as all resulted in the issuance of only a warning. This percentage served as the benchmark measure in Baker District for stops of female drivers for having an improper headlight.

There were 94 one-violation stops of female drivers within Baker District for having an improper headlight, none of which (0.0%) received a traffic citation. This was exactly the same percentage as the male drivers who received a citation for this offense within Baker District. This outcome revealed that males and females were cited equally when stopped for operating with an improper

headlight. There was no evidence of disparity in the treatment of female drivers in this regard within Baker District for this offense.

Table 5.11 Baker District Improper Headlights Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (94 / 0)	0.0% (176 / 0)	0.0	.910	No – no disparity.

The fourth offense we examined was stops for having improper taillights. There were 168 single-violation vehicle stops within Baker District for improper taillights. Of these stops, 54.8% (92) involved a male driver. Of these 92 improper taillight stops of male drivers, only one (1.1%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure in Baker District for stops of female drivers for having an improper taillight. Table 5.12 displays the details of that analysis.

Table 5.12 Baker District Improper Taillights Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (76 / 0)	1.1% (92 / 1)	-1.1	.431	No – no disparity.

Among Baker District's one-violation stops there were 76 female drivers stopped for having an improper taillight, none of which (0.0%) received a traffic citation for that offense. This was 1.1 percentage points less than the citation rate for males, but within the margin of sampling error according to the binomial test. This outcome revealed that males and females were cited equally when stopped for operating with an improper taillight. There was no evidence of disparity in the treatment of female drivers in this regard within Baker District for this offense.

The final offense we examined was stops for failure to signal, of which there were 87 such one-violation stops within Baker District. Of these stops, 74.7% (65) involved a male driver. Of these 65 failure to signal stops of male drivers, only one (1.5%) resulted in the issuance of a traffic citation, and the rest resulted in the issuance of only a warning. This percentage served as the benchmark measure in Baker District for stops of female drivers for failing to signal properly.

Table 5.13 displays the details of this analysis. Among the single-violation stops within Baker District, there were 22 female drivers stopped for failing to signal, none of which (0.0%) received a traffic citation for that offense. Despite being 1.5 percentage points less than the citation rate for males, this difference was within the margin for sampling error. This outcome revealed that males and females were cited equally when stopped for failing to signal within Baker District.

Table 5.13 Baker District Failure to Signal Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (22 / 0)	1.5% (65 / 1)	-1.5	.717	No – no disparity.

5.2.2 Driver Race and Ethnicity

Next we examined citation rates within Baker District based on driver race or Hispanic ethnicity. As with the sex analysis, we began with speeding offenses. Within Baker District there were 927 one-violation vehicle stops for speeding that contained data on the driver's race and Hispanic ethnicity. Of these one-offense speeding stops, 67.4% (625) involved a Caucasian / White driver. Of these 625 speeding stops of Caucasian / White drivers, 97 (15.5%) resulted in the issuance of a traffic citation. This percentage for white drivers served as the benchmark measure within Baker District for the one-violation speeding stops of drivers for other races and Hispanic ethnicity. Table 5.14 displays the details of that analysis.

Table 5.14 Baker District Speeding Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	42.9% (7 / 3)	15.5% (625 / 97)	+ 27.4	.080	No – no disparity.
Asian / Pacific Islander	19.4% (49 / 9)	15.5% (625 / 97)	+3.9	.346	No – no disparity.
African-American / Black	21.5% (246 / 53)	15.5% (625 / 97)	+6.0	.007	Yes. More likely to be cited than whites.
Hispanic Ethnicity	19.7% (76 / 15)	15.5% (625 / 97)	+4.2	.192	No – no disparity.

Among Baker District's one-violation stops, there were only 7 Alaskan Native / American Indian drivers stopped for speeding, 3 of whom (42.9%) received a traffic citation for that offense. Although this citation rate was 27.4 percentage points higher than the citation rate for Caucasian / White drivers, the binomial test revealed this was still within the margin for sampling error. The reader should note that with only 7 drivers stopped, each stop makes up 14.3% of the sample of Alaskan Native / American Indian drivers. One single extra citation in the sample due to sampling error alone, inflates the citation rate by 14.3 percentage points. This explains why the binomial test still considered this width of a separation in percentages to be within the margin of sampling error.

There were 49 Asian / Pacific Islander drivers stopped for speeding, 9 of whom (19.4%) received a traffic citation. This citation rate differed from the percentage of Caucasian / White drivers cited for speeding by 3.9 percentage points, which the binomial test indicated was within the margin for

sampling error. A total of 76 Hispanic drivers were stopped for speeding, 15 (19.7%) of whom received a citation. This differed from the citation rate for Caucasian / White drivers by only 4.2 percentage points, and the binomial test indicated that this was within the margin of sampling error. These results suggested no disparity with regard to the citations issued to Alaskan Native / American Indian, Asian / Pacific Islander, and Hispanic drivers.

The findings for African-American drivers, however, differed. In Baker District, there were 246 one violation stops of African-American / Black drivers for speeding, 53 of whom (21.5%) received a traffic citation for that offense. The binomial test, making calculations with a larger sample size than the other race categories, indicated that the percentage of African-American / Black drivers cited for speeding, and the percentage of Caucasian / White drivers cited for speeding (15.5%), were far enough apart to be outside the margin for sampling error. Therefore, the evidence here suggested that African-American / Black drivers stopped for speeding within Baker District were more likely to receive a traffic citation for the offense than were white drivers who were stopped under similar circumstances.

In actual human terms, however, how great was this disparity? There were 246 African-American drivers stopped for speeding. Since only 15.5% of white drivers stopped for speeding received a citation, if we applied that same percentage to stops of African-American drivers we would find 38 African-American drivers would have received a citation if cited just as often as white drivers. In reality, 53 African-American drivers received a citation for speeding, a difference of 15 drivers. By this estimate, during the 12-month period of study there were, on average, only between one and two more African-American drivers cited each month within Baker District than would have been predicted by the white driver citation rate benchmark.

Next, we examined stops for having an expired license plate. There were 317 one-violation vehicle stops within Baker District for having an expired license plate. Of these stops, 66.3% (210) involved a Caucasian / White driver. Of these 210 expired license plate stops of Caucasian / White drivers, 34 stops (16.2%) resulted in the issuance of a traffic citation. This white driver citation percentage served as the benchmark measure within Baker District for the expired license plate stops of drivers of other races and Hispanic ethnicity. Table 5.15 displays the details of that analysis.

In Baker District's one-violation stops, there were 7 Alaskan Native / American Indian drivers stopped for having an expired license plate, and none received a traffic citation for that offense. Despite the citation rate difference when compared to white drivers (cited 16.2 percentage points *less* than whites), this difference was within the margin for sampling error because it was based on a sample of only 7 cases. The results were similar for all of the other race categories as well. Of the 20 Asian / Pacific Islander drivers stopped, only 10.0% (2 drivers) received a traffic citation.

Of the 80 African-American / Black drivers stopped for an expired license plate, only 8.8% (7 drivers) received a traffic citation, compared to 16.2% for Caucasian / White drivers. Of the 8 Hispanic ethnicity drivers stopped for an expired license plate, 25.0% (2 drivers) received a traffic citation, but the small sample size of 8 cases meant this was still within the margin of sampling error. In fact, *all* of these differences in comparison to white drivers were within the margin of sampling error. Therefore, we found no evidence to suggest that any racial or ethnic group was

treated differently with regard to the decision to issue citations for expired license plates within Baker District.

Table 5.15 Baker District Expired Plates Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (7 / 0)	16.2% (210 / 34)	-16.2	.021	No – no disparity.
Asian / Pacific Islander	10.0% (20 / 2)	16.2% (210 / 34)	-6.2	.349	No – no disparity.
African-American / Black	8.8% (80 / 7)	16.2% (210 / 34)	-7.4	.041	No – no disparity.
Hispanic Ethnicity	25.0 (8 / 2)	16.2% (210 / 34)	+8.8	.381	No – no disparity.

Third, we examined stops for having improper headlights. There were 267 one-violation vehicle stops within Baker District for an improper headlights violation. Of these stops, 65.5% (175) involved a Caucasian / White driver. Of these 175 improper headlight stops of Caucasian / White drivers, none (0.0%) resulted in the issuance of a traffic citation. This percentage of white drivers cited served as the benchmark measure within Baker District for stops involving an improper headlight, for examining the citation rates for other races and Hispanic ethnicity. Table 5.16 displays the details of that analysis.

Table 5.16 Baker District Improper Headlights Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (5 / 0)	0.0% (175 / 0)	0.0	.995	No – no disparity.
Asian / Pacific Islander	0.0% (9 / 0)	0.0% (175 / 0)	0.0	.991	No – no disparity.
African-American / Black	0.0% (78 / 0)	0.0% (175 / 0)	0.0	.925	No – no disparity.
Hispanic Ethnicity	0.0% (18 / 0)	0.0% (175 / 0)	0.0	.982	No – no disparity.

Among the one-violation stops, Baker District saw only 5 Alaskan Native / American Indian drivers stopped for having an improper headlight, and none received a traffic citation for that offense. This was the exact same percentage of Caucasian / White drivers that were cited for this offense, so no evidence of disparity was revealed. Likewise, there were only 9 Asian / Pacific Islander drivers stopped for having an improper headlight, and none received a traffic citation for that offense. This was the exact same percentage of Caucasian / White drivers that were cited for

this offense, so no evidence of disparity in the treatment of Asian / Pacific Islander drivers was revealed.

The same was also true for African-American / Black drivers. While there were 78 African-American / Black drivers stopped for having an improper headlight, none received a traffic citation for that offense. No evidence of disparity in the treatment of African-American / Black drivers was revealed with regard to improper headlight citations within Baker District. Finally, there were 18 Hispanic ethnicity drivers stopped, and none received a traffic citation for that offense, just as was the case for Caucasian / White drivers. In summary, we found no evidence to suggest that any racial or ethnic group was cited at a higher rate than white drivers for having an improper headlight within Baker District.

Fourth, we examined stops for improper taillights. Among the single-violation stops within Baker District, there were 163 vehicle stops for improper taillights. Of these stops, 62.6% (102) involved a Caucasian / White driver. Of these 102 improper taillight stops of Caucasian / White drivers, only one (1.0%) resulted in the issuance of a traffic citation. This white driver citation percentage (1.0%) served as the benchmark measure in Baker District for single-offense stops involving an improper taillight when examining the citation rates for other races and Hispanic ethnicity. Table 5.17 displays the details of that analysis.

Among the single-violation stops within Baker District, there was only one Alaskan Native / American Indian driver stopped for an improper taillight violation, and this individual did not receive a traffic citation for that offense. Therefore, no evidence of disparity in the treatment of Alaskan Native / American Indian drivers was revealed with regard to improper taillight citations within Baker District. Likewise, there were 10 Asian / Pacific Islander drivers stopped for an improper taillight, and none of these drivers (0.0%) received a traffic citation for that offense.

Table 5.17 Baker District Improper Taillights Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (1 / 0)	1.0% (102 / 1)	-1.0	.915	No – no disparity.
Asian / Pacific Islander	0.0% (10 / 0)	1.0% (102 / 1)	-1.0	.990	No – no disparity.
African-American / Black	0.0% (50 / 0)	1.0% (102 / 1)	-1.0	.951	No – no disparity.
Hispanic Ethnicity	0.0% (11 / 0)	1.0% (102 / 1)	-1.0	.989	No – no disparity.

The same was true for African-American / Black drivers. In Baker District, 50 African-American / Black drivers were stopped for having an improper taillight, and again none received a traffic citation for that offense. Finally, 11 Hispanic ethnicity drivers were stopped for having an improper taillight, and none received a traffic citation for that offense. These were all less than the percentage of Caucasian / White drivers that were cited for this offense, so no evidence of disparity in the

treatment of drivers of any race or ethnicity was revealed with regard to citations for improper taillight within Baker District.

The final offense we examined was stops for failure to signal. There were 82 one-violation vehicle stops within Baker District for failing to signal. Of these stops, 51 (62.2%) involved a Caucasian / White driver. Of these 51 failure to signal stops of Caucasian / White drivers, only one (2.0%) resulted in the issuance of a traffic citation. This white driver percentage served as the benchmark measure within Baker District for stops involving drivers of other races and Hispanic ethnicity. Table 5.18 displays the details of that analysis.

Of the one-violation stops within Baker District, there were only 2 Alaskan Native / American Indian drivers stopped for a failure to signal violation, and none received a traffic citation for that offense. Likewise, there were only 2 Asian / Pacific Islander drivers stopped, and none (0.0%) received a citation. A total of 29 African-American / Black drivers were stopped for a failure to signal violation, and again none received a traffic citation for that offense. Finally, 9 Hispanic ethnicity drivers were stopped for failure to signal, and none received a citation for this offense. All four race and ethnicity categories were cited less often than Caucasian / White drivers that were stopped for the same offense under similar conditions within Baker District. Nevertheless, the binomial test results revealed that these differences were within the margin of sampling error. Therefore, no evidence was found that officers disproportionately cited drivers of any specific racial or ethnic group for failure to signal violations within Baker District once seriousness of offense and number of violations was controlled.

Table 5.18 Baker District Failure to Signal Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (2 / 0)	2.0% (51 / 1)	-2.0	.960	No – no disparity.
Asian / Pacific Islander	0.0% (2 / 0)	2.0% (51 / 1)	-2.0	.960	No – no disparity.
African-American / Black	0.0% (29 / 0)	2.0% (51 / 1)	-2.0	.557	No – no disparity.
Hispanic Ethnicity	0.0% (9 / 0)	2.0% (51 / 1)	-2.0	.890	No – no disparity.

5.2.3 Post-Stop Citations Summary

We found no evidence to suggest that females and males were treated differently with regard to the decision to issue citations within Baker District. When stops of similar type and seriousness were compared, there was no evidence that female drivers disproportionately received traffic citations more often than men and vice versa. Regarding treatment by race or ethnicity, we did find evidence to suggest that African-American drivers were more likely than white drivers to receive a citation when stopped for speeding within Baker District, even when stopped under similar circumstances. This disparity, however, amounted to between one and two additional traffic citations, on average, per month. This was a substantively small amount of disparity. We

also found no other evidence of racial disparity in the citation rates of drivers of other races, or in the citation rates of African-American drivers for the four other traffic offenses.

5.3 Criminal Arrests

We examined the criminal arrests made by the Carmel Police Department to determine if evidence existed of disproportionately punitive treatment of any particular sex or racial group. From July 1, 2020, through June 30, 2021, there were 198 individuals arrested within Baker District for criminal offenses. These arrests were compared against the benchmark measure of criminal suspect descriptions mentioned earlier regarding the vehicle stops. There were 323 criminal suspect descriptions received from members of the public within Baker District during this period of evaluation.

5.3.1 Arrestee Sex

The results of the analysis by sex are displayed in Table 5.19 below. Of the 198 individuals arrested within Baker District during the period of study, 130 (65.7%) were male. Among the 229 criminal suspect descriptions received from the public within Baker District during the period of study, 149 (65.7%) were male. The arrests differed from the benchmark by only 4.0 percentage points, and the result of the binomial test was greater than .01, revealing the difference was within the margin for sampling error for males. The same was true for females. Exactly 68 (34.3%) of the arrested individuals were female, and 98 (30.3%) of the criminal suspects within the benchmark were female, a difference of 4.0 percentage points. This difference was also within the margin of sampling error. As a result, we found no evidence to suggest that females (or males for that matter) were disproportionately more or less likely to be arrested when compared to a benchmark measure of the criminal offender population active within Baker District.

Table 5.19 Baker District Criminal Arrests Sex Comparison

Sex	Arrested Individuals (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	65.7% (130)	69.7% (225)	-4.0	.124	No – no disparity.
Female	34.3% (68)	30.3% (98)	-4.0	.124	No – no disparity.

5.3.2 Arrestee Race and Ethnicity

The results of the arrests analysis by race and ethnicity are displayed in Table 5.20 below. Of the 198 individuals arrested within Baker District during the period of study, none (0.0%) were Alaskan Natives / American Indians. Likewise, there were no Alaskan Native / American Indian persons described within the criminal suspect descriptions from Baker District. As a result, there was no evidence that individuals of this race category were arrested at all within Baker District, much less at a disproportionate rate.

Likewise, there were no individuals arrested within Baker District within the Asian / Pacific Islander category, despite this racial group making up 1.5% of the criminal suspect descriptions

benchmark. Nevertheless, this differences was within the margin of sampling error, thus there was no evidence to suggest that Asians / Pacific Islanders were disproportionately arrested within Baker District.

As mentioned earlier, more than half of the criminal suspects described by crime victims and witnesses within Baker District described the individual they observed committing a crime as being African-American or black. While African-American individuals constituted 54.5% of the criminal suspect descriptions obtained within Baker District, African-Americans made up 54.6% of the individuals arrested within Baker District (108 arrests). As this was a difference of only one-tenth of a percentage point, the binomial test revealed that this was within the margin for sampling error. Therefore, there was no evidence to suggest that African-Americans were disproportionately arrested within Baker District. In fact, even with the possibility of sampling error, the percentage arrested and the percentage within the benchmark were almost identical.

Caucasian / White individuals were also arrested at a rate similar to their representation within the criminal suspect benchmark. Whites made up 45.5% of the arrested individuals, and 43.7% of the suspects described in the benchmark. This difference of 1.8 percentage points was within the margin of sampling error. Finally, arrests of individuals of Hispanic ethnicity were also within the margin of error with the benchmark measure. Within Baker District, Hispanics made up 12.6% of the individuals arrested, and 9.9% of the criminal suspect descriptions during the same period, a difference of only 2.7 percentage points.

Table 5.20 Baker District Criminal Arrests Race / Ethnicity Comparison

Race or Ethnicity	Arrested Individuals (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0)	0.3% (1)	-0.3	.552	No – no disparity.
Asian / Pacific Islander	0.0% (0)	1.5% (5)	-1.5	.050	No – no disparity.
African-American / Black	54.6% (108)	54.5% (176)	+0.1	.524	No – no disparity.
Caucasian / White	45.5% (90)	43.7% (141)	+1.8	.334	No – no disparity.
Hispanic Ethnicity	12.6% (25)	9.9% (32)	+2.7	.127	No – no disparity.

5.3.3 Criminal Arrests Summary

Comparisons of arrests by sex within Baker District revealed that females and males were arrested at percentages fairly equal to the percentages of the sexes within the criminal suspect description benchmark for Baker District. Likewise, all of the racial groups examined, and Hispanic ethnicity, were arrested at similar proportions as they were represented within the criminal suspect

description benchmark. We found no evidence to suggest any sex, race, or ethnic group was disproportionately arrested more often within Baker District when compared to the offender population active within Baker District.

5.4 Baker District Summary

Regarding vehicle stops (a combination of traffic offense and criminal investigative stops) within Baker District, part of our analysis suggested that female drivers might be disproportionately stopped within Baker District during hours of daylight, while other measures suggested no stop disparity for female drivers. We found no evidence that the Carmel Police Department disproportionally issued citations to female drivers within Baker District, once the type, seriousness, and number of traffic violations committed were properly controlled. When stops of similar type and seriousness were compared, there was no evidence female drivers received traffic citations at a higher rate than male drivers. Examination of arrests by sex within Baker District revealed that females and males were arrested at percentages equal to the percentages of the sexes within the criminal suspect benchmark for Baker District.

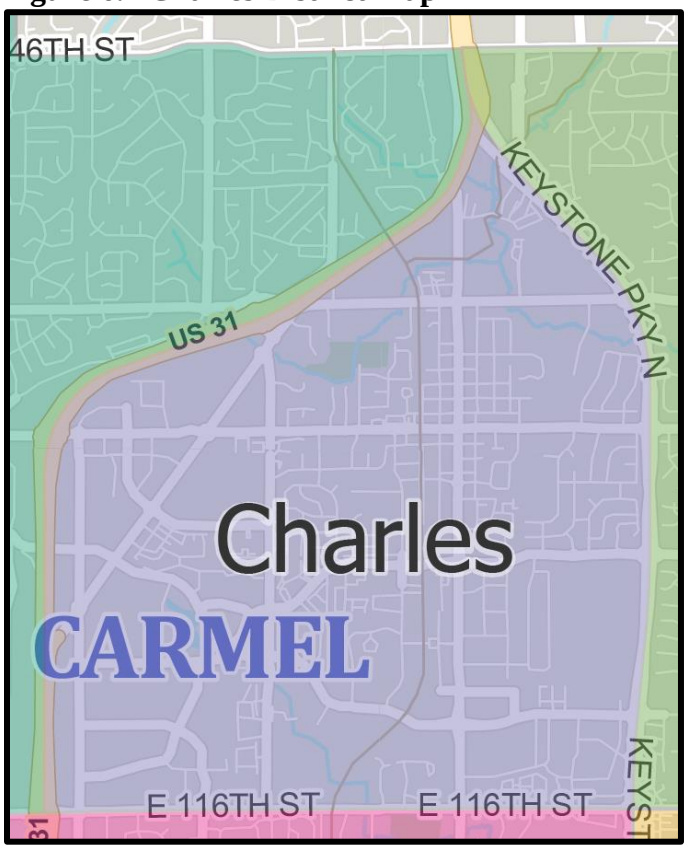
Our analyses revealed no evidence that persons of color were disproportionately stopped, cited, or arrested within Baker District during the period of study. Despite initial evidence of disparity suggested by the veil-of-darkness method, examinations of crash drivers by night and day revealed that these possible disparities were likely simply the result of differences in racial representation within the driving population by time of day.

With regard to citations, we found that African-American drivers within Baker District were more likely to receive a citation for speeding than were white drivers stopped under similar conditions. While this is disconcerting, the substantive impact of this disproportionate citation rate was that between one and two additional speeding citations were issued to African-American drivers per month than would have been expected. For the other four violations examined, African-American drivers were cited at rates similar to the citation rate of whites. All other racial and ethnic groups were also cited at rates similar to white drivers. Finally, examination of arrests by race and ethnicity within Baker District revealed that individuals of all races, and Hispanic ethnicity, were arrested at percentages equal to the percentages of these groups within the criminal suspect benchmark for Baker District.

6. CHARLES DISTRICT

Charles District is the northcentral district within Carmel, and includes the city's central business district. It lies between Adam District to the west and northwest, Edward District to the east and northeast, and David District to the south. It is somewhat triangular in shape, with its northern point boundary ending at the junction where US Highway 31 and Keystone Parkway merge. The western boundary of Charles District is U.S. 31, and its eastern boundary is Keystone Parkway. East 116th Street between U.S. 31 and Keystone Parkway is its southern boundary. Charles District is the smallest district in size (approximately 5 square miles), yet it had the most vehicle stops and highest volume of crime and calls for service among the six districts. This is because of the high volume of people drawn to the area.

Figure 6.1 Charles District Map



Charles District contains single-family housing, apartment complexes, and several large retirement villages, but the majority of Charles District is composed of government buildings, large office complexes, entertainment venues, restaurants, stores, and other businesses. City hall and the headquarters for several city government agencies (including the police department) are within Charles District. The post office and the bureau of motor vehicles are also located within Charles District. The district includes Ascension St. Vincent Carmel Hospital, Indiana Spine Hospital, and

Indianapolis Rehabilitation Hospital, which are large medical facilities drawing patients and employees from across the metro area. Large places of worship include Carmel United Methodist Church and St. Christopher's Episcopal Church. Schools include Carmel High School and Carmel Elementary School. Other notable venues within Charles District include Carmel Stadium, the Carmel Symphony Orchestra, and the Kawachinagano Japanese Garden Park.

Such locations as these attract large numbers of people to Carmel from within Carmel, across the Indianapolis metro area, and from even farther afield. In fact, approximately 57% of the crash drivers within Charles District were not Carmel residents. The largest proportion of the city's vehicle stops (26.1%) occurred within Charles District and Charles is the district with the highest traffic congestion. The most common issues reported to the police within Charles District included traffic accidents, theft (including shoplifting), fraud / deception (such as credit card fraud, forged checks, or identity theft), drug offenses, and mental health crisis incidents.

6.1 Vehicle Stops

Data were available regarding 5,023 vehicle stops made by the Carmel Police Department within Charles District. For benchmark comparisons, data were available for 840 drivers involved in crashes, and 608 descriptions of criminal suspects, from within Charles District for the 12-month period of study. We compared the stops against both of these benchmarks, and compared daylight stops with stops during hours of darkness. First, we conducted these comparisons by sex, then we repeated the process for comparisons by race and Hispanic ethnicity.

6.1.1 Driver Sex

During the 12-month period of study, 5,021 vehicle stops (combined traffic stops and criminal investigative stops) took place within Charles District in which the driver's sex was recorded by the officer. Of these vehicle stops, 2,797 of these stops involved male drivers, and 2,224 involved female drivers. During that same period, 840 drivers were involved in crashes within Charles District, who served as the benchmark for the driving population estimate. Of these crash drivers, 423 were male and 417 were female. Descriptions by sex of a total of 608 criminal suspects were provided to the police by members of the public reporting crimes that had occurred within Charles District. Of these, 438 suspects were male, and 170 were female. Recall that the Carmel Police Department stops contained a mixture of traffic stops and criminal investigative stops of unknown proportions. Therefore, we compared these stops against both benchmarks, under the assumption the correct (unknown) benchmark would lie somewhere between them.

Table 6.1 below reveals the analysis of the stopped drivers within Charles District, by sex, using the crash driver benchmark. As the table reveals, 55.7% of the drivers stopped in Charles District were male, and 50.4% of the drivers involved in crashes within Charles District were male. These two percentage values differed by 5.3 percentage points and the sample sizes within Charles District were larger than was the case in Adam and Baker Districts. The binomial test result of $p = .001$ confirmed that this difference could not be explained away by sampling error. Males were more likely to be stopped than expected when compared to this benchmark designed for traffic stop comparisons only. Conversely, female drivers made up 44.3% of the stopped drivers, yet as much as 49.6% of the drivers involved in crashes within Charles District. As the binomial test

result revealed this difference was statistically significant, the evidence suggested that females were less likely to be stopped than expected by this traffic violation benchmark estimate.

Table 6.1 Charles District Vehicle Stops by Sex (Crash Driver Benchmark)

Sex	Stopped Drivers (number)	Benchmark Crash Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	55.7% (2.797)	50.4% (423)	+5.3	.001	Yes. More likely to be stopped than expected.
Female	44.3% (2,224)	49.6% (417)	-5.3	.001	Yes, but ***less*** likely to be stopped than expected.

Next, we examined stops by sex using the criminal suspect description benchmark. Table 6.2 reveals the details of that analysis. In this analysis we found that while 55.7% of stopped drivers in Charles District were male, 72.0% of the criminal suspects reported to the police by members of the public were described as male. This was a difference of 16.3 percentage points and, based on the sample size and the laws of probability, was not within the bounds of normal sampling error. The binomial test *p*-value was even less than .001. As the percentage of males stopped was less than the percentage of males in the benchmark, this suggested that males were less likely to be stopped than one would expect based on this criminal offender benchmark, a benchmark designed for comparison with criminal investigative stops only.

Table 6.2 Charles District Vehicle Stops by Sex (Criminal Suspect Benchmark)

Sex	Stopped Drivers (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	55.7% (2.797)	72.0% (438)	-16.3	< .001	Yes, but ***less*** likely to be stopped than expected.
Female	44.3% (2,224)	28.0% (170)	+16.3	< .001	Yes. More likely to be stopped than expected.

As the percentage of females in these stops was simply the reciprocal of the stops for males, this meant that females were more likely to be stopped than expected, based on this criminal offender benchmark. We found 44.3% of the drivers stopped in Charles District were female, and only 28.0% of the criminal suspects reported to the police were female, a difference of 16.3 percentage points that was a statistically significant difference.

The reader should remember, however, that the vehicle stops being examined were a mixture of unknown proportions of traffic violation stops (appropriate for a crash driver benchmark) and criminal investigative stops (appropriate for a criminal suspect description benchmark). Each of the two benchmarks utilized was designed for only one of these types of stops. We expected that the true benchmark for these combined stops would reside somewhere between the crash driver benchmark and the criminal suspect benchmark. Therefore, we used these

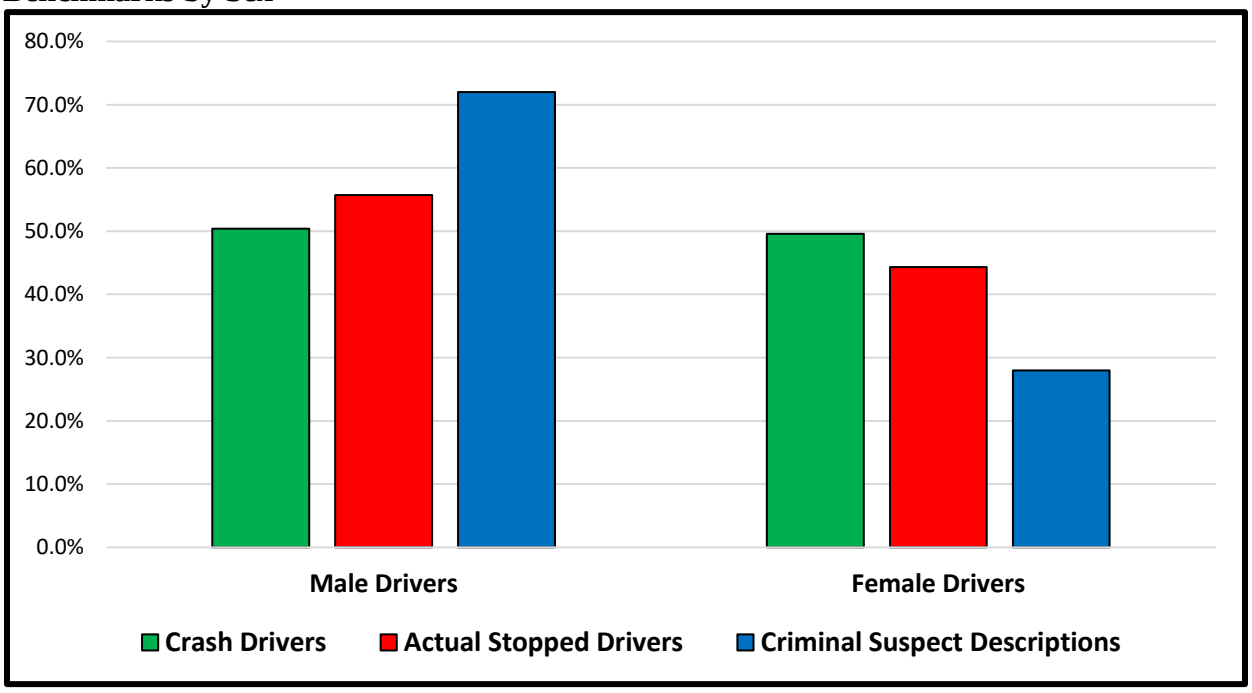
two benchmarks as boundaries for the true (unknown) benchmark for a combined sample of traffic violation stops and criminal investigative stops.

Table 6.3 Charles District Vehicle Stops by Sex using Benchmark Boundaries

Sex	Crash Drivers Benchmark	Actual Stopped Drivers	Criminal Suspect Benchmark	Within boundaries?
Male	50.4%	55.7%	72.0%	**Yes – No Disparity**
Female	49.6%	44.3%	28.0%	**Yes – No Disparity**

Table 6.3 above illustrates that when these two benchmarks are utilized as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops, we find the no evidence of disparity in vehicle stops by sex within Charles District. The proportion of male drivers stopped fits neatly between the proportion of males revealed within the crash driver benchmark and the criminal suspect descriptions benchmark. Likewise, the proportion of female drivers stopped fits neatly between the proportion of females revealed within the crash driver benchmark and the criminal suspect descriptions benchmark.

Figure 6.2 Charles District Vehicle Stops Compared to Crash Driver and Criminal Suspect Benchmarks by Sex



The benchmark boundaries for the stops of male drivers were 50.4% (crash drivers) and 72.0% (criminal suspects), with a midpoint of 61.2%. The actual stops of male drivers was 55.7%, between these two boundaries and below the midpoint. The benchmark boundaries for the stops of female drivers were 49.6% (crash drivers) and 28.0% (criminal suspects), with a midpoint of

38.8%. The actual stops of female drivers was 44.3%, above the midpoint but still between the two benchmark boundaries. This suggested no disparity by sex existed within the Charles District vehicle stops. Figure 6.2 above serves as a visual illustration of the data in Table 6.3. This bar graph illustrates how well the proportions of female and male stops reside between the two benchmark measure extremes for each sex.

We also utilized the veil-of-darkness benchmark method. We examined the stops made during hours of daylight, when it was assumed to be easier to determine the sex and race of the driver prior to stop, and compared these stops with stops made during hours of darkness, when it was assumed to be harder to determine driver's characteristics prior to stop. A total of 3,366 vehicle stops occurred during daylight hours (defined as between 30 minutes before sunrise and 30 minutes after sunset). An additional 1,655 vehicle stops occurred during the remaining hours of the day that were classified as darkness. Table 6.4 reveals the details of this veil-of-darkness analysis by sex for Charles District.

Table 6.4 Charles District Vehicle Stops by Sex (Veil of Darkness Benchmark)

Sex	Daylight Stopped Drivers (number)	Benchmark Darkness Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	52.6% (1,769)	62.1% (1,028)	-9.5	< .001	Yes, but ***less*** likely to be stopped than expected.
Female	47.4% (1,597)	37.9% (627)	+9.5	< .001	Yes. More likely to be stopped than expected.

As Table 6.4 reveals, females were found to be stopped more often than expected when using this method. While 47.4% of the drivers stopped during the daylight hours were female, only 37.9% of the drivers stopped during hours of darkness were female. The binomial test found this difference to be statistically significant with a *p*-value of less than .01 (actually the *p*-value was even less than .001). Likewise, male drivers made up 62.1% of stops during darkness, yet this dropped to only 52.6% of stops during daylight.

A counter explanation could be that females were less likely than males to drive at night within Charles District. To respond to the counter claim, we examined our crash driver data by daylight and darkness. When examining crash drivers within Charles District, we found that females made up 50.3% of crash drivers during daylight hours, and 47.1% of crash drivers during hours of darkness. The binomial test revealed that this difference was within the margin for sampling error ($p = .223$). Therefore, we found insufficient evidence that this argument was true to the degree that it could produce a statistically significant difference between female stops made during hours of daylight and darkness. Therefore, based on the veil-of-darkness benchmark method, evidence was revealed to suggest that the proportion of female drivers stopped was disproportionately higher within Charles District during daylight periods, when it was potentially easier to determine the characteristics of the drivers prior to stop.

In actual human terms, however, how great was this disparity? There were 3,366 drivers stopped during daylight. Female drivers constituted 37.9% of drivers stopped during hours of darkness,

when the opportunity for bias in stops was less present. If 37.9% of the daylight stops had been female drivers, this would have amounted to 1,276 female drivers stopped during daylight. As it was, 1,597 female drivers were stopped during daylight, a difference of 321 drivers stopped. By this estimate, during the 12-month period of study there were, on average, 27 more female drivers stopped (and 27 fewer male drivers stopped) each month than would have been predicted by the darkness benchmark.

Therefore, our analyses of stops by sex revealed mixed results regarding the stopping of female drivers within Charles District for this period of study. Using the crash driver and criminal suspect description benchmarks as boundaries, we found that the percentage of female drivers stopped fit within these boundaries, suggesting no disparity. The veil-of-darkness benchmark method, however, revealed that females were disproportionately stopped more often during hours of daylight (when it was easier to determine driver characteristics prior to stop); a difference that could not be explained by an argument that females were less likely to drive during hours of darkness. This disparity was estimated to result in as many as 27 more stops of female drivers than expected within Charles District each month.

6.1.2 Driver Race and Ethnicity

During the 12-month period of study, 4,960 vehicle stops took place within Charles District in which the driver's race and ethnicity was recorded by the officer. During that same period, race and ethnicity data were available for 840 drivers involved in crashes within Charles District to serve as a traffic benchmark estimate. Descriptions of 608 criminal suspects within Charles District served as a criminal offender population benchmark. The reader should always remember that the Carmel Police Department stops contained a mixture of traffic stops and criminal investigative stops of unknown proportions, thus explaining why both benchmarks were used.

Table 6.5 below reveals the analysis of the stopped drivers in Charles District, by race and Hispanic ethnicity, using the crash driver benchmark. As this table reveals, 0.4% of the drivers stopped by the Carmel Police Department within Charles District were Alaskan Natives / American Indians, as were 0.4% of the crash drivers. As these percentages were identical, even without the binomial test there was obviously no disparity in these stops. While 3.2% of the drivers stopped were Asians / Pacific Islanders, 7.3% of the crash drivers were Asian / Pacific Islander drivers. This difference was 4.1 percentage points ***less*** likely to be stopped, and it was not explained away by sampling error. Asian / Pacific Islander drivers were ***less*** likely to be stopped than expected based on this crash driver benchmark.

While African-American / Black drivers made up only 8.8% of the crash drivers within Charles District, they constituted 17.3% of the drivers stopped within the district. This difference of 9.5 percentage points was not explained away by sampling error. African-American / Black drivers were disproportionately more likely to be stopped by the police than would be expected by this crash driver benchmark designed for comparison solely to traffic violation stops. Conversely, while 83.6% of the crash drivers in Charles District were Caucasian / White, only 79.0% of stopped rivers were Caucasian / White, a difference of 4.6 percentage points. This statistically significant difference suggested that white drivers were less likely to be stopped in Charles District than would have been expected based on this crash driver benchmark. Finally, regarding stops of Hispanic ethnicity drivers, 7.0% of vehicle stops involved Hispanic drivers, and 6.4% of crash drivers were

Hispanic, a difference of only 0.6 percentage points. The binomial test revealed that this difference was within the margin of sampling error, thus no disparity was revealed for stops of Hispanic drivers with this benchmark.

Table 6.5 Charles District Vehicle Stops by Race / Ethnicity (Crash Driver Benchmark)

Race or Ethnicity	Stopped Drivers (number)	Benchmark Crash Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.4% (22)	0.4% (3)	0.0	.969	No – no disparity.
Asian / Pacific Islander	3.2% (159)	7.3% (61)	-4.1	< .001	Yes, but ***less*** likely to be stopped than expected.
African-American / Black	17.3% (860)	8.8% (74)	+9.5	< .001	Yes. More likely to be stopped than expected.
Caucasian / White	79.0% (3,919)	83.6% (702)	-4.6	< .001	Yes, but ***less*** likely to be stopped than expected.
Hispanic Ethnicity	7.0% (352)	6.4% (54)	+0.6	.285	No – no disparity.

Next, we examined stops by race and ethnicity using the criminal suspect description benchmark within Charles District – a benchmark designed for comparison to criminal investigative stops. Table 6.6 reveals the details of that analysis. In this case, no disparity was revealed with regards to stops of Alaskan Native / American Indian drivers. Alaskan Native / American Indian drivers made up 0.4% of the stops and exactly 0.4% of the criminal suspect benchmark. As no difference existed, no disparity was revealed.

Asian and white drivers, however, were disproportionately more likely to be stopped based on this criminal benchmark measure. Asians / Pacific Islanders made up 4.4% of the drivers stopped, but only 1.5% of the criminal suspect descriptions in the benchmark, a difference that could not be explained away by sampling error. Similarly, Caucasian / White drivers made up 63.9% of the drivers stopped, but only 43.7% of the criminal suspect descriptions in the benchmark. Again, this was a difference that could not be explained away by sampling error.

While African-American / Black drivers were found to be disproportionately more likely to have been stopped based on the crash driver benchmark, the exact opposite was true when compared to the criminal suspect benchmark. While African-Americans made up 17.3% of the drivers stopped within Charles District, 28.6% of the criminal suspects described to the police by members of the public within Charles District were described as being African-American or black. African-American / Black drivers were ***less*** likely to be stopped than expected by as much as 11.3 percentage points, a difference that could not be explained away by sampling error. Likewise, Hispanic drivers were also less likely to be stopped than expected when based on this criminal

suspect benchmark. While 14.5% of the criminal suspects were described as Hispanic, only 7.0% of the vehicle stops involved Hispanic drivers, a difference not explained by sampling error.

Table 6.6 Charles District Vehicle Stops by Race / Ethnicity (Criminal Suspect Benchmark)

Race or Ethnicity	Stopped Drivers (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.4% (22)	0.0% (0)	+0.4	.087	No – no disparity.
Asian / Pacific Islander	3.2% (159)	1.2% (7)	+2.0	.001	Yes. More likely to be stopped than expected.
African-American / Black	17.3% (860)	28.6% (174)	-11.3	< .001	Yes, but ***less*** likely to be stopped than expected.
Caucasian / White	79.0% (3,919)	70.0% (427)	+9.0	< .001	Yes. More likely to be stopped than expected.
Hispanic Ethnicity	7.0% (352)	14.5% (88)	-7.5	< .001	Yes, but ***less*** likely to be stopped than expected.

The reader should remember, however, that the vehicle stops being examined were a mixture of unknown proportions of traffic violation stops (appropriate for a crash driver benchmark) and criminal investigative stops (appropriate for a criminal suspect description benchmark). Each of the two benchmarks utilized was designed for only one of these types of stops. We expected that the true benchmark for these combined stops would reside somewhere between the crash driver benchmark and the criminal suspect benchmark. Therefore, we used these two benchmarks as boundaries for the true (unknown) benchmark for a combined sample of traffic violation stops and criminal investigative stops.

Table 6.7 below illustrates that when these two benchmarks are utilized as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops, we found no evidence of stop disparity within Charles District for drivers of any race category or Hispanic ethnicity. The proportions of each racial and ethnic group's stopped drivers fit neatly between the proportion of these drivers revealed within the crash driver benchmark and the criminal suspect descriptions benchmark. The earlier contradictory findings from the two benchmarks likely stemmed from the mixture of unknown proportions of traffic violation stops and criminal investigative stops contained within the vehicle stop data. Each of the two benchmarks was designed for only one of these types of stops.

For example, as the boundaries for stops of African-Americans were 8.8% (crash drivers) and 28.6% (criminal suspects), the midpoint between these two benchmarks would have been 18.7%. The actual stop percentage of African-Americans was 17.3%, between these two boundaries and 1.4 percentage points lower than the midpoint. The boundaries for stops of Asians / Pacific Islanders were 7.3% (crash drivers) and 1.2% (criminal suspects), with the midpoint between these

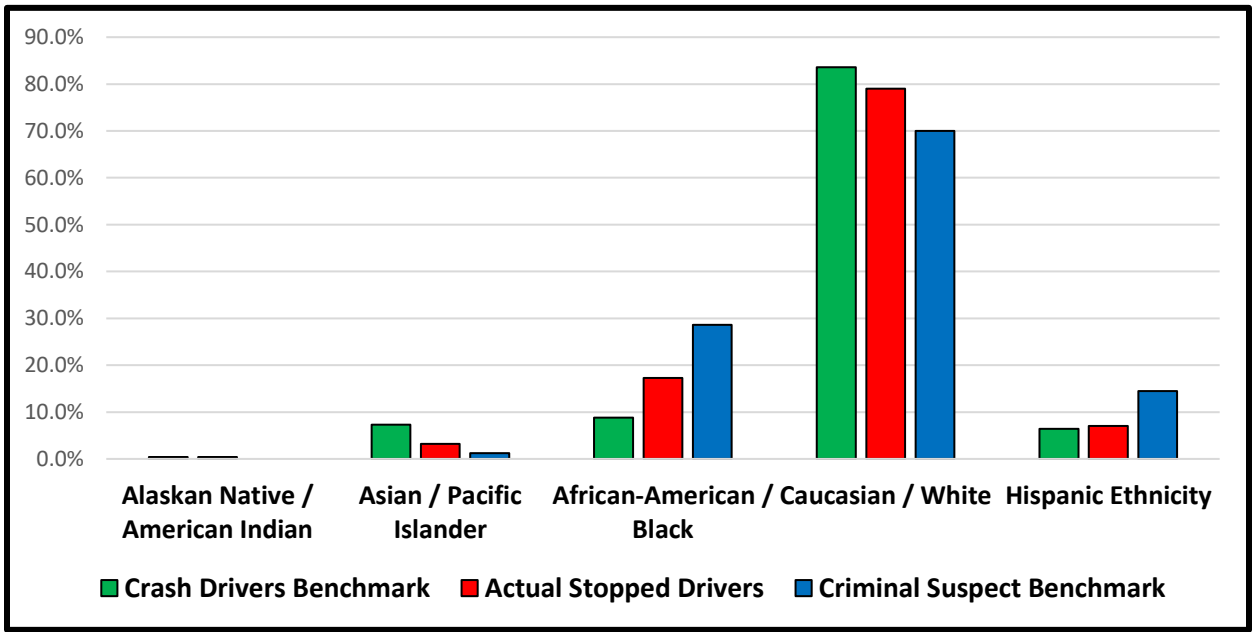
two benchmarks being 4.3%. The actual stop percentage of Asian / Pacific Islander drivers was 3.2%, between the boundaries and 1.1 percentage point lower than the midpoint.

Table 6.7 Charles District Vehicle Stops by Race / Ethnicity using Benchmark Boundaries

Race or Ethnicity	Crash Drivers Benchmark	Actual Stopped Drivers	Criminal Suspect Benchmark	Within boundaries?
Alaskan Native / American Indian	0.4%	0.4%	0.0%	Yes – No Disparity.
Asian / Pacific Islander	7.3%	3.2%	1.2%	Yes – No Disparity.
African-American / Black	8.8%	17.3%	28.6%	Yes – No Disparity.
Caucasian / White	83.6%	79.0%	70.0%	Yes – No Disparity.
Hispanic Ethnicity	6.4%	7.0%	14.5%	Yes – No Disparity.

The boundaries for stops of Caucasian / White drivers were 83.6% (crash drivers) and 70.0% (criminal suspects), having a midpoint of 76.8%. The actual stop percentage of Caucasian / White drivers was 79.0%, between these two boundaries. Finally, the boundaries for stops of Hispanic ethnicity drivers were 6.4% (crash drivers) and 14.5% (criminal suspects), the midpoint between these two benchmarks being 10.5%. The actual stop percentage of Hispanic ethnicity drivers was 7.0%, 3.5 percentage points below that midpoint.

Figure 6.3 Charles District Vehicle Stops Compared to Crash Driver and Criminal Suspect Benchmarks



This evidence suggested that the unusual disparities (disproportionately more or less likely to be stopped based on the benchmark) was attributable to the mixture of criminal investigative and traffic offense stops. Figure 6.3 above is a bar graph comparing the stops within Charles District to each of these two benchmarks by race. This graph serves as an excellent visual illustration of the statistics we have detailed above. This graph demonstrates how consistently the percentage of drivers stopped for each demographic group was found between the percentages of that race within each of the two benchmarks.

We next utilized the veil-of-darkness benchmark method. We examined stops made during hours of daylight, when it was assumed to be easier to determine the race of the driver prior to stop. We then compared these daylight stops to stops made during hours of darkness, when it was assumed to be harder to determine the driver's characteristics prior to stop. Within Charles District, a total of 3,324 vehicle stops occurred during daylight hours, and 1,623 vehicle stops occurred during the hours classified as darkness. Table 6.8 reveals the details of this veil-of-darkness analysis by race and ethnicity for Charles District.

Table 6.8 reveals that during daylight hours, when it was assumed to be easier to identify the race of the driver prior to stop, 0.4% of vehicle stops involved Alaskan Native / American Indian drivers. During hours of darkness, when it was likely harder to determine the characteristics of the drivers prior to stop, 0.6% of the drivers stopped were Alaskan Natives / American Indians. This small 0.2 percentage point difference, and the binomial test outcome, both revealed that this difference was within the margin of sampling error and showed no racial disparity. Likewise, there was no disparity found for Asian / Pacific Islander drivers as this group made up 3.1% of drivers stopped during daylight and 3.4% of drivers stopped at night. This almost identical outcome was within the margin of sampling error. Hispanic ethnicity drivers were found to be stopped at similar rates during daylight and darkness too. Hispanic ethnicity drivers constituted 6.3% of stops during daylight, and 8.5% of stops during darkness, a 2.2 percentage point difference that was within the margin of sampling error. Using the veil-of-darkness method revealed no racial disparity in stops for these three groups.

Statistically significant disparity was revealed, however, for stops of African-American drivers. But African-Americans were ***less*** likely to be stopped (not more likely to be stopped) within Charles District during hours of daylight, when it was assumed to be easier to determine the race of the driver. During daylight, African-Americans / Blacks made up 16.0% of drivers. After dark, when it was harder to determine the driver's race prior to stop, 20.1% of the drivers stopped were African-American / Black. This difference could not be explained away by sampling error. Conversely, Caucasian / White driver were more likely to be stopped during hours of daylight, when it was easier to determine the driver's race, and less likely to be stopped after dark. Again, this difference could not be explained by sampling error.

The counter explanation could be made that African-American / Black drivers were less likely to drive during daylight and more likely to drive at night within Charles District. Similarly, one could argue that Caucasian / White drivers were more likely to drive during daylight and less likely to drive at night. To respond to this counter claim, we examined our crash driver data by daylight and darkness. When examining African-American crash drivers within Charles District, we found that 7.4% of crash drivers during daylight hours, and 14.4% of crash drivers during hours of darkness,

were African-Americans. This difference of 7.0 percentage points ***was*** statistically significant as the binomial test result (p = < .001) was less than .01. Therefore, we found evidence to support the argument that African-American drivers actually were a smaller proportion of the drivers on the roadway during daylight hours within Charles District, thus likely explaining why their proportions of stops were smaller than expected during daylight, and larger during hours of darkness.

Table 6.8 Charles District Vehicle Stops by Race / Ethnicity (Veil of Darkness Benchmark)

Race or Ethnicity	Daylight Stopped Drivers (number)	Benchmark Darkness Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.4% (13)	0.6% (9)	-0.2	.207	No – no disparity.
Asian / Pacific Islander	3.1% (104)	3.4% (55)	-0.3	.270	No – no disparity.
African-American / Black	16.0% (534)	20.1% (326)	-4.1	< .001	Yes, but ***less*** likely to be stopped than expected.
Caucasian / White	80.5% (2,686)	76.0% (1,233)	+4.5	< .001	Yes. More likely to be stopped than expected.
Hispanic Ethnicity	6.3% (212)	8.5% (140)	-2.2	.042	No – no disparity.

The opposite was true for white drivers. Caucasian / White drivers constituted 85.0% of daylight crash drivers within Charles District, and only 78.2% of darkness crash drivers. This difference was also statistically significant (p = .010), revealing that white drivers were stopped more often during daylight because white drivers made up a larger proportion of the drivers on the roadways during daylight.

Therefore, the veil-of-darkness disparities revealed within Charles District regarding the under-stopping of African-Americans and over-stopping of white drivers were due to differences in driving patterns by race. White drivers made up greater percentages of the driving population during hours of daylight within Charles District, and smaller proportions of the driving population after dark. Conversely, African-American drivers made up a smaller percentage of the driving population during hours of daylight within Charles District, and a larger proportion of the driving population after dark.

6.1.3 Vehicle Stops Summary

In summary, the majority of our analyses revealed that female drivers were not disproportionately stopped within Charles District during the period of study. The percentage of stops involving female drivers was within the boundaries of the crash driver and criminal suspect benchmarks. When examining by daylight and darkness, however, there was evidence to suggest that female drivers may be disproportionately selected by officers for vehicle stops during daylight hours, when they can more easily determine the driver's characteristics. During hours of darkness, when

it was much harder to select drivers by their characteristics, the proportion of female drivers stopped declined. We found no evidence to support the argument that this was because female drivers made up a larger proportion of the drivers during daylight.

Our analyses also revealed no evidence that persons of color were disproportionately stopped more often within Charles District during the period of study. The percentage of stops involving each racial or ethnic group was within the boundaries of the crash driver and criminal suspect benchmarks. When examined by daylight and darkness, we initially found that white drivers were disproportionately more likely to be stopped during daylight hours, and African-American drivers were disproportionately less likely to be stopped during daylight hours. However, an examination of crash drivers by daylight and darkness hours revealed that these differences could be explained by race differences in traffic patterns by time of day.

6.2 Post-Stop Citations

We examined equity in the treatment of drivers (in terms of citations) after they had already been stopped. As described in earlier sections of this report, we considered stops with similar offense seriousness and number of offenses committed. Once these one-violation stops were isolated, stops for the same reason were then compared with one another. Of the 5,023 individual vehicle stops that occurred within Charles District, 4,137 (82.4%) involved only one traffic violation. As before, we only examined post-stop citations for the five most common reasons for stop across the city: 1.) Speeding; 2.) Expired license plate; 3.) Improper headlights; 4.) None or improper taillights; and 5.) Failure to signal lane change or intent to turn. These five reasons for stop totaled 3,684 of the one-violation stops within Charles District, making up 73.3% of all stops within Charles District, and 89.1% of the one-violation stops within Charles District.

As the benchmark for each of these categories of stops, we used the outcomes for male drivers as the benchmark for stops of female drivers. The percentage of females cited for that violation was compared to the males to see if females were treated more punitively than males. For the examination by race and Hispanic ethnicity, we used the outcome for white drivers as the benchmark for comparison to all other racial categories and Hispanic ethnicity. The assumption for this sort of comparison was that if officers were not biased, males and females would receive citations at a similar rate for similar offenses, and persons of color would receive citations at a similar rate as whites for similar offenses under similar circumstances.

6.2.1 Driver Sex

As was the case in other districts, speeding was by far the most common reason for stop within Charles District, with 2,726 one-violation vehicle stops for speeding that contained data on the driver's sex. Of these stops, 53.5% (1,459) involved a male driver. Of these 1,459 speeding stops of male drivers, 310 (21.2%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure within Charles District for stops of female drivers for speeding. Table 6.9 displays the details of that analysis.

As Table 6.9 reveals, female drivers stopped for speeding within Charles District were ***less*** likely to receive a citation than were male drivers stopped under similar circumstances. While 21.2% of male speeders received a citation, only 14.6% of female drivers received a citation. This difference

of 6.6 percentage points was statistically significant. Therefore, we found no evidence to suggest that female drivers were disproportionately more likely to be cited for speeding within Charles District. They were less likely than males to receive a citation.

Table 6.9 Charles District Speeding Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	14.6% (1,267 / 185)	21.2% (1,459 / 310)	-6.6	< .001	Yes, but ***less*** likely to be cited than males.

Next, we examined stops for having an expired license plate. There were 384 one-violation vehicle stops within Charles District for having an expired license plate. Of these stops, 52.9% (203) involved a male driver. Of these 203 expired license plate stops of male drivers, 39 stops (19.2%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure in Charles District for stops of female drivers for having an expired license plate. Table 6.10 below displays the details of that analysis.

Table 6.10 Charles District Expired Plates Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	12.7% (181 / 23)	19.2% (203 / 39)	-6.5	.014	No – no disparity.

Of Charles District's one-violation vehicle stops, there were 181 female drivers stopped for having an expired license plate, 23 (12.7%) of which received a traffic citation for that offense. This was 6.5 percentage points lower than the citation rate for male drivers, but the binomial test confirmed that this difference was within the margin of sampling error. No evidence of disparity between the sexes existed with regard to citations for expired license plate stops within Charles District.

Improper headlight stops were next, the analysis of which is displayed in Table 6.11 below. Among the one-violation stops, there were 211 vehicle stops within Charles District for improper headlights. Of these stops, 57.4% (121) involved a male driver. Of these 121 improper headlight stops of male drivers, none (0.0%) resulted in the issuance of a traffic citation, as all resulted in the issuance of only a warning. This percentage served as the benchmark measure within Charles District for stops of female drivers for having an improper headlight.

There were 90 one-violation stops of female drivers within Charles District for having an improper headlight, none of which (0.0%) received a traffic citation. This was exactly the same percentage as the male drivers who received a citation for this offense within Charles District. This outcome revealed that males and females were cited equally when stopped for operating with an improper

headlight. There was no evidence of disparity in the treatment of female drivers in this regard within Charles District for this offense.

Table 6.11 Charles District Improper Headlights Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (90 / 0)	0.0% (121 / 0)	0.0	.914	No – no disparity.

The fourth offense we examined was stops for having improper taillights. There were 250 single-violation vehicle stops within Charles District for improper taillights. Of these stops, 64.4% (161) involved a male driver. Of these 161 improper taillight stops of male drivers, only one (0.6%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure within Charles District for stops of female drivers for having an improper taillight. Table 6.12 displays the details of that analysis.

Table 6.12 Baker District Improper Taillights Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	1.1% (89 / 1)	0.6% (161 / 1)	+0.5	.415	No – no disparity.

Among Charles District's one-violation stops, there were 89 female drivers stopped for having an improper taillight, and only one of which (1.1%) received a traffic citation for that offense. This was less than one percentage point different than the citation rate for males, and within the margin of sampling error according to the binomial test. This outcome revealed that males and females were cited equally when stopped for operating with an improper taillight. There was no evidence of disparity in the treatment of female drivers in this regard within Charles District for this offense.

The final offense we examined was stops for failure to signal, of which there were 113 such one-violation stops within Charles District. Of these stops, 63.7% (72) involved a male driver. Of these 72 failure to signal stops of male drivers, 3 stops (4.2%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure within Charles District for stops of female drivers for failing to signal properly. The results of this analysis are displayed in Table 6.13 below.

Among the single-violation stops within Charles District, there were 41 female drivers stopped for failing to signal, 2 of which (4.9%) received a traffic citation for that offense. Being less than one percentage point different from the citation rate for males, this difference was within the margin for sampling error. This outcome revealed that males and females were cited equally when stopped for failing to signal within Charles District.

Table 6.13 Charles District Failure to Signal Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	4.9% (41 / 2)	4.2% (72 / 3)	+0.7	.518	No – no disparity.

6.2.2 Driver Race and Ethnicity

Next we examined citation rates within Charles District based on driver race or Hispanic ethnicity. As with the sex analysis, we began with speeding offenses. Within Charles District there were 2,700 one-violation vehicle stops for speeding that contained data on the driver's race and Hispanic ethnicity. Of these one-offense speeding stops, 77.3% (2,086) involved a Caucasian / White driver. Of these 2,086 speeding stops of Caucasian / White drivers, 373 (17.9%) resulted in the issuance of a traffic citation. This percentage for white drivers served as the benchmark measure within Charles District for the one-violation speeding stops of drivers for other races and Hispanic ethnicity. Table 6.14 below displays the details of that analysis.

Table 6.14 Charles District Speeding Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (9 / 0)	17.9% (2,086 / 373)	-17.9	< .001	Yes, but ***less*** likely to be cited than expected.
Asian / Pacific Islander	19.1% (94 / 18)	17.9% (2,086 / 373)	+1.2	.417	No – no disparity.
African-American / Black	19.8% (511 / 101)	17.9% (2,086 / 373)	+1.9	.149	No – no disparity.
Hispanic Ethnicity	28.9% (180 / 52)	17.9% (2,086 / 373)	+11.0	< .001	Yes. More likely to be cited than expected.

Among the Charles District one-violation stops, there were only 9 Alaskan Native / American Indian drivers stopped for speeding, none of whom (0.0%) received a traffic citation for that offense. This citation rate was 17.9 percentage points ***lower*** than the citation rate for Caucasian / White drivers, and the binomial test revealed that this difference was not explained away by sampling error. Therefore we found that Alaskan Native / American Indian drivers stopped for speeding within Charles District were ***less*** likely than white drivers to have received a citation for that offense.

There were 94 Asian / Pacific Islander drivers stopped for speeding among the one-violation stops within Charles District, 18 of whom (19.1%) received a traffic citation. This citation rate differed from the percentage of Caucasian / White drivers cited for speeding by only 1.2 percentage points, which the binomial test indicated was within the margin for sampling error. Therefore there was

no evidence to suggest that Asian / Pacific Islander drivers were more likely than whites to receive a traffic citation for speeding when the conditions of the stop were similar.

Likewise, 511 African-American drivers were among the speeding stops, 101 (19.8%) of whom received a citation. This differed from the citation rate for white drivers by only 1.9 percentage points and was within the margin of sampling error. Therefore, within Charles District we found no evidence that African-American drivers were more likely than whites to receive a traffic citation for speeding when stopped under similar circumstances.

However, we did find that among the one-violation stops within Charles District, Hispanic drivers stopped for speeding were cited at a higher rate than white drivers. A total of 180 Hispanic drivers were stopped for speeding, 52 (28.9%) of whom received a citation. This differed from the citation rate for Caucasian / White drivers by 11.0 percentage points, a difference the binomial test revealed was not explained away by sampling error.

In actual human terms, however, how great was this disparity? As mentioned, there were 180 Hispanic drivers stopped for speeding among the one-violation stops. When stopped under similar circumstances, 17.9% of the white drivers stopped for speeding received a citation. If Hispanic drivers had been cited at that same rate, only 32 Hispanic drivers would have been cited. As it was, 52 Hispanic drivers received a citation, 20 more cited Hispanic drivers than expected. By this estimate, during the 12-month period of study there were, on average, only between 1 and 2 more Hispanic drivers cited for speeding each month within Charles District than would have been predicted by the benchmark of citations issued to white drivers.

Next, we examined stops for having an expired license plate. There were 381 one-violation vehicle stops within Charles District for having an expired license plate. Of these stops, 82.9% (316) involved a Caucasian / White driver. Of these 316 expired license plate stops of Caucasian / White drivers, 55 stops (17.4%) resulted in the issuance of a traffic citation. This white driver citation percentage served as the benchmark measure within Charles District for the expired license plate stops of drivers of other races and Hispanic ethnicity. Table 6.15 below displays the details of that analysis.

Among Charles District's one-violation stops, there were only 3 Alaskan Native / American Indian drivers stopped for having an expired license plate. While only one of these drivers received a traffic citation for that offense, because the sample size of drivers within this race category was so small, this one stop constituted 33.3% of those drivers. While 33.3% seems different from the 17.4% citation rate for white drivers, because there were only 3 Alaskan Native / American Indian drivers stopped, this was as close to 17.4% as was mathematically possible. Therefore, the binomial test revealed that this difference was within the margin for sampling error, primarily because it was based on a sample of only 3 cases.

The results were similar for the stops of other race categories. Of the 10 Asian / Pacific Islander drivers stopped, 20.0% (2 drivers) received a traffic citation. This was within the margin of sampling error when compared to the 17.4% for white drivers. There were 52 African-American / Black drivers stopped, and 7.7% (4 drivers) received a traffic citation. This was 9.7 percentage

points ***lower*** than the citation rate for white drivers, but was still within the margin for sampling error. The African-American drivers were not cited more often than white drivers.

Finally, of the 16 Hispanic ethnicity drivers stopped for an expired license plate, none (0.0%) received a traffic citation. In other words, Hispanic ethnicity drivers were significantly ***less*** likely than white drivers to receive a citation when stopped for having an expired license plate. Therefore, with regard to one-violation stops within Charles District for having an expired license plate, we found no evidence to suggest that drivers from any of these racial or ethnic groups was cited more often than were white drivers.

Table 6.15 Charles District Expired Plates Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	33.3% (3 / 1)	17.4% (316 / 55)	+15.9	.436	No – no disparity.
Asian / Pacific Islander	20.0% (10 / 2)	17.4% (316 / 55)	+2.6	.541	No – no disparity.
African-American / Black	7.7% (52 / 4)	17.4% (316 / 55)	-9.7	.039	No – no disparity.
Hispanic Ethnicity	0.0% (16 / 0)	17.4% (316 / 55)	-17.4	< .001	Yes, but ***less*** likely to be cited than expected.

Third, we examined stops for having improper headlights. There were 208 one-violation vehicle stops within Charles District for an improper headlights violation. Of these stops, 79.8% (166) involved a Caucasian / White driver. Of these 166 improper headlight stops of Caucasian / White drivers, none (0.0%) resulted in the issuance of a traffic citation. This percentage of white drivers cited served as the benchmark measure within Charles District for stops involving an improper headlight, for examining the citation rates for other races and Hispanic ethnicity. Table 6.16 displays the details of that analysis.

Among the one-violation stops within Charles District involving a headlight violation, none of the drivers received a citation from the vehicle stop. No Alaskan Native / American Indian drivers were even stopped. Only 6 Asian / Pacific Islander drivers, 8 Hispanic drivers, and 36 African-American drivers were stopped, and none were cited. This was the same outcome for white drivers – no citation issued. Therefore we found no evidence of disparity in the treatment of Alaskan Native, American Indian, Asian / Pacific Islander, African-American / Black, or Hispanic drivers within Charles District regarding the issuance of citations for headlight violations.

Table 6.16 Charles District Improper Headlights Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	0.0% (166 / 0)	0.0	---	No – no disparity. None were stopped.
Asian / Pacific Islander	0.0% (6 / 0)	0.0% (166 / 0)	0.0	.994	No – no disparity.
African-American / Black	0.0% (36 / 0)	0.0% (166 / 0)	0.0	.964	No – no disparity.
Hispanic Ethnicity	0.0% (8 / 0)	0.0% (166 / 0)	0.0	.992	No – no disparity.

Fourth, we examined stops for improper taillights. Among the single-violation stops within Charles District, there were 247 vehicle stops for improper taillights. Of these stops, 79.0% (195) involved a Caucasian / White driver. Of these 195 improper taillight stops of Caucasian / White drivers, only 2 (1.0%) resulted in the issuance of a traffic citation. This white driver citation percentage (1.0%) served as the benchmark measure within Charles District for single-offense stops involving an improper taillight when examining the citation rates for other races and Hispanic ethnicity. Table 6.17 below displays the details of that analysis.

Table 6.17 Charles District Improper Taillights Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	1.0% (195 / 2)	-1.0	---	No – no disparity. None were stopped.
Asian / Pacific Islander	0.0% (9 / 0)	1.0% (195 / 2)	-1.0	.914	No – no disparity.
African-American / Black	0.0% (43 / 0)	1.0% (195 / 2)	-1.0	.649	No – no disparity.
Hispanic Ethnicity	6.0% (17 / 1)	1.0% (195 / 2)	+5.0	.157	No – no disparity.

Among the single-violation stops within Charles District, there were no Alaskan Native / American Indian drivers stopped for an improper taillight violation, and thus none cited. There were 9 Asian / Pacific Islander drivers stopped for an improper taillight, and none of these drivers (0.0%) received a traffic citation for that offense. Likewise, there were 43 African-American / Black drivers were stopped for having an improper taillight, and again none received a traffic citation for that offense.

Finally, there were 17 Hispanic ethnicity drivers stopped for having an improper taillight, and only one received a traffic citation for that offense. This resulted in a 6.0% citation rate for Hispanics, but with a sample so small, this was as close as mathematically possible to the 1.0% citation rate

for white drivers. Therefore the binomial test revealed the difference was within the margin of sampling error. No evidence of disparity in the treatment of drivers of any race or ethnicity was revealed with regard to citations for improper taillight within Charles District.

The final offense we examined was stops for failure to signal. There were 111 one-violation vehicle stops within Charles District for failing to signal. Of these stops, 88 (79.3%) involved a Caucasian / White driver. Of these 88 failure to signal stops of Caucasian / White drivers, 4 (4.5%) resulted in the issuance of a traffic citation. This white driver percentage served as the benchmark measure within Charles District for stops involving drivers of other races and Hispanic ethnicity. Table 6.18 displays the details of that analysis.

Of the one-violation stops within Charles District, there were no stops of Alaskan Native / American Indian drivers for a failure to signal violation, and therefore none received a traffic citation for that offense. There were only 2 Asian / Pacific Islander drivers stopped for failure to signal, and none (0.0%) received a citation. A total of 21 African-American / Black drivers were stopped for a failure to signal violation, and only one such driver (4.8%) received a traffic citation for that offense. This differed from the citation rate for white drivers by less than a percentage point, and the binomial test confirmed that this difference was within the margin for sampling error.

Table 6.18 Charles District Failure to Signal Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	4.5% (88 / 4)	-4.5	---	No – no disparity. None were stopped.
Asian / Pacific Islander	0.0% (2 / 0)	4.5% (88 / 4)	-4.5	.912	No – no disparity.
African-American / Black	4.8% (21 / 1)	4.5% (88 / 4)	+0.3	.620	No – no disparity.
Hispanic Ethnicity	0.0% (4 / 0)	4.5% (88 / 4)	-4.5	.996	No – no disparity.

Finally, 4 Hispanic ethnicity drivers were stopped for failure to signal, and none received a citation for this offense. No evidence was found to suggest that any of the four race and ethnicity categories were cited more often than Caucasian / White drivers that were stopped for the same offense under similar conditions within Charles District.

6.2.3 Post-Stop Citations Summary

We found no evidence to suggest that females were more likely than males to receive a traffic citation within Charles District, once we controlled for reason for stop and number of violations observed. Similarly, with regard to race, we found no racial group of drivers was disproportionately cited more often than white drivers within Charles District for the five most common reasons for stop. Regarding ethnicity, we found that Hispanic drivers were cited for speeding more often than expected within Charles District, at a rate estimated to be between one

and two addition Hispanic citations per month. As for the other four traffic violations examined, Hispanic drivers were not disproportionately more likely to receive a citation. Therefore, we found only a minor amount of disproportionate citation disparity by ethnicity.

6.3 Criminal Arrests

We examined the criminal arrests made by the Carmel Police Department to determine if evidence existed of disproportionately punitive treatment of any particular sex or racial group. From July 1, 2020, through June 30, 2021, there were 367 individuals arrested within Charles District for criminal offenses. These arrests were compared against the benchmark measure of criminal suspect descriptions mentioned earlier regarding the vehicle stops. There were 608 criminal suspect descriptions received from members of the public within Charles District during this period of evaluation.

6.3.1 Arrestee Sex

The results of the analysis by sex are displayed in Table 6.19 below. Of the 367 individuals arrested within Charles District during the period of study, 265 (72.2%) were male. Among the 608 criminal suspect descriptions received from the public within Charles District during the period of study, 438 (72.0%) were male. The arrests differed from the benchmark by only two-tenths of a percentage point, and the result of the binomial test was greater than .01, revealing the difference was within the margin for sampling error.

The same was true for females. Exactly 102 (27.8%) of the arrested individuals were female, and 170 (28.0%) of the criminal suspects within the benchmark were female. This minor difference was within the margin of sampling error. As a result, we found no evidence to suggest that females (or males for that matter) were disproportionately more or less likely to be arrested when compared to a benchmark measure of the criminal offender population active within Charles District.

Table 6.19 Charles District Criminal Arrests Sex Comparison

Sex	Arrested Individuals (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	72.2% (265)	72.0% (438)	+0.2	.491	No – no disparity.
Female	27.8% (102)	28.0% (170)	-0.2	.491	No – no disparity.

6.3.2 Arrestee Race and Ethnicity

The results of the arrests analysis by race and ethnicity are displayed in Table 6.20 below. Of the 367 individuals arrested within Charles District during the period of study, none (0.0%) were Alaskan Natives / American Indians. Likewise, there were no Alaskan Native / American Indian persons described within the criminal suspect descriptions from Charles District. As a result, there was no evidence that individuals of this race category were arrested at all within Charles District, much less at a disproportionate rate.

There were 3 individuals (0.8%) arrested with Charles District within the Asian / Pacific Islander category, with this racial group making up 1.2% of the criminal suspect descriptions benchmark. This minor difference was within the margin of sampling error, and there was no evidence to suggest that Asians / Pacific Islanders were disproportionately arrested within Charles District.

African-American individuals constituted 28.6% of the criminal suspect descriptions obtained within Charles District, and African-Americans made up 26.2% of the individuals arrested within Charles District (96 arrests). The binomial test revealed that this was within the margin for sampling error. Therefore, there was no evidence to suggest that African-Americans were disproportionately arrested within Charles District as the percentage arrested and the percentage within the benchmark were very similar.

Caucasian / White individuals were arrested at a rate identical to their representation within the criminal suspect benchmark. Whites made up 70.0% of the arrested individuals, and 70.0% of the suspects described in the benchmark. Finally, 69 arrests of individuals of Hispanic ethnicity were recorded (18.8%), and Hispanic individuals made up 14.5% of the criminal suspect benchmark. The binomial test indicated that these two percentages were within the margin of sampling error. Thus, we found no evidence to suggest that individuals of any particular racial or ethnic group was disproportionately more likely to be arrested within Charles District when compared to a benchmark measuring the criminal offender population active within the district.

Table 6.20 Baker District Criminal Arrests Race / Ethnicity Comparison

Race or Ethnicity	Arrested Individuals (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0)	0.0% (0)	0.0	.693	No – no disparity.
Asian / Pacific Islander	0.8% (3)	1.2% (7)	-0.4	.357	No – no disparity.
African-American / Black	26.2% (96)	28.6% (174)	-2.4	.164	No – no disparity.
Caucasian / White	70.0% (268)	70.0% (427)	0.0	.113	No – no disparity.
Hispanic Ethnicity	18.8% (69)	14.5% (88)	+4.3	.014	No – no disparity.

6.3.3 Criminal Arrests Summary

Comparisons of arrests by sex within Charles District revealed that females and males were arrested at percentages fairly equal to the percentages of the sexes within the criminal suspect description benchmark for Charles District. Likewise, all of the racial groups examined, and Hispanic ethnicity, were arrested at similar proportions as they were represented within the criminal suspect description benchmark. We found no evidence to suggest any sex, race, or ethnic

group was disproportionately arrested more often within Charles District when compared to the offender population active within Charles District.

6.4 Charles District Summary

The vehicle stops within Charles District were a mixture of traffic offense stops and criminal investigative stops. When using a traffic benchmark (crash drivers) and a criminal offender benchmark (criminal suspect descriptions) as boundaries, the proportions of males and females stopped fell neatly between these two benchmark boundaries. This suggested that no disparity in vehicle stops existed by sex within Charles District. When using the veil-of-darkness method, however, we found that female drivers were disproportionately stopped within Charles District during hours of daylight, when it was theoretically easier to determine the driver's characteristics prior to stop. After examining the daylight to darkness patterns of crash drivers by sex, we found no evidence that this disparity was explained by differences in traffic patterns (i.e., females making up a larger proportion of the drivers during daylight).

When examining the post-stop decision to issue a citation, we found that female drivers were less likely than male drivers to receive a citation when stopped for speeding. Regarding the other four types of traffic violations examined, we found no evidence that the Carmel Police Department disproportionally issued citations to female drivers within Charles District, once the type, seriousness, and number of traffic violations committed were properly controlled. The examination of arrests by sex within Charles District revealed that females and males were arrested at percentages equal to the percentages of the sexes within the criminal suspect benchmark for Baker District. The veil-of-darkness finding that females were disproportionately stopped during daylight hours was the only evidence to suggest that females were treated more punitively within Charles District.

Our analyses of stops by race and ethnicity also found that the percentages of all of the groups fell neatly between the two types of benchmarks (crash drivers and criminal suspects). This finding revealed no evidence that persons of color were disproportionately stopped within Charles District. The veil-of-darkness method initially suggested that African-American drivers were less likely to be stopped, and white drivers more likely to be stopped, during hours of daylight when the characteristics of the driver are more visible. After examining the daylight to darkness differences in crash drivers, however, we found that this veil-of-darkness finding could be explained by differences (night to day) in the traffic patterns of white and African-American drivers. Therefore, in sum, there was no evidence to suggest that persons of color were disproportionately more likely to have been stopped within Charles District.

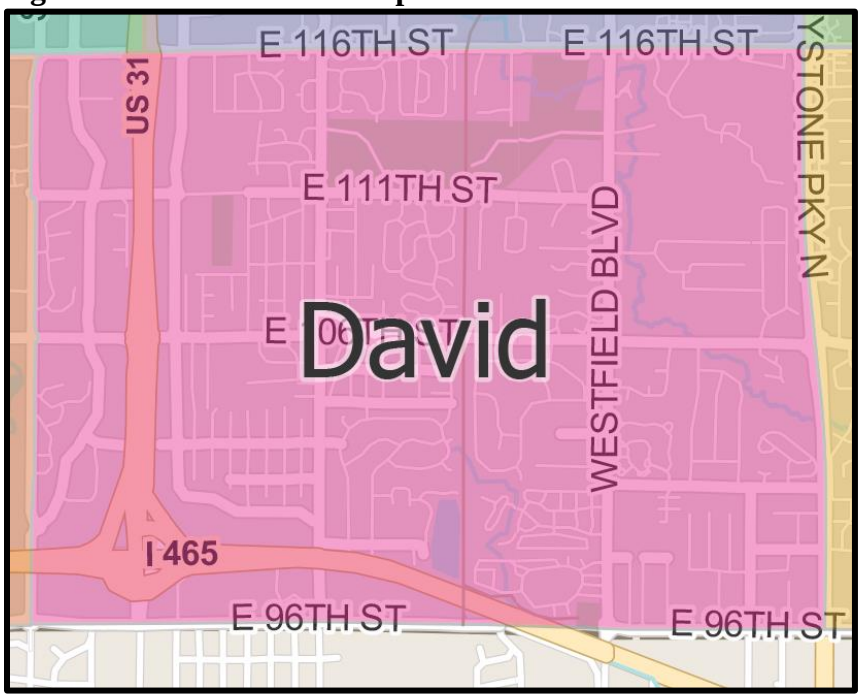
The examination of citations issued revealed that, compared to white drivers stopped under similar circumstances, Hispanic drivers were disproportionately more likely to have received a traffic citation when stopped for speeding within Charles District. This disproportionality amounted to less than two more citations issued to Hispanic drivers each month during the period of study. For the remaining four reasons for stop, Hispanic drivers were not cited more often than white drivers. Regarding the three racial categories, we found no evidence that any of these racial groups was disproportionately cited more often than white drivers within Charles District, once the reason for stop, and number of violations committed, was controlled. Finally, examination of arrests by race

and ethnicity within Charles District revealed no evidence that individuals of any race, or Hispanic ethnicity, were arrested at percentages disproportionate to the percentages of these groups within the criminal suspect benchmark for Charles District.

7. DAVID DISTRICT

David District is the southcentral district within Carmel. Baker District lies to its west, Frank District to its east, Charles District to its north, and Indianapolis / Marion County to its south. The western boundary of David District is Spring Mills Road from 116th Street in the north, down to 96th Street (the Marion County Line) in the south. Its southern boundary is 96th Street from Spring Mill Road, east to Keystone Parkway. Its eastern boundary is Keystone Parkway between 116th Street and 96th Street, and its northern boundary is 116th Street. David District is one of the smaller districts in size (approximately 6 square miles).

Figure 7.1 David District Map



David District is predominantly residential, made up of single-family houses, apartment complexes, and retirement communities. Part of David District includes portions of the Nora-Northside Community, a semi-independent neighborhood that lies within both Carmel and Indianapolis. Individuals from outside of Carmel routinely pass through David District because of the major thoroughfares it contains, such as two miles of U.S. 31, two miles of Keystone Parkway, and two miles of I-465. The major highway junction of I-465 and U.S. 31 is contained within David District, and the junction of I-465 and Keystone Parkway is less than a quarter mile from David District's border. Both of these major highway interchanges are surrounded by commercial districts with stores, restaurants, and hotels. David District contains the King of Glory Lutheran Church and the Orchard Park Presbyterian Church, both large churches that attract people to the district weekly. David District also contains the Woodland Country Club and Golf Course, the

Central Park Waterpark, the Central Park Skatepark, and the Westermeier Commons Playground and Park.

Such locations attract large numbers of people to David District from within Carmel, and across the metro area. Approximately 74% of the crash drivers within David District were not Carmel residents. The second largest proportion of city's crashes occurred within David District, and David District ranked third in number of vehicle stops as 16.0% of all stops occurred within David District. The most common issues reported to the police within David District included traffic accidents, drunken driving, and theft (including shoplifting).

7.1 Vehicle Stops

Data were available regarding 3,065 vehicle stops made by the Carmel Police Department within David District. For benchmark comparisons, data were available for 642 drivers involved in crashes, and 413 descriptions of criminal suspects, from within David District for the 12-month period of study. We compared the stops against both of these benchmarks, and compared daylight stops with stops during hours of darkness. First we conducted these comparisons by sex, then we repeated the process for comparisons by race and Hispanic ethnicity.

7.1.1 Driver Sex

During the 12-month period of study, 3,060 vehicle stops (combined traffic stops and criminal investigative stops) took place within David District in which the driver's sex was recorded by the officer. Of these vehicle stops, 1,685 of these stops involved male drivers, and 1,375 involved female drivers. During that same period, 642 drivers were involved in crashes within David District, who served as the benchmark for the driving population estimate. Of these crash drivers, 378 were male and 264 were female. Descriptions by sex of a total of 413 criminal suspects were provided to the police by members of the public reporting crimes that had occurred within Charles District. Of these, 302 were male and 111 were female. **Recall that the Carmel Police Department stops contained a mixture of traffic stops and criminal investigative stops of unknown proportions. Therefore, we compared these stops against both benchmarks, under the assumption the correct (unknown) benchmark should lie somewhere in between them.**

Table 7.1 David District Vehicle Stops by Sex (Crash Driver Benchmark)

Sex	Stopped Drivers (number)	Benchmark Crash Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	55.1% (1,685)	58.9% (378)	-3.8	.029	No – no disparity
Female	44.9% (1,375)	41.1% (264)	+3.8	.029	No – no disparity

Table 7.1 above reveals the analysis of the stopped drivers within David District, by sex, using the crash driver benchmark. As the table reveals, 55.1% of the drivers stopped within David District were male, and 58.9% of the drivers involved in crashes within the district were male. These two percentage values differed by 3.8 percentage points. The binomial test result of $p = .029$ was

greater than .01, so the test confirmed that this difference was within the margin for sampling error. Likewise, female drivers made up 44.9% of the stopped drivers, and 41.1% of the drivers involved in crashes within David District. Again, the binomial test result revealed that the percentage of females among the stopped drivers and the crash driver benchmark was sufficiently similar enough to be within the margin of sampling error. After controlling for the effects of sampling error, neither male drivers nor female drivers were disproportionately more likely to be stopped than expected within David District when compared to this driving population estimate benchmark.

Next, we examined stops by sex using the criminal suspect description benchmark. Table 7.2 reveals the details of that analysis. In this analysis we found that 55.1% of stopped drivers in David District were male, and 73.1% of the criminal suspects reported to the police by members of the public were described as male. This was a difference of 18.0 percentage points and, based on the sample size and the laws of probability, was not within the bounds of normal sampling error. The binomial test *p*-value was even less than .001, suggesting that male drivers were less likely to be stopped than expected when compared to this criminal investigative stop benchmark.

Table 7.2 David District Vehicle Stops by Sex (Criminal Suspect Benchmark)

Sex	Stopped Drivers (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	55.1% (1,685)	73.1% (302)	-18.0	< .001	Yes, but less likely to be stopped than expected.
Female	44.9% (1,375)	26.9% (111)	+18.0	< .001	Yes. More likely to be stopped than expected.

As the percentage of females in these stops was simply the reciprocal of the stops for males, this meant that females were more likely to be stopped than expected, based on this benchmark designed specifically for criminal investigative stops. We found 44.9% of the drivers stopped within David District were female, and 26.9% of the criminal suspects reported to the police were female, a difference that was statistically significant.

The reader should remember, however, that the vehicle stops being examined were a mixture of unknown proportions of traffic violation stops (appropriate for a crash driver benchmark) and criminal investigative stops (appropriate for a criminal suspect description benchmark). Each of the two benchmarks utilized was designed for only one of these types of stops. We expected that the true benchmark for these combined stops would reside somewhere between the crash driver benchmark and the criminal suspect benchmark. Therefore, we used these two benchmarks as boundaries for the true (unknown) benchmark for a combined sample of traffic violation stops and criminal investigative stops.

However, Table 7.3 below reveals that when these two benchmarks were utilized as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops, we found that for both sexes the percentage of drivers stopped was outside of these boundaries within David District. The benchmark boundaries for the stops of male drivers were 58.9% (crash drivers) and 73.1% (criminal suspects), with a midpoint of 66.0%. The actual stops of male drivers,

however, was 55.1%, lower than both benchmark boundaries. Recall, from Table 7.1, however, that the percentage of male stops was within the margin of error for the crash driver benchmark, so it was possible that the percentage of male stops was still statistically similar to the lower boundary of stops for males.

Table 7.3 David District Vehicle Stops by Sex using Benchmark Boundaries

Sex	Crash Drivers Benchmark	Actual Stopped Drivers	Criminal Suspect Benchmark	Within boundaries?
Male	58.9%	55.1%	73.1%	No, but within the margin of sampling error
Female	41.1%	44.9%	26.9%	No, but within the margin of sampling error

Similar results were found for female drivers. The benchmark boundaries for the stops of female drivers were 41.1% (crash drivers) and 26.9% (criminal suspects), with a midpoint of 34.0%. The actual stops of female drivers was 44.9%, above both benchmark boundaries. Female drivers appeared more likely to be stopped within David District than either benchmark predicted. However, recall from Table 7.1 that the percentage of female drivers stopped was within the margin of sampling error for the crash driver benchmark, so it is possible that the percentage of female driver stops was still statistically within the boundaries of these two benchmarks.

Figure 7.2 David District Vehicle Stops Compared to Crash Driver and Criminal Suspect Benchmarks by Sex

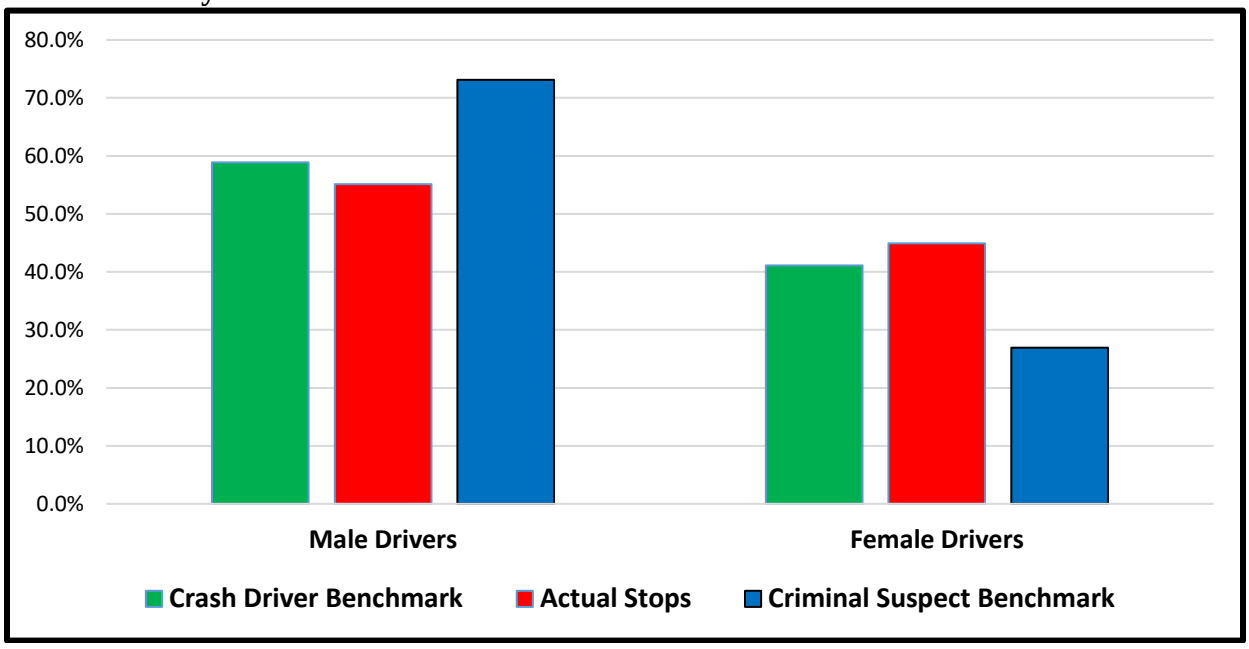


Figure 7.2 above serves as a visual illustration of the data in Table 7.3. This figure visually illustrates that the percentage of males stopped was lower than both benchmark measures, and the percentage of females stopped was above both benchmark measures.

We also utilized the veil-of-darkness benchmark method to examine the stops made during hours of daylight, when it was assumed to be easier to determine the sex of the driver prior to stop. We compared these stops with stops made during hours of darkness, when it was assumed to be harder to determine driver's characteristics prior to stop. A total of 1,848 vehicle stops occurred during daylight hours (defined as between 30 minutes before sunrise and 30 minutes after sunset). An additional 1,212 vehicle stops occurred during the remaining hours of the day that were classified as darkness. Table 7.4 reveals the details of this veil-of-darkness analysis by sex for David District.

Table 7.4 David District Vehicle Stops by Sex (Veil of Darkness Benchmark)

Sex	Daylight Stopped Drivers (number)	Benchmark Darkness Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	51.8% (958)	60.0% (727)	-8.2	< .001	Yes, but ***less*** likely to be stopped than expected.
Female	48.2% (890)	40.0% (485)	+8.2	< .001	Yes. More likely to be stopped than expected.

As Table 7.4 reveals, females again were found to be stopped more often than expected when using this method. While 48.2% of the drivers stopped during the daylight hours were female, only 40.0% of the drivers stopped during hours of darkness were female. The binomial test found this difference to be statistically significant with a *p*-value of less than .01. Likewise, male drivers made up 60.0% of the stops during darkness, yet this dropped to only 51.8% of stops during daylight.

A counter explanation could be that females were less likely than males to drive at night within David District. To respond to the counter claim, we examined our crash driver data by daylight and darkness. When examining crash drivers within David District, we found that females made up 42.0% of crash drivers during daylight hours, and 37.5% of crash drivers during hours of darkness. The binomial test revealed that this difference was within the margin for sampling error ($p = .173$). Therefore, we found insufficient evidence that this argument was true to the degree that it would produce a statistically significant difference between female stops made during hours of daylight and darkness. Therefore, based on the veil-of-darkness benchmark method, the evidence revealed the proportion of female drivers stopped was disproportionately higher within David District during daylight periods, when it is easier to determine the characteristics of the drivers prior to stop.

In actual human terms, however, how great was this disparity of female drivers? There were 1,848 drivers stopped during daylight. Female drivers constituted 40.0% of drivers stopped during hours of darkness, when the opportunity for bias in stops was less present. If 40.0% of the daylight stops had been female drivers, this would have amounted to 739 female drivers stopped during daylight. As it was, 890 female drivers were stopped during daylight, a difference of 151 drivers. By this

estimate, during the 12-month period of study there were, on average, 13 more female drivers stopped each month in David District than would have been predicted by the darkness benchmark.

Our analyses of stops by sex revealed mixed results within David District for this period of study. While the crash driver benchmark revealed that females were not statistically more likely to be stopped than expected, the percentage of stopped drivers who were female was outside the boundaries of the crash driver and criminal suspect benchmarks. The veil-of-darkness benchmark method also revealed that females were disproportionately stopped during hours of daylight (when it was easier to determine driver's characteristics prior to stop). This difference was not explained by an argument that females were less likely to drive during hours of darkness. The disparity in stops of females was estimated to result in approximately 13 more female drivers stopped than expected each month within David District.

7.1.2 Driver Race and Ethnicity

During the 12-month period of study, 3,028 vehicle stops took place within David District in which the driver's race and ethnicity was recorded by the officer. During that same period, race and ethnicity data were available for 642 drivers involved in crashes within David District to serve as a traffic benchmark estimate. Descriptions of 413 criminal suspects within David District served as a criminal offender population benchmark. The reader, however, should always remember that the Carmel Police Department stops contained a mixture of traffic stops and criminal investigative stops of unknown proportions, thus explaining why both benchmarks were used.

Table 7.5 David District Vehicle Stops by Race / Ethnicity (Crash Driver Benchmark)

Race or Ethnicity	Stopped Drivers (number)	Benchmark Crash Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.3% (8)	0.3% (2)	0.0	.998	No – no disparity.
Asian / Pacific Islander	3.5% (107)	3.4% (22)	+0.1	.516	No – no disparity.
African-American / Black	27.8% (842)	14.2% (91)	+13.6	< .000	Yes. More likely to be stopped than expected.
Caucasian / White	68.4% (2,071)	82.1% (527)	-13.7%	< .000	Yes, but ***less*** likely to be stopped than expected.
Hispanic Ethnicity	7.2% (221)	6.7% (43)	+0.5	.345	No – no disparity.

Table 7.5 above reveals the analysis of the stopped drivers in David District, by race and Hispanic ethnicity, using the crash driver benchmark. As this table reveals, 0.3% of the drivers stopped by the Carmel Police Department within David District were Alaskan Natives / American Indians, as were exactly 0.3% of the crash drivers. As these percentages were identical, even without the binomial test there was obviously no disparity in these stops. While 3.5% of the drivers stopped

were Asians / Pacific Islanders, 3.4% of the crash drivers were Asian / Pacific Islander drivers. These percentages were also almost identical, so even without the binomial test there was obviously no disparity in these stops. Hispanic ethnicity drivers made of 7.2% of the stopped drivers, and 6.7% of the crash driver benchmark, a difference of less than a percentage point that the binomial test revealed was within the margin of sampling error.

The African-American / Black drivers' stops revealed disparity when compared to the crash driver benchmark that was designed for comparison solely to traffic enforcement stops – not a mixture of stops including criminal investigative stops. African-American drivers constituted 27.8% of the stopped drivers, and 14.2% of the crash drivers. This difference of 13.6 percentage points could not be explained away by sampling error when compared against this traffic population benchmark. Conversely, while 82.1% of the crash drivers within David District were Caucasian / White, only 68.4% of stopped rivers were Caucasian / White, a difference of 13.7 percentage points. This too was a statistically significant difference

Next, we examined stops by race and ethnicity using the criminal suspect description benchmark within David District. Table 7.6 reveals the details of that analysis. Alaskan Native / American Indian drivers made up 0.3% of the stops and 0.0% of the criminal suspect benchmark. This difference of less than a third of a percentage point was within the margin for sampling error.

Table 7.6 David District Vehicle Stops by Race / Ethnicity (Criminal Suspect Benchmark)

Race or Ethnicity	Stopped Drivers (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.3% (8)	0.0 (0)	+0.3	.289	No – no disparity.
Asian / Pacific Islander	3.5% (107)	1.5% (6)	+2.0	.010	Yes. More likely to be stopped than expected.
African-American / Black	27.8% (842)	41.2% (170)	-13.4	< .001	Yes, but ***less*** likely to be stopped than expected.
Caucasian / White	68.4% (2,071)	57.4% (237)	+11.0	< .001	Yes. More likely to be stopped than expected.
Hispanic Ethnicity	7.2% (221)	11.4% (47)	-4.2	.001	Yes, but ***less*** likely to be stopped than expected.

We found that Asian and white drivers were disproportionately more likely to be stopped when using this benchmark designed for criminal investigative stops. Asians / Pacific Islanders made up 3.5% of the drivers stopped, but only 1.5% of the criminal suspect descriptions within the benchmark, a difference that could not be explained away by sampling error. Similarly, Caucasian / White drivers made up 68.4% of the drivers stopped, but only 57.4% of the criminal suspect descriptions in the benchmark. Again, this was a difference that could not be explained away by sampling error.

By this benchmark, however, African-American and Hispanic drivers were actually ***less*** likely to be stopped than expected. While African-Americans made up 27.8% of the drivers stopped within David District, 41.2% of the criminal suspects described to the police by members of the public within David District were described as being African-American or black. African-American / Black drivers were ***less*** likely to be stopped than expected by as much as 13.4 percentage points, a difference that could not be explained away by sampling error.

Likewise, Hispanic drivers were also less likely to be stopped than expected when based on this benchmark designed for comparison to only criminal investigative stops. While 11.4% of the criminal suspects within David District were described as Hispanic, only 7.2% of the vehicle stops within David District involved Hispanic drivers. This difference was not explained by sampling error.

The reader should remember, however, that the vehicle stops being examined were a mixture of unknown proportions of traffic violation stops (appropriate for a crash driver benchmark) and criminal investigative stops (appropriate for a criminal suspect description benchmark). Each of the two benchmarks utilized was designed for only one of these types of stops. We expected that the true benchmark for these combined stops would reside somewhere between the crash driver benchmark and the criminal suspect benchmark. Therefore, we used these two benchmarks as boundaries for the true (unknown) benchmark for a combined sample of traffic violation stops and criminal investigative stops.

As Table 7.7 below illustrates, these two benchmarks were utilized as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops. When doing so, we found that the stops for most of the race categories fit very well between these two boundaries.

Table 7.7 David District Vehicle Stops by Race / Ethnicity using Benchmark Boundaries

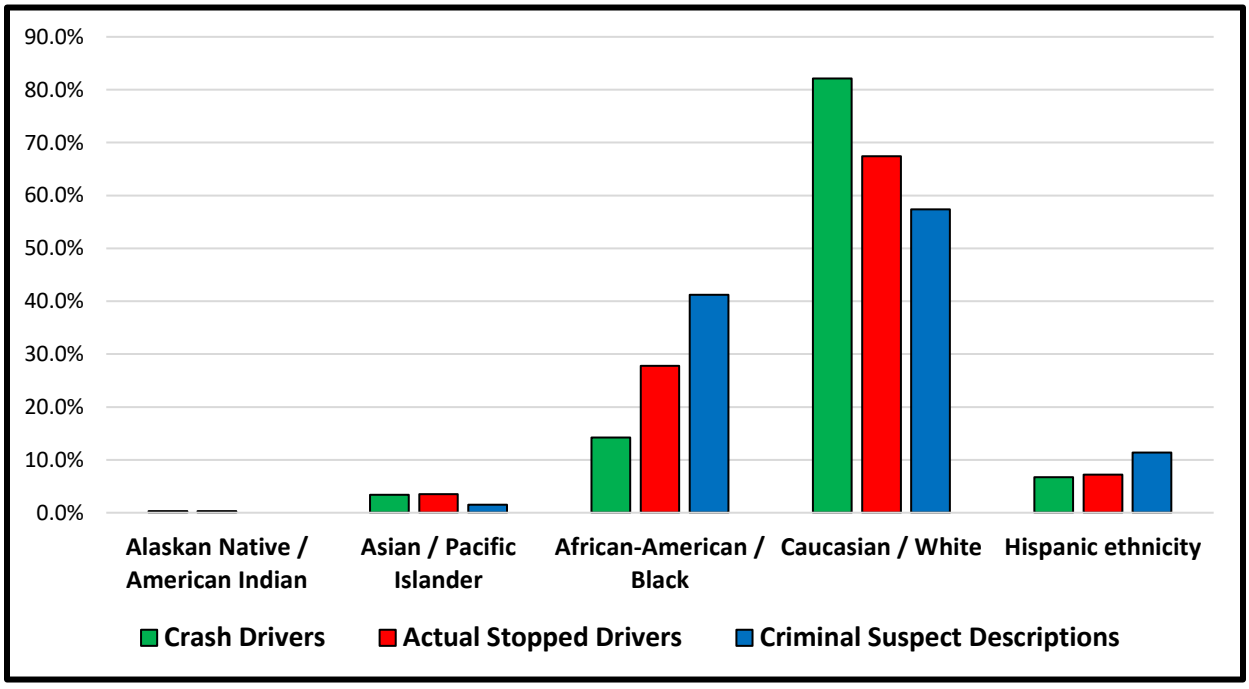
Race or Ethnicity	Crash Drivers Benchmark	Actual Stopped Drivers	Criminal Suspect Benchmark	Within boundaries?
Alaskan Native / American Indian	0.3%	0.3%	0.0	Yes – No Disparity.
Asian / Pacific Islander	3.4%	3.5%	1.5%	Yes – No Disparity.
African-American / Black	14.2%	27.8%	41.2%	Yes – No Disparity.
Caucasian / White	82.1%	68.4%	57.4%	Yes – No Disparity.
Hispanic Ethnicity	6.7%	7.2%	11.4%	Yes – No Disparity.

For example, the boundaries for stops of African-American drivers were 14.2% (crash drivers) and 41.2% (criminal suspects), with the midpoint between these two benchmarks being 27.7%. The actual stop percentage of African-Americans was 27.8%, between these two boundaries and only 0.1 percentage points away from the midpoint. The boundaries for stops of Caucasian / White

drivers were 82.1% (crash drivers) and 57.4% (criminal suspects), with the midpoint between these two benchmarks being 69.8%. The actual stop percentage of white drivers was 68.4%, between the boundaries and only 1.4 percentage point lower than the midpoint. The boundaries for stops of Hispanic drivers were 6.7% (crash drivers) and 11.4% (criminal suspects), having a midpoint of 9.1%. The actual stop percentage of Hispanic drivers was 7.2%, between these two boundaries and about 2 percentage points below the midpoint.

The David District stops of Alaskan Native / American Indian drivers, and Asian / Pacific Islander drivers, did not fit as cleanly between these benchmark boundaries. The boundaries for stops of Alaskan Native / American Indian drivers were very small, being 0.3% (crash drivers) and 0.0% (criminal suspects) respectively. The actual stops percentage for Alaskan Natives / American Indians was 0.3%, which was still within these boundaries as it was the exact same value as the crash driver benchmark. The boundaries for stops of Asian / Pacific Islander drivers were 3.4% (crash drivers) and 1.5% (criminal suspects). The actual percentage of stops that was Asian / Pacific Islander drivers was 3.5%. Although this value exceeded the crash driver boundary of 3.4%, it only did so by a tenth of a percentage point and our earlier analysis in Table 7.5 revealed that this difference was within the margin of sampling error for similarity to the crash benchmark value.

Figure 7.3 David District Vehicle Stops Compared to Crash Driver and Criminal Suspect Benchmarks



As a result, we concluded there was no evidence to suggest that drivers of any race, or Hispanic ethnicity, were disproportionately more likely to be stopped within David District when compared to both of these benchmarks combined and controlled for sampling error. Figure 7.3 above is a bar graph comparing the stops within David District to each of these two benchmarks by race. This

graph serves as a helpful visual illustration of the statistics found in Table 7.7. This graph demonstrates how consistently the percentage of drivers stopped for each demographic group was found between the percentages of that race represented by the two benchmarks (or how closely they compared to one of the benchmark boundaries).

We next utilized the veil-of-darkness benchmark method. We examined stops made during hours of daylight, when it was assumed to be easier to determine the race of the driver prior to stop. We then compared these daylight stops to stops made during hours of darkness, when it was assumed to be harder to determine driver characteristics prior to stop. A total of 1,829 vehicle stops occurred during daylight hours, and 1,199 vehicle stops occurred during the hours classified as darkness within David District. Table 7.8 reveals the details of this veil-of-darkness analysis by race and ethnicity for the district.

Table 7.8 David District Vehicle Stops by Race / Ethnicity (Veil of Darkness Benchmark)

Race or Ethnicity	Daylight Stopped Drivers (number)	Benchmark Darkness Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.2% (4)	0.3% (4)	-0.1	.221	No – no disparity.
Asian / Pacific Islander	3.3% (60)	3.9% (47)	-0.6	.132	No – no disparity.
African-American / Black	25.8% (471)	30.9% (371)	-5.1	< .000	Yes, but ***less*** likely to be stopped than expected.
Caucasian / White	70.7% (1,294)	64.8% (777)	+5.9	< .000	Yes. More likely to be stopped than expected.
Hispanic Ethnicity	6.8% (126)	7.8% (95)	-1.0	.087	No – no disparity.

Table 7.8 reveals that during the daylight hours, when it was assumed to be easier to identify the race of the driver prior to stop, 0.2% of vehicle stops involved Alaskan Native / American Indian drivers. During hours of darkness, when it was harder to determine the characteristics of the drivers prior to stop, 0.3% of the drivers stopped were Alaskan Natives / American Indians. This 0.1 percentage point difference, and the binomial test outcome, both revealed that this difference was within the margin of sampling error. This showed no racial disparity. Likewise, there was no disparity found for Asian / Pacific Islander drivers. This group made up 3.3% of drivers stopped during daylight, and 3.9% of drivers stopped at night. This 0.6 percentage point difference was within the margin of sampling error. Hispanic ethnicity drivers too were found to be stopped at similar rates during daylight and darkness. Hispanic ethnicity drivers constituted 6.8% of stops during daylight, and 7.8% of stops during darkness, a difference that was within the margin of sampling error.

During daylight, African-Americans / Black drivers made up 25.8% of all stopped drivers. After dark, when it was harder to determine the driver's race prior to stop, 30.9% of the drivers stopped were African-American / Black. This suggested that African-American drivers were actually ***less*** likely to be stopped when the driver's race was more easily determined prior to stop. This difference of 5 percentage points could not be explained away by sampling error. Conversely, Caucasian / White drivers were ***more*** likely to be stopped during hours of daylight, when it was easier to determine the driver's race, and less likely to be stopped after dark. During daylight, whites made up 70.7% of stopped drivers, while after dark only 64.8% of stopped drivers were white.

A counter explanation could be that African-American / Black drivers were less likely to drive during daylight and more likely to drive at night within David District. Similarly, one could argue that Caucasian / White drivers were more likely to drive during daylight and less likely to drive at night. To respond to this counter claim, we examined our crash driver data by daylight and darkness. When examining African-American crash drivers within David District, we found that 13.2% of crash drivers during daylight hours, and 18.0% of crash drivers during hours of darkness, were African-Americans. This difference 4.8 percentage points was within the margin of sampling error according to the binomial test result (p = .512). Therefore, we found no evidence that the proportion of drivers on the roadway within David District had significantly different proportions of African-American drivers from daylight to darkness. Officers were actually ***less*** likely than expected to choose to stop African-American drivers during daylight hours, when it was theoretically easier to determine the race of the driver prior to stop.

Alternatively, Caucasian / White drivers constituted 83.3% of daylight crash drivers within David District, and 77.3% of darkness crash drivers. This difference from daylight to darkness of 6.0 percentage points ***was*** statistically significant (p = .001), revealing that white drivers made up a greater percentage of the stopped drivers during daylight, simply because white drivers made up a larger proportion of the drivers on the roadways during daylight.

7.1.3 Vehicle Stops Summary

In summary, our analyses of stops by sex revealed very mixed results regarding the stopping of female drivers within David District for this period of study. While the crash driver benchmark revealed that females were not statistically more likely to be stopped than expected, the percentage of stopped drivers who were female was slightly outside the boundaries of the crash driver and criminal suspect benchmarks. The veil-of-darkness benchmark method also revealed that females were disproportionately more likely to be stopped during hours of daylight (when it was easier to determine drivers' characteristics prior to stop). This was a difference that could not be explained by an argument that females were less likely to drive during hours of darkness. This disparity was estimated to result in, on average, 13 more female drivers stopped than expected each month within David District.

Regarding driver race and ethnicity, the findings were more consistent. From the analyses using the crash driver and criminal suspect descriptions benchmarks as boundaries, we concluded there was no evidence to suggest that drivers of any race, or Hispanic ethnicity, were disproportionately more likely to be stopped within David District. When using the veil-of-darkness method, however, we found an apparent reluctance to stop African-American drivers on the part of the

officers within David District during hours of daylight when it was potentially easier to determine the race of the driver prior to the stop. The finding that African-American drivers were ***less*** likely to be stopped than expected was statistically significant and not explained away by race difference in traffic patterns between daylight and darkness. For all racial groups, and Hispanic ethnicity, we concluded there was no evidence that any group was disproportionately more likely to be stopped than expected. Therefore, we found no evidence that people of color were more likely to be stopped within David District.

7.2 Post-Stop Citations

We examined equity in the treatment of drivers (in terms of citations) after they had already been stopped. As described in earlier sections of this report, we considered stops with similar offense seriousness and number of offenses committed. Once these one-violation stops were isolated, stops for the same reason were then compared with one another. Of the 3,065 individual vehicle stops that occurred within David District, 2,702 (88.2%) involved only one traffic violation. As before, we only examined post-stop citations for the five most common reasons for stop across the city: 1.) Speeding; 2.) Expired license plate; 3.) Improper headlights; 4.) None or improper taillights; and 5.) Failure to signal lane change or intent to turn. These five reasons for stop totaled 2,027 of the one-violation stops within David District, making up 66.1% of all stops within David District, and 75.0% of the one-violation stops within David District.

As the benchmark for each of these categories of stops, we used the outcomes for male drivers as the benchmark for stops of female drivers. The percentage of females cited for that violation was compared to the males to see if females were treated more punitively than males. For the examination by race and Hispanic ethnicity, we used the outcome for white drivers as the benchmark for comparison to all other racial categories and Hispanic ethnicity. The assumption for this sort of comparison was that if officers were not biased, males and females would receive citations at a similar rate for similar offenses, and persons of color would receive citations at a similar rate as whites for similar offenses.

7.2.1 Driver Sex

As was the case in other districts, speeding was by far the most common reason for stop within David District with 1,284 one-violation vehicle stops for speeding that contained data on the driver's sex. Of these stops, 56.1% (720) involved a male driver. Of these 1,284 speeding stops of male drivers, 199 (27.6%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure within David District for stops of female drivers for speeding. Table 7.9 displays the details of that analysis.

As Table 7.9 reveals, female drivers stopped for speeding within David District were less likely to receive a citation than were male drivers stopped for speeding under similar circumstances. While 27.6% of male speeders received a citation, only 20.0% of female drivers received a citation. This difference was not explained away by sampling error. Therefore, we found no evidence to suggest that female drivers were disproportionately ***more*** likely to be cited for speeding within David District. In fact, they were shown more leniency than male drivers with regard to speeding stops.

Table 7.9 David District Speeding Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	20.0% (564 / 113)	27.6% (720 / 199)	-7.6	< .001	Yes, but ***less*** likely to be cited than expected.

Next, we examined stops for having an expired license plate. There were 347 one-violation vehicle stops within David District for having an expired license plate. Of these stops, 51.9% (180) involved a male driver. Of these 180 expired license plate stops of male drivers, 24 stops (13.3%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure within David District for stops of female drivers for having an expired license plate. Table 7.10 below reveals the results of this analysis by sex.

Table 7.10 David District Expired Plates Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	8.4% (167 / 14)	13.3% (180 / 24)	-4.9	.034	No – no disparity.

Of David District's one-violation vehicle stops, there were 167 female drivers stopped for having an expired license plate, 14 (8.4%) of which received a traffic citation for that offense. This was 4.9 percentage points lower than the rate for males, but the binomial test indicated that this difference was still within the margin of sampling error. No evidence of disparity between the sexes existed with regard to citations for expired license plate stops within David District.

Improper headlight stops were next, the analysis of which is displayed in Table 7.11 below. Among the one-violation stops, there were 175 vehicle stops within David District for improper headlights. Of these stops, 51.4% (90) involved a male driver. Of these 90 improper headlight stops of male drivers, only one (1.1%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure within David District for stops of female drivers for having an improper headlight.

There were 85 one-violation stops of female drivers within David District for having an improper headlight, none of which (0.0%) received a traffic citation. This was a lower percentage than the male drivers who received a citation for this offense within David District, yet was within the margin of sampling error. This outcome revealed that males and females were cited equally when stopped for operating with an improper headlight. There was no evidence of disparity in the treatment of female drivers in this regard within David District for this offense.

Table 7.11 Davis District Improper Headlights Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (85 / 0)	1.1% (90 / 1)	-1.1	.391	No – no disparity.

The fourth offense we examined was stops for having improper taillights. There were 160 single-violation vehicle stops within David District for improper taillights. Of these stops, 61.9% (99) involved a male driver. Of these 99 improper taillight stops of male drivers, none (0.0%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure within David District for stops of female drivers for having an improper taillight. Table 7.12 displays the details of that analysis.

Table 7.12 David District Improper Taillights Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (61 / 0)	0.0% (99 / 0)	0.0	.941	No – no disparity.

Among David District's one-violation stops, there were 61 female drivers stopped for having an improper taillight, none of which (0.0%) received a traffic citation for that offense. This was the exact same citation rate for males, and revealed that males and females were cited equally when stopped for operating with an improper taillight. There was no evidence of disparity in the treatment of female drivers in this regard within David District for this offense.

The final offense we examined was stops for failure to signal, of which there were 61 such one-violation stops within David District. Of these stops, 68.9% (42) involved a male driver. Of these 42 failure to signal stops of male drivers, 2 stops (4.8%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure within David District for stops of female drivers for failing to signal properly. The results of this analysis are displayed in Table 7.13 below.

Table 7.13 David District Failure to Signal Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (19 / 0)	4.8% (42 / 2)	-4.8	.393	No – no disparity.

Among the single-violation stops within David District, there were 19 female drivers stopped for failing to signal, none of which (0.0%) received a traffic citation for that offense. While this was a lower citation rate than for males, this difference was within the margin for sampling error. This outcome revealed that males and females were cited equally when stopped for failing to signal violations within David District.

7.2.2 Driver Race and Ethnicity

Next we examined citation rates within David District based on driver race or Hispanic ethnicity. As with the sex analysis, we began with speeding offenses. Within David District there were 1,280 one-violation vehicle stops for speeding that contained data on the driver's race and Hispanic ethnicity. Of these one-offense speeding stops, 67.4% (863) involved a Caucasian / White driver. Of these 863 speeding stops of Caucasian / White drivers, 208 (24.1%) resulted in the issuance of a traffic citation. This percentage for white drivers served as the benchmark measure within David District for the one-violation speeding stops of drivers for other races and Hispanic ethnicity. Table 7.14 below displays the details of that analysis.

Table 7.14 David District Speeding Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	33.3% (3 / 1)	24.1% (863 / 208)	+9.2	.563	No – no disparity.
Asian / Pacific Islander	23.3% (43 / 10)	24.1% (863 / 208)	-0.8	.532	No – no disparity.
African-American / Black	25.1% (371 / 93)	24.1% (863 / 208)	+1.0	.351	No – no disparity.
Hispanic Ethnicity	35.3% (85 / 30)	24.1% (863 / 208)	+11.2	.016	No – no disparity.

Among the David District one-violation stops, there were only 3 Alaskan Native / American Indian drivers stopped for speeding, one of whom (33.3%) received a traffic citation for that offense. This sample size was so small that 33.3% was as mathematically close to 24.1% that could be achieved with only three cases. Therefore, the binomial test revealed the difference between the Alaskan Native / American Indian citation rate and the white citation rate was explained away by sampling error. We found that Alaskan Native / American Indian drivers stopped for speeding within David District were equally as likely as white drivers to have received a citation for that offense.

There were 43 Asian / Pacific Islander drivers stopped for speeding among the one-violation stops within David District, 10 of whom (23.3%) received a traffic citation. This citation rate differed from the percentage of Caucasian / White drivers cited for speeding by less than one percentage point, which the binomial test indicated was within the margin for sampling error. There was no evidence to suggest that Asian / Pacific Islander drivers were more likely than whites to receive a traffic citation for speeding when the conditions of the stop were controlled.

Likewise, 371 African-American drivers were among the speeding stops, 93 (25.1%) of whom received a citation. This differed from the citation rate for white drivers by only one percentage point and was within the margin of sampling error. Therefore, within David District we found no evidence that African-American drivers were more likely than whites to receive a traffic citation for speeding when stopped under similar circumstances. Finally, 85 Hispanic drivers were stopped for speeding, 30 (35.3%) of whom received a citation. This differed from the citation rate for Caucasian / White drivers by 11.2 percentage points, yet the binomial test revealed this was within the margin for sampling error. There was no evidence to suggest that Hispanic ethnicity drivers were more likely than whites to receive a traffic citation for speeding within David District when the conditions of the stop, and sampling error, were controlled.

Next, we examined stops for having an expired license plate. There were 343 one-violation vehicle stops within David District for having an expired license plate. Of these stops, 77.0% (264) involved a Caucasian / White driver. Of these 264 expired license plate stops of Caucasian / White drivers, 28 stops (10.6%) resulted in the issuance of a traffic citation. This white driver citation percentage served as the benchmark measure within David District for the expired license plate stops of drivers of other races and Hispanic ethnicity. Table 7.15 below displays the details of that analysis.

Table 7.15 David District Expired Plates Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	10.6% (264 / 28)	-10.0	---	No – none were stopped.
Asian / Pacific Islander	14.3% (7 / 1)	10.6% (264 / 28)	+3.7	.544	No – no disparity.
African-American / Black	12.5% (72 / 9)	10.6% (264 / 28)	+1.9	.353	No – no disparity.
Hispanic Ethnicity	9.1% (11 / 1)	10.6% (264 / 28)	-1.5	.672	No – no disparity.

Among David District's one-violation stops, there were no Alaskan Native / American Indian drivers stopped for having an expired license plate, and therefore none were cited. Of the 7 Asian / Pacific Islander drivers stopped, only one (14.3%) received a traffic citation. Given such a small sample, this was as close as mathematically possible one could get to the white citation rate of 10.6% when using only 7 cases. Therefore, the difference was within the margin of sampling error and no disparity was revealed. There were 72 African-American / Black drivers stopped, and 12.5% (9 drivers) received a traffic citation. This was only 1.9 percentage points different than the citation rate for white drivers, and within the margin for sampling error. Finally, of the 11 Hispanic ethnicity drivers stopped for an expired license plate, only one (9.1%) received a traffic citation. This was less than the citation rate for white drivers, but also within the margin for sampling error. Therefore, with regard to one-violation stops within David District for having an expired license plate, we found no evidence to suggest that drivers from any of these racial or ethnic groups was cited more often than white drivers.

Third, we examined stops for having improper headlights. There were 173 one-violation vehicle stops within David District for an improper headlights violation. Of these stops, 75.2% (130) involved a Caucasian / White driver. Of these 130 improper headlight stops of Caucasian / White drivers, only one (0.8%) resulted in the issuance of a traffic citation. This percentage of white drivers cited served as the benchmark measure within David District for stops involving an improper headlight, for examining the citation rates for other races and Hispanic ethnicity. Table 7.16 displays the details of that analysis.

Among the one-violation stops within David District involving a headlight violation, none of the drivers other than white drivers received a citation from the vehicle stop. Therefore we found no evidence that Alaskan Native, American Indian, Asian / Pacific Islander, African-American / Black, or Hispanic drivers were more likely to be cited than white drivers when stopped for a headlight violation within David District.

Table 7.16 David District Improper Headlights Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	0.8% (130 / 1)	-0.8	---	No – no stops were made.
Asian / Pacific Islander	0.0% (7 / 0)	0.8% (130 / 1)	-0.8	.945	No – no disparity.
African-American / Black	0.0% (36 / 0)	0.8% (130 / 1)	-0.8	.749	No – no disparity.
Hispanic Ethnicity	0.0% (7 / 0)	0.8% (130 / 1)	-0.8	.945	No – no disparity.

Fourth, we examined stops for improper taillights. Among the single-violation stops within David District, there were 159 vehicle stops for improper taillights. Of these stops, 76.1% (121) involved a Caucasian / White driver. Of these 121 improper taillight stops of Caucasian / White drivers, none (0.0%) resulted in the issuance of a traffic citation. This white driver citation percentage (0.0%) served as the benchmark measure within David District for single-offense stops involving an improper taillight when examining the citation rates for other races and Hispanic ethnicity. Table 7.17 below displays the details of that analysis.

Table 7.17 David District Improper Taillights Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	0.0% (121 / 0)	0.0	---	No. No stops were even made.
Asian / Pacific Islander	0.0% (3 / 0)	0.0% (121 / 0)	0.0	.997	No – no disparity.
African-American / Black	0.0% (35 / 0)	0.0% (121 / 0)	0.0	.966	No – no disparity.
Hispanic Ethnicity	0.0% (15 / 0)	0.0% (121 / 0)	0.0	.985	No – no disparity.

Among the single-violation stops within David District, there were no Alaskan Native / American Indian drivers stopped for an improper taillight violation, and thus none were cited. There were 3 Asian / Pacific Islander drivers stopped for an improper taillight, and none of these drivers (0.0%) received a traffic citation for that offense. There were 35 African-American / Black drivers stopped for having an improper taillight, and again none received a traffic citation for that offense. Finally, there were 7 Hispanic ethnicity drivers stopped for having an improper taillight, and none received a traffic citation for that offense. Therefore, we found no evidence to suggest that drivers of any racial or ethnic group were more likely than whites to receive a citation when stopped for having an improper taillight.

The final offense we examined was stops for failure to signal. There were 60 one-violation vehicle stops within David District for failing to signal. Of these stops, 37 (61.7%) involved a Caucasian / White driver. Of these 37 failure to signal stops of Caucasian / White drivers, 2 (5.4%) resulted in the issuance of a traffic citation. This white driver percentage served as the benchmark measure within David District for stops involving drivers of other races and Hispanic ethnicity. Table 7.18 displays the details of that analysis.

Of the one-violation stops within David District, there were no stops of Alaskan Native / American Indian drivers for a failure to signal violation, and therefore none received a traffic citation for that offense. Beyond that, of all the one-violation stops within David District involving a failure to signal violation, none of the drivers other than white drivers received a citation from the vehicle stop. Therefore we found no evidence that Alaskan Native, American Indian, Asian / Pacific Islander, African-American / Black, or Hispanic drivers were more likely to be cited than white drivers when stopped for a failure to signal violation within David District.

Table 7.18 David District Failure to Signal Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	5.4% (37 / 2)	-5.4	---	No. No stops were even made.
Asian / Pacific Islander	0.0% (5 / 0)	5.4% (37 / 2)	-5.4	.758	No – no disparity.
African-American / Black	0.0% (18 / 0)	5.4% (37 / 2)	-5.4	.368	No – no disparity.
Hispanic Ethnicity	0.0% (5 / 0)	5.4% (37 / 2)	-5.4	.758	No – no disparity.

7.2.3 Post-Stop Citations Summary

We found no evidence to suggest that females were more likely than males to receive a traffic citation within David District, once we controlled for reason for stop and number of violations observed. Similarly, with regard to race, we found no racial group of drivers was disproportionately cited more often than white drivers within David District for the five most common offenses we examined. Regarding ethnicity, we again found no evidence that Hispanic drivers were cited more frequently than white drivers within David District.

7.3 Criminal Arrests

We examined the criminal arrests made by the Carmel Police Department to determine if evidence existed of disproportionately punitive treatment of any particular sex or racial group. From July 1, 2020, through June 30, 2021, there were 272 individuals arrested within David District for criminal offenses. These arrests were compared against the benchmark measure of criminal suspect descriptions mentioned earlier regarding the vehicle stops. There were 413 criminal suspect descriptions received from members of the public within David District during this period of evaluation.

7.3.1 Arrestee Sex

The results of the analysis by sex are displayed in Table 7.19 below. Of the 272 individuals arrested within David District during the period of study, 187 (68.8%) were male. Among the 413 criminal suspect descriptions received from the public within David District during the period of study, 302 (73.1%) were male. The arrests differed from the benchmark by only 4.3 percentage points, and the result of the binomial test was greater than .01, revealing the difference was within the margin for sampling error.

Table 7.19 David District Criminal Arrests Sex Comparison

Sex	Arrested Individuals (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	68.8% (187)	73.1% (302)	-4.3	.062	No – no disparity.
Female	31.3% (85)	26.9% (111)	+4.3	.062	No – no disparity.

The same was true for females as 85 (31.3%) of the arrested individuals were female, and 111 (26.9%) of the criminal suspects within the benchmark were female. This minor difference was within the margin of sampling error. As a result, we found no evidence to suggest that females (or males for that matter) were disproportionately more or less likely to be arrested when compared to a benchmark measure of the criminal offender population active within David District.

7.3.2 Arrestee Race and Ethnicity

The results of the arrests analysis by race and ethnicity are displayed in Table 7.20 below. Of the 272 individuals arrested within David District during the period of study, none (0.0%) were Alaskan Natives / American Indians. Likewise, there were no Alaskan Native / American Indian persons described within the criminal suspect descriptions from David District. As a result, there was no evidence that individuals of this race category were arrested at all within David District, much less at a disproportionate rate.

There were 4 individuals (1.5%) arrested with David District within the Asian / Pacific Islander category, with this racial group making up 1.5% of the criminal suspect descriptions benchmark. This minor difference was within the margin of sampling error, and there was no evidence to suggest that Asians / Pacific Islanders were disproportionately arrested within David District.

While African-American individuals constituted a high 40.8% of the individuals arrested within David District during the period of study, this percentage was still lower than the African-American representation among the criminal suspect descriptions within David District. Within this district, 41.2% of the criminal suspect descriptions provided to the police by members of the public who were witnesses or victims of crimes, described the person committing the crime as African-American or black. Finally, 14.7% of the individuals arrested by the Carmel Police Department within David District were Hispanic in ethnicity, and 11.4% of the criminal suspect descriptions involved a Hispanic suspect. The binomial test revealed that this was within the margin for sampling error.

Table 7.20 David District Criminal Arrests Race / Ethnicity Comparison

Race or Ethnicity	Arrested Individuals (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0 (0)	0.0 (0)	0.0	.762	No – no disparity.
Asian / Pacific Islander	1.5% (4)	1.5% (6)	0.0	.613	No – no disparity.
African-American / Black	40.8% (111)	41.2% (170)	-0.4	.474	No – no disparity.
Caucasian / White	57.8% (157)	57.4% (237)	+0.4	.483	No – no disparity.
Hispanic Ethnicity	14.7% (40)	11.4% (47)	+3.3	.056	No – no disparity.

Caucasian / White individuals were also arrested at a rate almost identical to their representation within the criminal suspect benchmark. Whites made up 57.8% of the arrested individuals, and 57.4% of the suspects described in the benchmark. The binomial test indicated that these two percentages were within the margin of sampling error. Thus, we found no evidence to suggest that individuals of any particular racial or ethnic group was disproportionately more likely to be arrested within David District when compared to a benchmark measuring the criminal offender population active within the district.

7.3.3 Criminal Arrests Summary

Comparisons of arrests by sex within David District revealed that females and males were arrested at percentages fairly equal to the percentages of the sexes within the criminal suspect description benchmark for David District. Likewise, all of the racial groups examined, and Hispanic ethnicity, were arrested at similar proportions as they were represented within the criminal suspect description benchmark. We found no evidence to suggest any sex, race, or ethnic group was disproportionately arrested more often within David District when compared to the offender population active within David District.

7.4 David District Summary

Our analyses of stops by sex revealed very mixed results regarding the stopping of female drivers within David District for this period of study. While the crash driver benchmark revealed females were not statistically more likely to be stopped than expected, the percentage of stopped drivers who were female was outside the boundaries of the crash driver and criminal suspect benchmarks. The veil-of-darkness benchmark method also revealed that females were disproportionately stopped during hours of daylight (when it is easier to determine driver characteristics prior to stop), a difference that could not be explained by an argument that females were less likely to drive

during hours of darkness. This disparity was estimated to result in approximately 13 more female drivers stopped than expected each month within David District.

We found no evidence that the Carmel Police Department disproportionally issued citations to female drivers within David District, once the type, seriousness, and number of traffic violations committed were properly controlled. When stops of similar type and seriousness were compared, there was no evidence female drivers received traffic citations at a higher rate than male drivers. Examination of arrests by sex within David District revealed that females and males were arrested at percentages equal to the percentages of the sexes within the criminal suspect benchmark for David District.

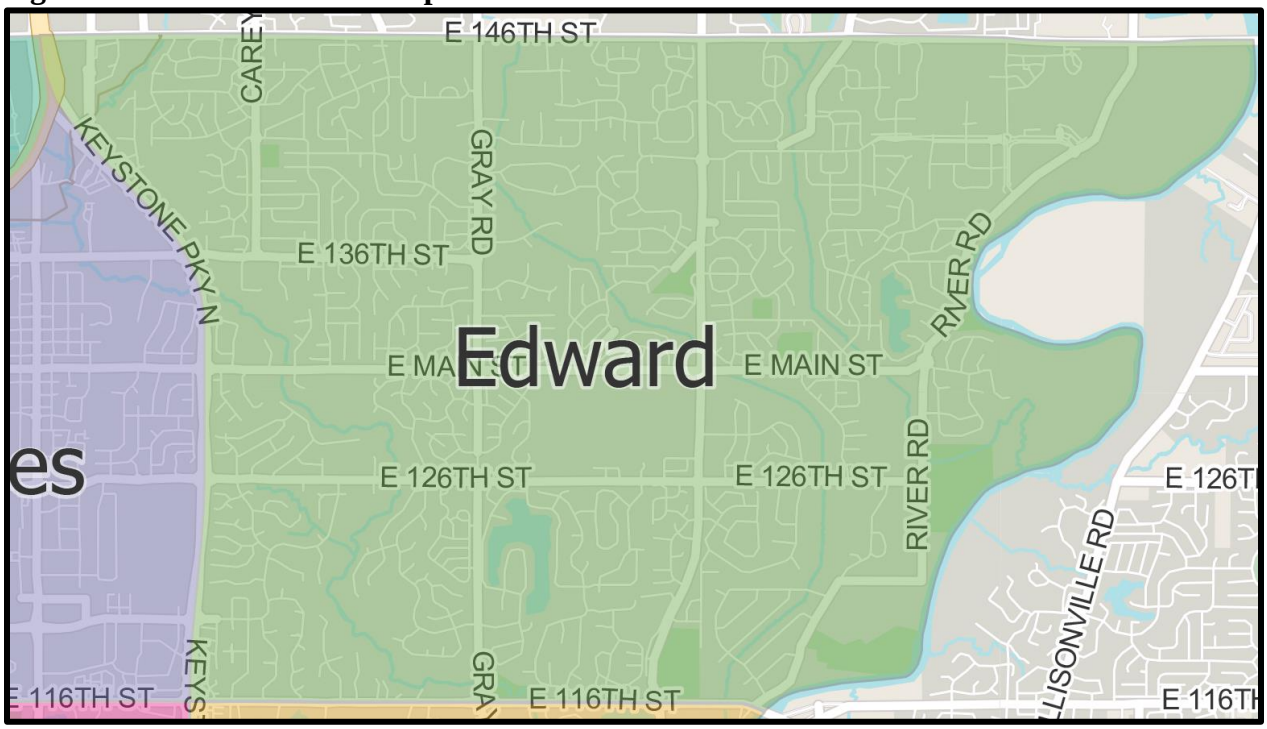
Regarding driver race and ethnicity, we concluded there was no evidence to suggest that drivers of any specific race, or Hispanic ethnicity, were disproportionately more likely to be stopped within David District when compared to both of the crash driver and criminal suspect benchmarks combined. When using the veil-of-darkness method, however, we found an apparent reluctance to stop African-American drivers on the part of the officers within David District during hours of daylight when it was potentially easier to determine the race of the driver prior to the stop. We concluded there was no evidence that any group was disproportionately more likely to be stopped than expected. Therefore we found no evidence of disparate treatment of people of color within the stops of David District.

Similarly, with regard to citations, we found no racial group of drivers was disproportionately cited more often than white drivers within David District for the five most common offenses we examined. Regarding ethnicity, we again found no evidence that Hispanic drivers were cited more frequently than white drivers within David District. Once the number of offenses committed and the seriousness of offense were controlled, we found that persons of color were equally or less likely to receive a citation when compared to white drivers stopped under similar circumstances. Finally, our analyses revealed no evidence that persons of any racial group or Hispanic ethnicity were disproportionately arrested within David District during the period of study.

8. EDWARD DISTRICT

Edward District is the northeastern most district within Carmel. It is nestled between Noblesville to the north, Fishers to the east, Frank District to the south, and Charles District to the west. Its northern boundary is East 146th Street from Keystone Parkway to the White River border with the city of Fishers. Its eastern boundary is the White River / Fishers border from East 146th Street down to East 116th Street. Its southern boundary is East 116th Street from the White River to Keystone Parkway. Its western boundary is Keystone Parkway. Edward District is roughly 14 square miles in area. Edward ranked second (after Charles District) in number of vehicle stops, yet ranked fourth in call for service volume.

Figure 8.1 Edward District Map



Edward District is predominantly residential, being mostly composed of single-family houses, parks (Carey Grove Park, Cherry Tree Park, Founders Park, Prairie Meadow Park, and River Road Park), and schools (Cherry Tree Elementary School, Clay Middle School, Mohawk Trails Elementary School, and Prairie Trace Elementary School). It contains the Brookshire, Plum Creek, and Prairie View golf courses, and the Northview Church and Venture Christian Church campuses that draw people to the district from outside the community. The western and northern edges of the district are commercialized with shopping plazas, restaurants, hotels, office complexes, and medical facilities. The most common issues reported to the police within this district included family disturbances, neighbor disturbances, minor traffic accidents, speeding driver complaints, and mental health crisis situations.

8.1 Vehicle Stops

Data were available regarding 3,972 vehicle stops made by the Carmel Police Department within Edward District. For benchmark comparisons, data were available for 340 drivers involved in crashes, and 316 descriptions of criminal suspects, from within Edward District for the 12-month period of study. We compared these stops against both of these benchmarks, and compared daylight stops with stops during hours of darkness. First we conducted these comparisons by sex, then we repeated the process for comparisons by race and Hispanic ethnicity.

8.1.1 Driver Sex

During the 12-month period of study, 3,969 vehicle stops (combined traffic stops and criminal investigative stops) took place within Edward District in which the driver's sex was recorded by the officer; 2,178 of these stops involved male drivers and 1,791 involved female drivers. During that same period, 340 drivers were involved in crashes within Edward District, who served as the benchmark for the driving population estimate in Edward District during that same time. Of these crash drivers, 196 were male and 144 were female. Finally, descriptions of a total of 316 criminal suspects were provided to the police by members of the public reporting crimes that had occurred within Edward District. Of these, 230 suspects were described as male, and 86 described as female.

As the Carmel Police Department stops contained a mixture of traffic stops and criminal investigative stops of unknown proportions, it was necessary to compare these vehicle stops against both benchmarks, under the assumption the correct (unknown) benchmark should lie somewhere between these two other benchmarks.

Table 8.1 below reveals the analysis of the stopped drivers in Edward District, by sex, using the crash driver benchmark. As the table reveals, 54.9% of the drivers stopped within Edward District were male, and 57.6% of the drivers involved in crashes within Edward District were male. These two percentage values were already relatively close (a difference of only 2.7 percentage points). Furthermore, the binomial test result of $p = .168$ confirmed that this difference was within the bounds of sampling error, after controlling for the differences in percentages, the sample sizes, and the laws of probability.

Table 8.1 Edward District Vehicle Stops by Sex (Crash Driver Benchmark)

Sex	Stopped Drivers (number)	Benchmark Crash Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	54.9% (2,178)	57.6% (196)	-2.7%	.168	No – no disparity.
Female	45.1% (1,791)	42.4% (144)	+2.7	.168	No – no disparity.

Therefore, there was no statistically significant difference between the stops of male drivers and the crash driver benchmark. There was no evidence to suggest that males were more or less likely to be stopped in Edward District when compared to this benchmark designed specifically for examining stops of a traffic enforcement nature.

Our focus, however, was the female drivers, and we found the same result for this group. No evidence of disparity in female driver stops was revealed with this benchmark. While 45.1% of the stops involved female drivers, and 42.4% of crash drivers were females, the difference was within the margin for sampling error.

Next, we examined stops by sex using the criminal suspect description benchmark. Table 8.2 reveals the details of that analysis. In this analysis we found that while 54.9% of stopped drivers within Edward District were male, 72.8% of the criminal suspects reported to the police by members of the public in that district were described as male. This was a difference of 17.9 percentage points and, based on the sample size and the laws of probability, was not within the bounds of sampling error. As the binomial test *p*-value was less than .01, the difference between the stops and the benchmark was a true difference, not a result of sampling error. Male drivers were less likely to be stopped than one would expect when using the criminal offender benchmark that was designed for comparison specifically to criminal investigative stops.

Table 8.2 Edward District Vehicle Stops by Sex (Criminal Suspect Benchmark)

Sex	Stopped Drivers (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	54.9% (2,178)	72.8% (230)	-17.9	< .001	Yes, but ***less*** likely to be stopped than expected.
Female	45.1% (1,791)	27.2% (86)	+17.9	< .001	Yes. More likely to be stopped than expected.

Conversely, female drivers were more likely to be stopped than expected when compared to the criminal suspect benchmark. Of the stopped drivers, 45.1% were female, while 27.2% of criminal suspects within Edward District were described as female. This difference of 17.9 percentage points was statistically significant.

The reader should be reminded, however, that the vast criminological research has consistently revealed that crimes (especially violent crimes) are disproportionately committed by males.[90] Consequently, a benchmark designed to measure the criminal offender population (rather than the driving population) will have higher male representation. The driving population is not nearly so skewed towards males.[91] As we suspect that a majority of these vehicle stops were traffic stops by nature, this difference in criminal offending behavior can explain this disparity.

The reader should also remember that the vehicle stops being examined were a mixture of unknown proportions of traffic violation stops (appropriate for a crash driver benchmark) and criminal investigative stops (appropriate for a criminal suspect description benchmark).

[90] Sampson, R. J., & Laub, J. H. (1995). *Crime in the Making: Pathways and Turning Points through Life*. Cambridge, MA: Harvard University Press; Wright, J. P., Tibbetts, S. G., & Diagle, L. E. (2014). *Criminals in the Making: Criminality across the Life Course*. Los Angeles: Sage.

[91] National Highway Traffic Safety Administration (2021). *Traffic Safety Facts Annual Report, 2019*. Washington, DC: National Highway Traffic Safety Administration (https://cdan.nhtsa.gov/tsftables/tsfar.htm#).

Each of the two benchmarks utilized was designed for only one of these types of stops. We expected that the true benchmark for these combined stops would reside somewhere between the crash driver benchmark and the criminal suspect benchmark. Therefore, we used these two benchmarks as boundaries for the true (unknown) benchmark for a combined sample of traffic violation stops and criminal investigative stops.

Table 8.3 Edward District Vehicle Stops by Sex using Benchmark Boundaries

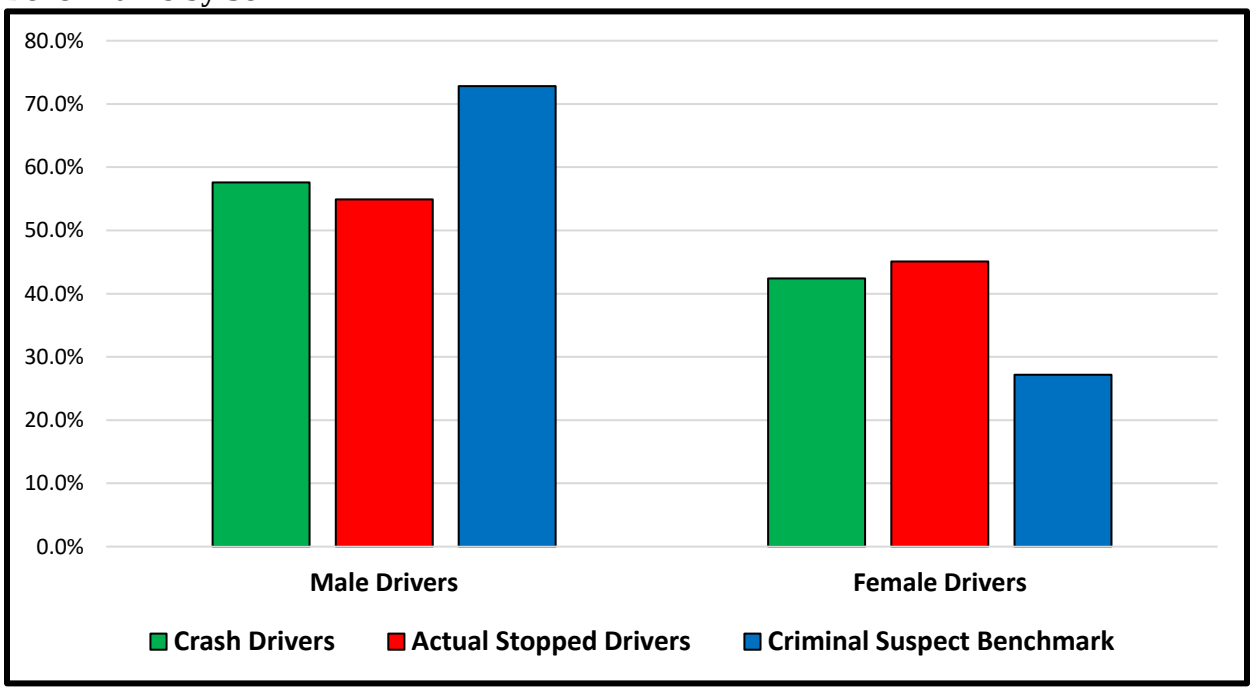
Sex	Crash Drivers Benchmark	Actual Stopped Drivers	Criminal Suspect Benchmark	Within boundaries?
Male	57.6%	54.9%	72.8%	No, but within margin of sampling error
Female	42.4%	45.1%	27.2%	No, but within margin of sampling error

Table 8.3 above illustrates the application of these two benchmarks as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops. We found, however, that the stops within Edward District did not fit so neatly between these boundaries. The proportion of male drivers stopped was 2.7 percentage points below the lowest benchmark boundary, the crash driver benchmark. Nevertheless, back in Table 8.1 above, it was revealed that the percentage of male crash drivers and the percentage of male drivers stopped were within the margin of sampling error, and thus were statistically equal.

The percentage of female drivers stopped was 45.1%, which was 2.7 percentage points above the highest benchmark boundary, the crash driver benchmark. It should again be noted, however, that Table 8.1 revealed that the percentage of female crash drivers, and the percentage of female drivers stopped by the police, were within the margin of sampling error and thus were statistically similar. Nevertheless, they did not fit neatly within these boundaries and leaned toward female drivers being disproportionately more likely to be stopped than expected, and male drivers being disproportionately less likely to be stopped than expected.

Figure 8.1 below provides a visual illustration of the information contained within Table 8.3. This figure is a bar graph representing the percentages of stops by sex, bracketed by the percentages of the two benchmarks. As this figure reveals, the percentage of stops for each sex did not rest between the two boundaries of the benchmark measures. For each sex, the percentage of drivers stopped by the police came close to the percentage of the crash driver benchmark, but still rested farther above or below that benchmark than we would have expected.

Figure 8.2 Edward District Vehicle Stops Compared to Crash Driver and Criminal Suspect Benchmarks by Sex



We also utilized the veil-of-darkness benchmark method to compare stops made during daylight hours and times of darkness. During daylight it was assumed to be easier to determine the sex of the driver prior to stop. Stops made during hours of darkness, it was assumed, occurred when it was harder to determine drivers' characteristics prior to stop and less likely for officers to discriminate based on driver characteristics. A total of 2,857 vehicle stops occurred during daylight hours, defined as between 30 minutes before official sunrise until 30 minutes after official sunset. An additional 1,112 vehicle stops occurred during the remaining hours of the day that were classified as darkness. Table 8.4 reveals the details of this veil-of-darkness analysis by sex for Edward District.

As Table 8.4 reveals, males were less likely to be stopped than expected, and females were stopped more often than expected. While 51.8% of the drivers who were stopped during the daylight hours were male, 62.8% of the drivers stopped during hours of darkness were male. Even after controlling for sampling error, the binomial test found this difference of 9.0 percentage points to be statistically significant. While 48.2% of the drivers who were stopped during the daylight hours were female, only 37.2% of the drivers stopped during hours of darkness were female. Even after controlling for sampling error, the binomial test found this difference to be statistically significant.

One possible counter explanation that could be offered for this disparity would be the suggestion that females are less likely than males to drive at night. To respond to the counter claim, we examined our crash driver data by daylight and darkness. In Edward District, we found that females made up 46.3% of crash drivers during daylight hours, and only 30.1% of crash drivers during hours of darkness. This was a large difference of 16.2 percentage points and the binomial test

revealed that this difference was beyond the margin for sampling error ($p = < .001$). Therefore, we found that females ***did*** make up a larger percentage of drivers on the roadways during daylight, and a smaller proportion of drivers during darkness. The exact opposite finding was true for male drivers. **In other words, the evidence suggested that these disparities by sex of the driver were explained by sex differences in driving patterns by time of day, *not* officer bias.**

Table 8.4 Edward District Vehicle Stops by Sex (Veil of Darkness Benchmark)

Sex	Daylight Stopped Drivers (number)	Benchmark Darkness Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	51.8% (1,480)	62.8% (698)	-11.0	< .001	Yes, but *less* likely to be stopped than expected.
Female	48.2% (1,377)	37.2% (414)	+11.0	< .001	Yes. More likely to be stopped than expected.

In summary, our analysis revealed mixed results regarding female drivers. Utilizing the crash driver benchmark and criminal suspect benchmarks as boundaries for the true (unknown) benchmark for the combination of traffic violation and criminal investigative stops revealed stops of female drivers were slightly higher than either benchmark would have predicted, but still within the margin of sampling error. The veil-of-darkness method revealed that female drivers were more likely to be stopped than expected during daylight hours, but examination of patterns of crash drivers revealed that this was likely because females made up a larger percentage of the motoring public within Edward District during daylight.

8.1.2 Driver Race and Ethnicity

During the 12-month period of study, 3,925 vehicle stops took place within Edward District in which the driver's race and ethnicity were recorded by the officer. During that same period, race and ethnicity data were available for 340 drivers involved in crashes within Edward District. These crash drivers served as a driving population benchmark estimate. Descriptions of a total of 316 criminal suspects were provided to the police by members of the public reporting crimes that had occurred within Edward District, serving as a criminal offender population benchmark.

Again, as the Carmel Police Department stops contained a mixture of traffic stops and criminal investigative stops of unknown proportions, it was necessary to compare these stops against both benchmarks, under the assumption that the correct (unknown) benchmark would lie somewhere between these two benchmark measures.

Table 8.5 below reveals the analysis of the stopped drivers within Edward District, by race and Hispanic ethnicity, using the crash driver benchmark. As this table reveals, 0.4% of the drivers stopped by the Carmel Police Department within Edward District were Alaskan Native / American Indian, 5.0% were Asian / Pacific Islander, 11.8% were African-American, and 82.8% were Caucasian / White. Of all these stops of individuals of various races, 6.2% were Hispanic in ethnicity. In comparison, 0.9% of the crash drivers within Edward District were Alaskan Native / American Indian, 5.6% were Asian / Pacific Islander, 13.8% were African-American, and 79.7%

were Caucasian / White. Of all these individuals of various races, 4.4% of crash drivers were Hispanic in ethnicity.

Table 8.5 Edward District Vehicle Stops by Race / Ethnicity (Crash Driver Benchmark)

Race or Ethnicity	Stopped Drivers (number)	Benchmark Crash Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.4% (14)	0.9% (3)	-0.5	.157	No – no disparity.
Asian / Pacific Islander	5.0% (198)	5.6% (19)	-0.6	.343	No – no disparity.
African-American / Black	11.8% (462)	13.8% (47)	-2.0	.142	No – no disparity.
Caucasian / White	82.8% (3,251)	79.7% (271)	+3.1	.077	No – no disparity.
Hispanic Ethnicity	6.2% (247)	4.4% (15)	+1.8	.101	No – no disparity.

The reader should note the small percentage differences between the stops and the benchmark for each racial group. All differences were small, the greatest difference being only 3.1 percentage points. The reader should also note the small number of actual stops or crash drivers from which to calculate percentages in many of the demographic categories. Therefore, it was no surprise that the binomial test found all of the minor percentage differences between the stops and the crash driver benchmark to be within the margin of sampling error. None of the races or ethnicity examined within this table were found to be statistically significantly different from the benchmark percentages, when using a crash benchmark designed for comparison to stops for only traffic enforcement purposes.

Next, we examined stops by race and ethnicity using the criminal suspect description benchmark within Edward District. Remember that this benchmark was designed for comparison only to criminal investigative stops, but the stop data being analyzed was a combination of traffic offense stops and criminal offense-related stops. Table 8.6 reveals the details of that analysis. In this analysis we found that within Edward District, 0.0% of the criminal suspects described by members of the public were Alaskan Native / American Indian, and 0.4% of the vehicle stops (criminal and traffic stops combined) involved Alaskan Native / American Indian drivers. As this difference of less than a percentage point was within the margin of sampling error, the stops and the criminal benchmark were not statistically different. All of the rest of the race and ethnicity categories, however, revealed statistically significant differences from this benchmark intended for use with only criminal investigative stops.

While only 1.9% of the criminal suspects were described as Asian / Pacific Islander, 5.0% of the vehicle stops involved drivers of this racial category. African-American / Black drivers only made

up 11.8% of the vehicle stops, yet were described as 25.0% of the criminal suspects. Caucasian / White drivers consisted of 82.8% of the stops, but 73.1% of the criminal suspects. Hispanic ethnicity drivers constituted only 6.2% of the stops, yet they were 16.8% of the criminal suspects. Under this benchmark comparison, African-American and Hispanic drivers were disproportionately less likely (not more likely) to be stopped than expected, while white and Asian / Pacific Islander drivers were stopped more often than expected.

Table 8.6 Edward District Vehicle Stop Race / Ethnicity Comparison (Criminal Suspect Benchmark)

Race or Ethnicity	Stopped Drivers (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.4% (14)	0.0% (0)	+0.4	.282	No – no disparity.
Asian / Pacific Islander	5.0% (198)	1.9% (6)	+3.1	.004	Yes. More likely to be stopped than expected.
African-American / Black	11.8% (462)	25.0% (79)	-13.2	< .001	Yes, but ***less*** likely to be stopped than expected.
Caucasian / White	82.8% (3,251)	73.1% (231)	+9.7	< .001	Yes. More likely to be stopped than expected.
Hispanic Ethnicity	6.2% (247)	16.8% (53)	-10.6	< .001	Yes, but ***less*** likely to be stopped than expected.

The reader should remember, however, that the vehicle stops being examined were a mixture of unknown proportions of traffic violation stops (appropriate for a crash driver benchmark) and criminal investigative stops (appropriate for a criminal suspect description benchmark). Each of the two benchmarks utilized was designed for only one of these types of stops. We expected that the true benchmark for these combined stops would reside somewhere between the crash driver benchmark and the criminal suspect benchmark. Therefore, we used these two benchmarks as boundaries for the true (unknown) benchmark for a combined sample of traffic violation stops and criminal investigative stops.

Table 8.7 below illustrates the results when these two benchmarks are utilized as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops. For three of the categories, we found the proportion of drivers stopped fit neatly between the proportion of these groups revealed within the crash driver benchmark and the criminal suspect descriptions benchmark. The benchmark boundaries for the stops of Alaskan Native / American Indian drivers were 0.9% (crash drivers) and 0.0% (criminal suspects), with a midpoint of 0.45%. The actual stop percentage for this race group was 0.4%, within these two benchmark boundaries and almost exactly at the midpoint. The benchmark boundaries for the stops of Asian / Pacific Islander drivers were 5.6% (crash drivers) and 1.9% (criminal suspects), with a midpoint of 3.8%. The actual stop percentage for this race group was 5.0%, within these two benchmark boundaries. The benchmark

boundaries for the stops of Hispanic ethnicity drivers were 4.4% (crash drivers) and 16.8% (criminal suspects), with a midpoint of 10.6%. The actual stop percentage for this race group was 6.2%, within these two benchmark boundaries and below the midpoint.

Table 8.7 Edward District Vehicle Stops by Race / Ethnicity using Benchmark Boundaries

Race or Ethnicity	Crash Drivers Benchmark	Actual Stopped Drivers	Criminal Suspect Benchmark	Within boundaries?
Alaskan Native / American Indian	0.9%	0.4%	0.0%	Yes – No Disparity.
Asian / Pacific Islander	5.6%	5.0%	1.9%	Yes – No Disparity.
African-American / Black	13.8%	11.8%	25.0%	No, but within margin of sampling error.
Caucasian / White	79.7%	82.8%	73.1%	No, but within margin of sampling error.
Hispanic Ethnicity	4.4%	6.2%	16.8%	Yes – No Disparity.

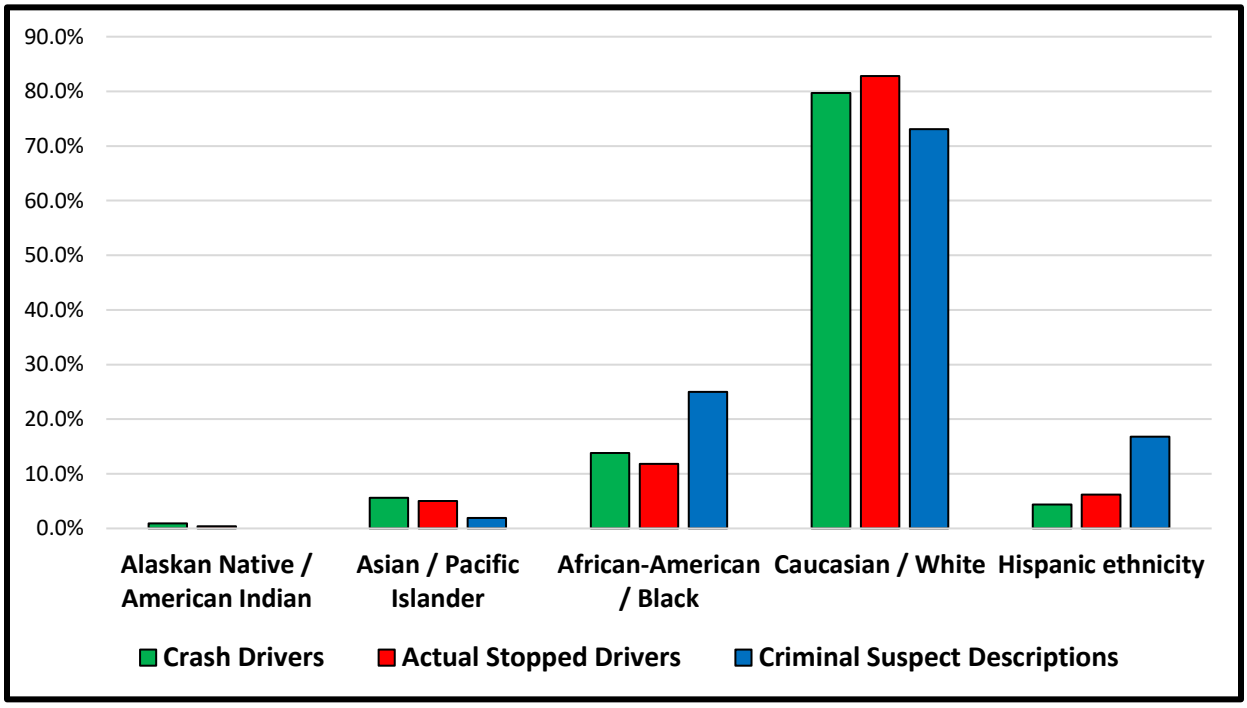
The exceptions to this pattern were the African-American / Black category, and the Caucasian / White category. The benchmark boundaries for the stops of African-American / Black drivers were 13.8% (crash drivers) and 25.0% (criminal suspects), with a midpoint of 19.4%. The actual stop percentage for African-Americans was only 11.8%, two percentage points below the lowest benchmark boundary. Recall from Table 8.5, however, that the binomial test revealed that 11.8% was still within the margin of sampling error and statistically similar to the lower benchmark boundary of 13.8%. This means that statistically the percentage of stops involving African-American drivers was basically the same as the percentage of crash drivers. In any event, there was no evidence to suggest that African-American drivers were disproportionately more likely to be stopped. In fact, the evidence suggests they were almost less likely to be stopped at a statistically significant level.

The benchmark boundaries for the stops of white drivers were 79.7% (crash drivers) and 73.1% (criminal suspects), with a midpoint of 76.4%. The actual stop percentage for whites was 82.8%, almost ten percentage points higher than the highest benchmark boundary (criminal suspect descriptions). Recall from Table 8.5 that the difference between the white stops and crash driver benchmark was within the margin sampling error. This means that the proportion of drivers stopped who were white was statistically the same as the proportion of crash drivers who were white. As a result, although white drivers were close to being disproportionately stopped more often than expected within Edward District, the stop rate was still within the margin for sampling error. Therefore we found no evidence to suggest that any racial or ethnic group was disproportionately more likely to be stopped by Carmel police officers within Edward District.

Figure 8.3 below provides a visual illustration of the information contained within Table 8.7. This figure is a bar graph representing the percentages of stops by race and ethnicity, bracketed by the percentages of the two benchmarks. As this figure reveals, the percentage of stops for African-Americans and Caucasian / Whites does not rest neatly between the two extremes of the benchmark measures. For each of these racial groups, the percentage of drivers stopped comes close to the

percentage of crash driver benchmark, but still rests farther above (whites) or below (African-Americans) that benchmark than we would have expected. However, in all of the other race categories, and Hispanic ethnicity, the percentage of drivers stopped ***did*** fall neatly between these two benchmarks.

Figure 8.3 Edward District Vehicle Stops Compared to Crash Driver and Criminal Suspect Benchmarks



As with the comparisons by driver sex, we also utilized the veil-of-darkness benchmark method. We examined stops made during hours of daylight, when it was assumed to be easier to determine the race of the driver prior to stop, and compared these with stops made during hours of darkness, when it was assumed to be harder to determine driver's characteristics prior to stop. A total of 2,828 vehicle stops occurred during daylight hours, and 1,097 vehicle stops occurred during the hours classified as darkness. Table 8.8 reveals the details of this veil-of-darkness analysis by race and ethnicity for Edward District.

Table 8.8 reveals that during daylight hours, when it may be easier to determine the race of the driver prior to stop, 0.2% of vehicle stops involved Alaskan Native / American Indian drivers. During hours of darkness, when it would have been harder to stop drivers in a biased manner, Alaskan Natives / American Indians made up 0.6% of the drivers stopped. This difference proved to be within the margin for sampling error, suggesting that Alaskan Native / American Indian drivers were no more or less likely to be stopped when the officer could more easily determine the driver's race before stopping. Asians / Pacific Islanders made up 4.7% of the drivers stopped during daylight, and 6.0% of the drivers stopped after dark. Again, this difference was within the margin for sampling error, suggesting no evidence of disparity. Hispanic drivers also revealed no

signs of disparity. They made up 5.9% of drivers stopped during daylight, and 7.1% of drivers stopped during darkness, a difference of only 1.2 percentage points that was not statistically significant.

However, the veil-of-darkness method suggested that African-American / Black drivers were disproportionately less likely to be stopped than expected, and Caucasian / White drivers were disproportionately more likely to be stopped than expected, within Edward District. During hours of darkness, when it was assumed to be harder to stop drivers based on their characteristics, African-Americans made up 16.6% of vehicle stops. But during daylight, when it is hypothetically easier to determine the drivers' races before stopping, African-Americans declined 6.7 percentage points to only 9.9% of stopped drivers, a difference not explained away by sampling error.

Table 8.8 Edward District Vehicle Stop Race / Ethnic Comparison (Veil of Darkness Benchmark)

Race or Ethnicity	Daylight Stopped Drivers (number)	Benchmark Darkness Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.2% (7)	0.6% (7)	-0.4	.017	No – no disparity.
Asian / Pacific Islander	4.7% (132)	6.0% (66)	-1.3	.027	No – no disparity.
African-American / Black	9.9% (280)	16.6% (182)	-6.7	< .001	Yes, but ***less*** likely to be stopped than expected.
Caucasian / White	85.2% (2,409)	76.8% (842)	+8.4	< .001	Yes. More likely to be stopped than expected.
Hispanic Ethnicity	5.9% (168)	7.1% (79)	-1.2	.054	No – no disparity.

Conversely, during hours of darkness, when it was assumed to be harder to stop drivers based on their characteristics, white drivers made up 76.8% of vehicle stops. But during daylight, when it is hypothetically easier to determine the drivers' races before stopping, stops of white drivers increased by 8.4 percentage points to 85.2% of stopped drivers, a difference not explained away by sampling error. White drivers appear to have been disproportionately more likely to be stopped (as compared to other races) during hours of daylight when the officers could more easily determine the driver's race before stopping. However, African-American / Black drivers were actually less likely to be stopped in comparison to other races during hours of daylight when it was easier to determine driver race prior to the stop. This suggested that officers might have elected to stop white drivers more often and electing to stop African-American drivers less often.

A counter argument could be offered that African-Americans were simply less likely to be driving during hours of daylight, and more likely to be driving during hours of darkness, thus suggesting that they are overrepresented among stops made at night. The same logic would suggest that

Caucasian / White drivers were less likely to be driving during hours of darkness, and more likely to be driving during hours of daylight, thus causing them to be overrepresented in stops during hours of daylight.

To explore these counter-claims, we examined our crash driver data by daylight and darkness. When examining all of the crash drivers for Edward District, we found that during daylight hours 11.7% of the crash drivers were African-American / Black, but during hours of darkness 20.5% of crash drivers were African-American / Black. This difference of 8.8 percentage points was not explained away by sampling error (binomial test result $p = .005$), meaning that African-American drivers were substantially less likely to be stopped during daylight because they made up a smaller proportion of the driving population within Edward District during daylight hours. As for white drivers, we found that Caucasian / White drivers made up 80.9% of crash drivers during daylight, but only 75.9% of crash drivers during darkness, a difference of 5.0 percentage points. A binomial test of this difference produced an output of $p = .149$, meaning this difference was still within the margin for sampling error. In other words, white drivers were disproportionately more likely to be stopped within Edward District during daylight hours, and this difference could not be explained by a difference from night to day in the driving patterns of white drivers. The evidence suggested a tendency to stop white drivers **more often** than expected during daylight when it is easier to determine the race of the driver prior to stop.

In actual human terms, however, how great was this disparity of white drivers? There were 2,828 drivers stopped during daylight. White drivers constituted 76.8% of drivers stopped during hours of darkness, when the opportunity for bias in stops was less present. If 76.8% of the daylight stops had been white drivers, this would have amounted to 2,172 white drivers stopped during daylight. As it was, 2,409 white drivers were stopped during daylight, a difference of 237 drivers. By this estimate, during the 12-month period of study there were, on average, 20 more white drivers stopped each month in Edward District than would have been predicted by the darkness benchmark.

8.1.3 Vehicle Stops Summary

In summary, our analysis generally revealed no disparity by sex in the stopping of drivers within Edward District. Utilizing the crash driver and criminal suspect benchmarks as boundaries for the true (unknown) benchmark for the combination of traffic violation and criminal investigative stops, revealed stops of female drivers were slightly higher than either benchmark would have predicted, but still within the margin of sampling error. The veil-of-darkness method revealed that female drivers were more likely to be stopped than expected during daylight hours, but examination of patterns of crash drivers revealed this was likely because females made up larger percentages of the motoring public within Edward District during daylight.

Regarding race and ethnicity, several times we found evidence to suggest that African-American drivers were stopped ***less*** often than the benchmarks would suggest, while white drivers were stopped disproportionately more often. All but one of these disparities were found to be within the margin of sampling error, or could be explained by racial differences in traffic patterns between daylight and darkness times of the day. The only instance where the disparity could not be resolved was with regard to the stopping of white drivers during daylight. White drivers were found to make up rather similar percentages of the drivers on the roadways from daylight to darkness. During

daylight, however, when it is assumed to be easier to determine the driver's race prior to stop, the proportion of white drivers stopped increased by a statistically significant amount. This disparity is estimated to result in approximately 20 more white drivers stopped each month in Edward District than would have otherwise been expected. Our analyses suggested that no other race category, or Hispanic ethnicity, were disproportionately stopped more often within Edward District.

8.2 Post-Stop Citations

We examined equity in the treatment of drivers (in terms of citations) after they had already been stopped. As described in earlier sections of this report, we considered stops with similar offense seriousness and number of offenses committed. Once these one-violation stops were isolated, stops for the same reason were then compared with one another. Of the 3,969 individual vehicle stops that occurred within Edward District, 3,731 (94.0%) involved only one traffic violation. As before, we only examined post-stop citations for the five most common reasons for stop across the city: 1.) Speeding; 2.) Expired license plate; 3.) Improper headlights; 4.) None or improper taillights; and 5.) Failure to signal lane change or intent to turn. These five reasons for stop totaled 3,361 of the one-violation stops within Edward District, making up 84.7% of all stops within Edward District, and 90.1% of the one-violation stops within Edward District.

As the benchmark for each of these categories of stops, we used the outcomes for male drivers as the benchmark for stops of female drivers. The percentage of females cited for that violation was compared to the males to see if females were treated more punitively than males. For the examination by race and Hispanic ethnicity, we used the outcome for white drivers as the benchmark for comparison to all other racial categories and Hispanic ethnicity. The assumption for this comparison was that if officers were not biased, males and females would receive citations at a similar rate for similar offenses, and persons of color would receive citations at a similar rate as whites for similar offenses.

8.2.1 Driver Sex

Speeding offenses were examined first. Speeding was by far the most common reason for stop within Edward District with 2,845 one-violation vehicle stops for speeding that contained data on the driver's sex. Of these stops, 53.5% (1,522) involved a male driver. Of these 1,522 speeding stops of male drivers, 270 (17.7%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure within Edward District for stops of female drivers for speeding. Table 8.9 displays the details of that analysis.

In Edward District, there were 1,323 female one-violation stops for speeding, 152 (11.5%) of which received a traffic citation. Compared to the 17.7% percentage of males cited, female drivers were cited 6.2 percentage points less often. The binomial test indicated that this difference could not be explained away by sampling error. Therefore, females were cited for speeding within Edward District ***less*** often than were male drivers during this period of analysis. Female drivers appear to have been treated more leniently than male drivers with regard to speeding citations.

Table 8.9 Edward District Speeding Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	11.5% (1,323 / 152)	17.7% (1,522 / 270)	-6.2	< .001	Yes, but ***less*** likely to be cited than expected.

Next, we examined stops for having an expired license plate. There were 177 one-violation vehicle stops within Edward District for having an expired license plate. Of these stops, 48.0% (85) involved a male driver. Of these 85 expired license plate stops of male drivers, 16 stops (18.8%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure in Edward District for stops of female drivers for having an expired license plate. Table 8.10 below displays the details of that analysis.

Table 8.10 Edward District Expired Plates Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	21.7% (92 / 20)	18.8% (85 / 16)	+2.9	.272	No – no disparity.

Of Edward District's one-violation vehicle stops, there were 92 female drivers stopped for having an expired license plate, 20 (21.7%) of which received a traffic citation for that offense. This differed from the percentage of male drivers cited by only 2.9 percentage points, and the binomial test confirmed that this difference was within the margin of sampling error. Therefore, no evidence of disparity between the sexes existed with regard to citations for expired license plate stops within Edward District.

Improper headlight stops were next, the analysis of which is displayed in Table 8.11. Among the one-offense stops, there were 144 vehicle stops within Edward District for improper headlights. Of these stops, 53.5% (77) involved a male driver. Of these 77 improper headlight stops of male drivers, none (0.0%) resulted in the issuance of a traffic citation, as all resulted in the issuance of only a warning. This percentage served as the benchmark measure in Edward District for stops of female drivers for having an improper headlight.

There were 67 one-violation stops of female drivers within Edward District for having an improper headlight, none of which (0.0%) received a traffic citation. This was exactly the same percentage as the male drivers who received a citation for this offense within Edward District. This outcome revealed that males and females were cited equally when stopped for operating with an improper headlight. There was no evidence of disparity in the treatment of female drivers in this regard within Edward District for this offense.

Table 8.11 Edward District Improper Headlights Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (67 / 0)	0.0% (77 / 0)	0.0	.935	No – no disparity.

The fourth offense we examined was stops for having improper taillights. There were 155 single-violation vehicle stops within Edward District for improper taillights. Of these stops, 61.9% (96) involved a male driver. Of these 96 improper taillight stops of male drivers, none (0.0%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure within Edward District for stops of female drivers for having an improper taillight. Table 8.12 displays the details of that analysis.

Table 8.12 Edward District Improper Taillights Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (59 / 0)	0.0% (96 / 0)	0.0	.943	No – no disparity.

Among Edward District's one-violation stops, there were 59 female drivers stopped for having an improper taillight, none of which (0.0%) received a traffic citation for that offense. This was exactly the same citation rate for males, revealing that males and females were cited equally when stopped for operating with an improper taillight. There was no evidence of disparity in the treatment of female drivers in this regard within Edward District for this offense.

The final offense we examined was stops for failure to signal, of which there were 40 such one-violation stops within Edward District. Of these stops, 65.0% (26) involved a male driver. Of these 26 failure to signal stops of male drivers, only two (7.7%) resulted in the issuance of a traffic citation, and the rest resulted in the issuance of only a warning. This percentage served as the benchmark measure in Edward District for stops of female drivers for failing to signal properly. Table 8.13 displays the details of this analysis.

Among the single-violation stops within Edward District, there were 14 female drivers stopped for failing to signal, none of which (0.0%) received a traffic citation for that offense. Despite being 7.7 percentage points ***less*** than the citation rate for males, this difference was within the margin for sampling error because of the very small samples involved. Since this difference was within the margin of sampling error, this outcome revealed that males and females were cited equally when stopped for failing to signal within Edward District.

Table 8.13 Edward District Failure to Signal Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (14 / 0)	7.7% (26 / 2)	-7.7	.326	No – no disparity.

8.2.2 Driver Race and Ethnicity

Next, we examined citation rates within Edward District based on driver race or Hispanic ethnicity. As with the sex analysis, we began with speeding offenses. Within Edward District there were 2,816 one-violation vehicle stops for speeding that contained data on the driver's race and Hispanic ethnicity. Of these one-offense speeding stops, 83.8% (2,359) involved a Caucasian / White driver. Of these 2,359 speeding stops of Caucasian / White drivers, 328 (13.9%) resulted in the issuance of a traffic citation. This percentage for white drivers served as the benchmark measure within Edward District for the one-violation speeding stops of drivers for other races and Hispanic ethnicity. Table 8.14 displays the details of that analysis.

Table 8.14 Edward District Speeding Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	28.5% (7 / 2)	13.9% (2,359 / 328)	+14.6	.253	No – no disparity.
Asian / Pacific Islander	19.2% (140 / 27)	13.9% (2,359 / 328)	+5.3	.047	No – no disparity.
African-American / Black	19.7% (310 / 61)	13.9% (2,359 / 328)	+5.8	.004	Yes. More likely to be cited than expected.
Hispanic Ethnicity	19.0% (158 / 30)	13.9% (2,359 / 328)	+5.1	.046	No – no disparity.

Among Edward District's one-violation stops, there were only 7 Alaskan Native / American Indian drivers stopped for speeding, 2 of whom (28.5%) received a traffic citation for that offense. Although this citation rate was 14.6 percentage points higher than the citation rate for Caucasian / White drivers, the sample of only 7 stops was so small that the binomial test revealed this difference was within the margin for sampling error.

There were 140 Asian / Pacific Islander drivers stopped for speeding, 27 of whom (19.2%) received a traffic citation. This citation rate differed from the percentage of Caucasian / White drivers cited for speeding by 5.3 percentage points, which the binomial test indicated was within the margin for sampling error. A total of 158 Hispanic drivers were stopped for speeding, 158 (19.0%) of whom received a citation. This differed from the citation rate for Caucasian / White drivers by only 5.1 percentage points, and the binomial test indicated that this was within the

margin of sampling error. These results suggested no disparity with regard to the citations issued to Alaskan Native / American Indian, Asian / Pacific Islander, or Hispanic drivers.

The findings for African-American drivers, however, differed. In Edward District, there were 310 one-violation stops of African-American / Black drivers for speeding, 61 of whom (19.7%) received a traffic citation for that offense. The binomial test, making calculations with a larger sample size than the other race categories, indicated that the percentage of African-American / Black drivers cited for speeding, and the percentage of Caucasian / White drivers cited for speeding (13.9%), were far enough apart to be outside the margin for sampling error. Therefore, the evidence here suggested that African-American / Black drivers stopped for speeding within Edward District were more likely to receive a traffic citation for the offense than were white drivers who were stopped under similar circumstances.

In actual human terms, however, how great was this disparity? There were 310 African-American drivers stopped for speeding. Since only 13.9% of white drivers stopped for speeding received a citation, if we applied that same percentage to stops of African-American drivers we would find 43 African-American drivers would have received a citation if cited just as often as white drivers. In reality, 61 African-American drivers received a citation for speeding, a difference of 18 drivers. By this estimate, during the 12-month period of study there were, on average, only between one and two more African-American drivers cited each month within Edward District than would have been predicted by the white driver citation rate benchmark. This is a substantively minor amount of disparity.

Next, we examined stops for having an expired license plate. There were 173 one-violation vehicle stops within Edward District for having an expired license plate. Of these stops, 81.5% (141) involved a Caucasian / White driver. Of these 141 expired license plate stops of Caucasian / White drivers, 31 stops (22.0%) resulted in the issuance of a traffic citation. This white driver citation percentage served as the benchmark measure within Edward District for the expired license plate stops of drivers of other races and Hispanic ethnicity. Table 8.15 displays the details of that analysis.

Among Edward District's one-violation stops, there were no Alaskan Native / American Indian drivers stopped for having an expired license plate, and none received a traffic citation for that offense. If no drivers of this category were even stopped, it was impossible for them to be cited disproportionally. Of the one-violation Edward District stops for an expired license plate, only 5 Asian / Pacific Islander drivers were stopped, of whom only one (20.0%) received a traffic citation. This was a lower citation rate than that of white drivers, but still within the margin for sampling error. This suggested no differences between the white driver citation rate and the Asian / Pacific Islander driver citation rate.

Among Edward District's one-violation stops, there were no Alaskan Native / American Indian drivers stopped for having an expired license plate, and none received a traffic citation for that offense. If no drivers of this category were even stopped, it was impossible for them to be cited disproportionally. Of the one-violation Edward District stops for an expired license plate, only 5 Asian / Pacific Islander drivers were stopped, of whom only one (20.0%) received a traffic citation. This was a lower citation rate than that of white drivers, but still within the margin for sampling

error. This suggested no difference between the white driver citation rate and the Asian / Pacific Islander driver citation rate.

Table 8.15 Edward District Expired Plates Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	22.0% (141 / 31)	-22.0	---	No – none were stopped
Asian / Pacific Islander	20.0% (5 / 1)	22.0% (141 / 31)	-2.0	.696	No – no disparity.
African-American / Black	15.0% (27 / 4)	22.0% (141 / 31)	-7.0	.260	No – no disparity.
Hispanic Ethnicity	0.0% (6 / 0)	22.0% (141 / 31)	-22.0	< .001	Yes, but ***less*** likely to be cited than expected.

Of the 27 African-American / Black drivers stopped for an expired license plate, only 15.0% (4 drivers) received a traffic citation, compared to 22.0% for Caucasian / White drivers. Of the 6 Hispanic ethnicity drivers stopped for an expired license plate, none (0.0%) received a traffic citation. The binomial test revealed that even with such a small sample as 6 cases, this difference was so great (22 percentage points lower than the white citation rate) that it was beyond the margin for sampling error. Therefore, we found no evidence to suggest that any racial or ethnic group was cited more often than white drivers for having expired license plates within Edward District.

Third, we examined stops for having improper headlights. There were 142 one-violation vehicle stops within Edward District for an improper headlights violation. Of these stops, 76.8% (109) involved a Caucasian / White driver. Of these 109 improper headlight stops of Caucasian / White drivers, none (0.0%) resulted in the issuance of a traffic citation. This percentage of white drivers cited served as the benchmark measure within Edward District for stops involving an improper headlight, for examining the citation rates for other races and Hispanic ethnicity. Table 8.16 displays the details of that analysis.

Among the one-violation stops, Edward District saw only 4 Alaskan Native / American Indian drivers stopped for having an improper headlight, and none received a traffic citation for that offense. This was the exact same percentage of Caucasian / White drivers that were cited for this offense, so no evidence of disparity was revealed. Likewise, there were only 14 Asian / Pacific Islander drivers stopped for having an improper headlight, and none received a traffic citation for that offense. This was the exact same percentage of Caucasian / White drivers that were cited for this offense, so no evidence of disparity in the treatment of Asian / Pacific Islander drivers was revealed.

Table 8.16 Edward District Improper Headlights Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (4 / 0)	0.0% (109 / 0)	0.0	.996	No – no disparity.
Asian / Pacific Islander	0.0% (14 / 0)	0.0% (109 / 0)	0.0	.986	No – no disparity.
African-American / Black	0.0% (15 / 0)	0.0% (109 / 0)	0.0	.985	No – no disparity.
Hispanic Ethnicity	0.0% (10 / 0)	0.0% (109 / 0)	0.0	.990	No – no disparity.

The same was also true for African-American / Black drivers. While there were 15 African-American / Black drivers stopped for having an improper headlight, none received a traffic citation for that offense. No evidence of disparity in the treatment of African-American / Black drivers was revealed with regard to improper headlight citations within Edward District. Finally, there were 10 Hispanic ethnicity drivers stopped, and none received a traffic citation for that offense, just as was the case for Caucasian / White drivers. In summary, we found no evidence to suggest that any racial or ethnic group was cited at a higher rate than white drivers for having an improper headlight within Edward District.

Fourth, we examined stops for improper taillights. Among the single-violation stops within Edward District, there were 153 vehicle stops for improper taillights. Of these stops, 75.2% (115) involved a Caucasian / White driver. Of these 115 improper taillight stops of Caucasian / White drivers, none (0.0%) resulted in the issuance of a traffic citation. This white driver citation percentage (0.0%) served as the benchmark measure in Edward District for single-offense stops involving an improper taillight when examining the citation rates for other races and Hispanic ethnicity. Table 8.17 displays the details of that analysis.

Among the single-violation stops within Edward District, there were only 2 Alaskan Native / American Indian drivers stopped for an improper taillight violation, and neither received a traffic citation (0.0%) for that offense. There were 9 Asian / Pacific Islander drivers stopped for an improper taillight, and none of these drivers (0.0%) received a traffic citation for that offense. The same was true for African-American / Black drivers. In Edward District, 27 African-American / Black drivers were stopped for having an improper taillight, and none (0.0%) received a traffic citation for that offense. Finally, 11 Hispanic ethnicity drivers were stopped for having an improper taillight, and none (0.0%) received a traffic citation for that offense. As none of these drivers received a citation after being stopped for having an improper taillight, no evidence of disparity in the treatment of drivers of any race or ethnicity was revealed with regard to citations for improper taillight within Edward District.

Table 8.17 Edward District Improper Taillights Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (2 / 0)	0.0% (115 / 0)	0.0	.998	No – no disparity.
Asian / Pacific Islander	0.0% (9 / 0)	0.0% (115 / 0)	0.0	.991	No – no disparity.
African-American / Black	0.0% (27 / 0)	0.0% (115 / 0)	0.0	.973	No – no disparity.
Hispanic Ethnicity	0.0% (11 / 0)	0.0% (115 / 0)	0.0	.989	No – no disparity.

Finally, we examined stops for failure to signal. There were 38 one-violation vehicle stops within Edward District for failing to signal. Of these stops, 33 (86.8%) involved a Caucasian / White driver. Of these 33 failure to signal stops of Caucasian / White drivers, only one (3.0%) resulted in the issuance of a traffic citation. This white driver percentage served as the benchmark measure within Edward District for stops involving drivers of other races and Hispanic ethnicity. Table 8.18 displays the details of that analysis.

Table 8.18 Edward District Failure to Signal Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	3.0% (33 / 1)	-3.0	---	No. None were stopped.
Asian / Pacific Islander	0.0% (2 / 0)	3.0% (33 / 1)	-3.0	.941	No – no disparity.
African-American / Black	0.0% (3 / 0)	3.0% (33 / 1)	-3.0	.913	No – no disparity.
Hispanic Ethnicity	0.0% (3 / 0)	3.0% (33 / 1)	-3.0	.913	No – no disparity.

Of the one-violation stops within Edward District, there were no Alaskan Native / American Indian drivers stopped for a failure to signal violation, and thus none received a traffic citation for that offense. There were only 2 Asian / Pacific Islander drivers stopped, and none (0.0%) received a citation. A total of 3 African-American / Black drivers were stopped for a failure to signal violation, and again none (0.0%) received a traffic citation for that offense. Finally, 3 Hispanic ethnicity drivers were stopped for failure to signal, and none received a citation for this offense. All four race and ethnicity categories were cited less often than Caucasian / White drivers that were stopped for the same offense under similar conditions within Edward District. Nevertheless, the binomial test results revealed that these differences were within the margin of sampling error. Therefore, no evidence was found that officers disproportionately cited drivers of any specific

racial or ethnic group for failure to signal violations within Edward District once sampling error, seriousness of offense, and number of violations was controlled.

8.2.3 Post-Stop Citations Summary

We found no evidence within Edward District to suggest that females were more likely than male drivers to be cited once we controlled for seriousness of offense, offense type, and number of offenses. In fact, female drivers were found to be ***less*** likely than male drivers to receive a citation once stopped for speeding. For all other violation types, males and females were cited statistically equally. Regarding driver race and ethnicity, we found that African-American drivers stopped for speeding were more likely than white drivers to receive a citation, but the amount of disparity averaged out to between one and two extra African-American citations per month. For all other races and reasons for stop, no evidence was found that people of color were more likely than white drivers to receive a citation when stopped under similar circumstances.

8.3 Criminal Arrests

We examined the criminal arrests made by the Carmel Police Department to determine if evidence existed of disproportionately punitive treatment of any particular sex or racial group. From July 1, 2020, through June 30, 2021, there were 173 individuals arrested within Edward District for criminal offenses. These arrests were compared against the benchmark measure of criminal suspect descriptions mentioned earlier regarding the vehicle stops. There were 316 criminal suspect descriptions received from members of the public within Edward District during this period of evaluation.

8.3.1 Arrestee Sex

The results of the analysis by sex are displayed in Table 8.19 below. Of the 173 individuals arrested within Edward District during the period of study, 122 (70.5%) were male. Among the 316 criminal suspect descriptions received from the public within Edward District during the period of study, 230 (72.8%) were male. The arrests differed from the benchmark by only 2.3 percentage points, and the result of the binomial test was greater than .01, revealing the difference was within the margin for sampling error for males.

Table 8.19 Edward District Criminal Arrests Sex Comparison

Sex	Arrested Individuals (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	70.5% (122)	72.8% (230)	-2.3	.535	No – no disparity.
Female	29.5% (51)	27.2% (86)	+2.3	.535	No – no disparity.

The same was true for females. Exactly 51 (29.5%) of the arrested individuals were female, and 86 (27.2%) of the criminal suspects within the benchmark were female, a difference of 2.3 percentage points. This difference was also within the margin of sampling error. As a result, we found no evidence to suggest that females (or males for that matter) were disproportionately more

or less likely to be arrested when compared to a benchmark measure of the criminal offender population active within Edward District.

8.3.2 Arrestee Race and Ethnicity

The results of the arrests analysis by race and ethnicity are displayed in Table 8.20 below. Of the 173 individuals arrested within Edward District during the period of study, none (0.0%) were Alaskan Natives / American Indians. Likewise, there were no Alaskan Native / American Indian persons described within the criminal suspect descriptions from Edward District. As a result, there was no evidence that individuals of this race category were arrested at all within Edward District, much less at a disproportionate rate.

There were 4 individuals (2.3%) arrested within Edward District within the Asian / Pacific Islander category, with this racial group making up 1.9% of the criminal suspect descriptions benchmark. This differences of only 0.4 percentage points was within the margin of sampling error, thus there was no evidence to suggest that Asians / Pacific Islanders were disproportionately arrested within Edward District.

Table 8.20 Edward District Criminal Arrests Race / Ethnicity Comparison

Race or Ethnicity	Arrested Individuals (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0)	0.0% (0)	0.0	---	No – no disparity.
Asian / Pacific Islander	2.3% (4)	1.9% (6)	+0.4	.565	No – no disparity.
African-American / Black	24.3% (42)	25.0% (79)	-0.7	.453	No – no disparity.
Caucasian / White	73.4% (127)	73.1% (231)	+0.3	.503	No – no disparity.
Hispanic Ethnicity	20.8% (36)	16.8% (53)	+4.0	.098	No – no disparity.

African-American individuals constituted 25.0% of the criminal suspect descriptions obtained within Edward District, and African-Americans made up 24.3% of the individuals arrested within Edward District (42 arrests). As this was a difference of less than one percentage point, the binomial test revealed that this was within the margin for sampling error. Therefore, there was no evidence to suggest that African-Americans were disproportionately arrested within Edward District.

Caucasian / White individuals were also arrested at a rate similar to their representation within the criminal suspect benchmark. Whites made up 73.4% of the arrested individuals, and 73.1% of the suspects described in the benchmark. This difference of only 0.3 percentage points was within the

margin of sampling error. Therefore, there was no evidence to suggest that Caucasian / White individuals were disproportionately arrested within Edward District.

Finally, arrests of individuals of Hispanic ethnicity were also within the margin of error with the criminal suspect benchmark measure. Hispanic individuals made up 20.8% of the individuals arrested, and 16.8% of the criminal suspect descriptions during the same period, a difference the binomial test indicated was still within the margin of sampling error.

8.3.3 Criminal Arrests Summary

Comparisons of arrests by sex within Edward District revealed that females and males were arrested at percentages statistically equal to the percentages of the sexes within the criminal suspect description benchmark for Edward District. Likewise, all of the racial groups examined, and Hispanic ethnicity, were arrested at similar proportions as they were represented within the criminal suspect description benchmark. We found no evidence to suggest any sex, race, or ethnic group was disproportionately arrested more often within Edward District when compared to the offender population found active within Edward District.

8.4 Edward District Summary

Regarding vehicle stops (a combination of traffic offense and criminal investigative stops), our analysis generally revealed no disparity by sex in the stopping of drivers within Edward District. Utilizing the crash driver and criminal suspect benchmarks as boundaries for the true (unknown) benchmark for the combination of traffic violation and criminal investigative stops, revealed stops of female drivers were slightly higher than either benchmark would have predicted, but still within the margin of sampling error. The veil-of-darkness method revealed that female drivers were more likely to be stopped than expected during daylight hours, but examination of patterns of crash drivers revealed this was likely because females made up larger percentages of the motoring public within Edward District during daylight.

We found no evidence within Edward District to suggest that females were more likely than male drivers to be cited once we controlled for seriousness of offense, offense type, and number of offenses. In fact, female drivers were found to be ***less*** likely than male drivers to receive a citation once stopped for speeding. For all other violation types, males and females were cited statistically equally. Comparisons of arrests by sex within Edward District revealed that females and males were arrested at percentages statistically equal to the percentages of the sexes within the criminal suspect description benchmark for Edward District.

Regarding race and ethnicity, several times we found evidence to suggest that African-American drivers were stopped ***less*** often than the benchmarks would have suggested, while white drivers were stopped disproportionately more often. All but one of these disparities, however, were found to be within the margin of sampling error, or could be explained by racial differences in traffic patterns between daylight and darkness times of the day. The only instance where the disparity could not be resolved was with regard to the stopping of white drivers during daylight. White drivers were found to make up rather similar percentages of the drivers on the roadways from daylight to darkness. During daylight, however, when it is assumed to be easier to determine the driver's race prior to stop, the proportion of white drivers stopped increased by a statistically

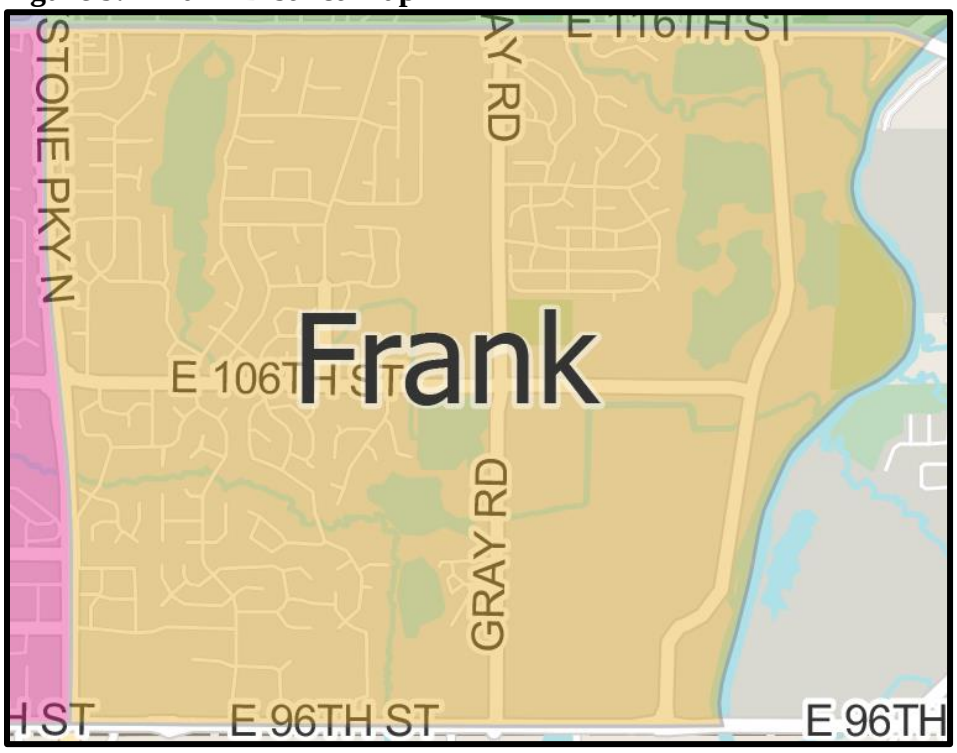
significant amount. This disparity was estimated to result in approximately 20 more white drivers stopped each month within Edward District than would have otherwise been expected. Our analyses suggested that no other race category, or Hispanic ethnicity, were disproportionately stopped more often within Edward District.

Regarding citations, we found that African-American drivers stopped for speeding were more likely than white drivers to receive a citation, even after controlling for sampling error, number of violations, and seriousness of violations. This amount of disparity was estimated to average between one and two extra African-American drivers cited per month. For all other races and reasons for stop, no evidence was found that people of color were more likely than white drivers to receive a citation when stopped under similar circumstances. Finally, examination of arrests by race and ethnicity within Edward District revealed that individuals of all races, and Hispanic ethnicity, were arrested at percentages statistically equal to the percentages of these groups found within the criminal suspect benchmark for Edward District.

9. FRANK DISTRICT

Frank District is the southeastern most district within Carmel. It is nestled between Edward District to the north, Fishers to the east, Marion County and Lawrence to the south, and David District to the west. Its northern boundary is East 116th Street from Keystone Parkway to the White River border with the city of Fishers. Its eastern boundary is the White River / Fishers border from East 116th Street down to East 96th Street (the Marion County line). Its southern boundary is East 96th Street from the White River to Keystone Parkway. Its western boundary is Keystone Parkway. Frank District is geographically small, being roughly 5 square miles in area. Frank ranked second to last (ahead of Adam District) in number of vehicle stops, yet ranked last in crashes and calls for service.

Figure 9.1 Frank District Map



Frank District is a mixture of residential, commercial, and industrial structures. The heart of the district is residential, being composed of single-family houses, condominiums, apartment complexes and retirement communities. Its western and southern boundaries are commercialized, with stores, restaurants, hotels, car dealerships, and office complexes. The southeastern section of the district contains industrial facilities, including limestone quarries, trucking companies, and the city's water treatment plant. The most common issues reported to the police within this district included traffic accidents, speeding driver complaints, drunken drivers, and theft (including shoplifting).

9.1 Vehicle Stops

Data were available regarding 2,541 vehicle stops made by the Carmel Police Department within Frank District. For benchmark comparisons, data were available for 223 drivers involved in crashes, and 203 descriptions of criminal suspects, from within Frank District for the 12-month period of study. We compared these stops against both of these benchmarks, and compared daylight stops with stops during hours of darkness. First we conducted these comparisons by sex, then we repeated the process for comparisons by race and Hispanic ethnicity.

9.1.1 Driver Sex

During the 12-month period of study, 2,540 vehicle stops (combined traffic stops and criminal investigative stops) took place within Frank District in which the driver's sex was recorded by the officer; 1,503 of these stops involved male drivers and 1,037 involved female drivers. During that same period, 223 drivers were involved in crashes within Frank District, who served as the benchmark for the driving population estimate within the district during that same time. Of these crash drivers, 135 were male and 88 were female. Finally, descriptions of a total of 203 criminal suspects were provided to the police by members of the public reporting crimes that had occurred within Frank District. Of these, 161 suspects were described as male, and 42 described as female.

As the Carmel Police Department stops contained a mixture of traffic stops and criminal investigative stops of unknown proportions, it was necessary to compare these vehicle stops against both benchmarks, under the assumption the correct (unknown) benchmark should lie somewhere between these two other benchmarks.

Table 9.1 below reveals the analysis of the stopped drivers within Frank District, by sex, using the crash driver benchmark. As the table reveals, 59.2% of the drivers stopped within Frank District were male, and 60.5% of the drivers involved in crashes within Frank District were male. These two percentage values were already relatively close (a difference of only 1.3 percentage points). Furthermore, the binomial test result of $p = .369$ confirmed that this difference was within the bounds of sampling error, after controlling for the differences in percentages, the sample sizes, and the laws of probability.

Table 9.1 Frank District Vehicle Stops by Sex (Crash Driver Benchmark)

Sex	Stopped Drivers (number)	Benchmark Crash Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	59.2% (1,503)	60.5% (135)	-1.3	.369	No – no disparity.
Female	40.8% (1,037)	39.5% (88)	+1.3	.369	No – no disparity.

Therefore, there was no statistically significant difference between the stops of male drivers and the crash driver benchmark. There was no evidence to suggest that males were more or less likely to be stopped in Frank District when compared to this benchmark designed specifically for examining stops of a traffic enforcement nature. Our focus, however, was the female drivers, and

we found the same result for this group. No evidence of disparity in female driver stops was revealed with this benchmark. While 40.8% of the stops involved female drivers, and 39.5% of crash drivers were females, the difference was within the margin of error for sampling error.

Next, we examined stops by sex using the criminal suspect description benchmark, a benchmark designed for comparison only to criminal investigative stops. Table 9.2 reveals the details of that analysis. In this analysis we found that while 59.2% of stopped drivers within Frank District were male, 79.3% of the criminal suspects reported to the police by members of the public in that district were described as male. This was a difference of 20.1 percentage points and, based on the sample size and the laws of probability, was not within the bounds of sampling error. As the binomial test *p*-value was less than .001 (i.e., less than .01), the difference between the stops and the benchmark was a true difference, not a result of sampling error. Male drivers were less likely to be stopped than one would expect when using the criminal offender benchmark designed for comparison specifically to criminal investigative stops only.

Table 9.2 Frank District Vehicle Stops by Sex (Criminal Suspect Benchmark)

Sex	Stopped Drivers (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	59.2% (1,503)	79.3% (161)	-20.1	< .001	Yes, but less likely to be stopped than expected.
Female	40.8% (1,037)	20.7% (42)	+20.1	< .001	Yes. More likely to be stopped than expected.

Conversely, female drivers were more likely to be stopped than expected when compared to the criminal suspect benchmark. Of the stopped drivers, 40.8% were female, while only 20.7% of criminal suspects within Frank District were described as female. The difference of 20.1 percentage points was statistically significant. The reader should be reminded, however, that the vast criminological research has consistently revealed that crimes (especially violent crimes) are disproportionately committed by males.[92] Consequently, a benchmark designed to measure the criminal offender population (rather than the driving population) will have higher male representation. The driving population is not nearly so skewed towards males.[93] As we suspect that a majority of these vehicle stops were traffic stops by nature, this difference in criminal offending behavior can explain this disparity.

The reader should remember that the vehicle stops being examined were a mixture of unknown proportions of traffic violation stops (appropriate for a crash driver benchmark) and criminal investigative stops (appropriate for a criminal suspect description benchmark). Each of the two benchmarks utilized was designed for only one of these types of stops. We expected that the true benchmark for these combined stops would reside somewhere between

[92] Sampson, R. J., & Laub, J. H. (1995). *Crime in the Making: Pathways and Turning Points through Life*. Cambridge, MA: Harvard University Press; Wright, J. P., Tibbetts, S. G., & Diagle, L. E. (2014). *Criminals in the Making: Criminality across the Life Course*. Los Angeles: Sage.

[93] National Highway Traffic Safety Administration (2021). *Traffic Safety Facts Annual Report, 2019*. Washington, DC: National Highway Traffic Safety Administration (https://cdan.nhtsa.gov/tsftables/tsfar.htm#).

the crash driver benchmark and the criminal suspect benchmark. Therefore, we used these two benchmarks as boundaries for the true (unknown) benchmark for a combined sample of traffic violation stops and criminal investigative stops.

Table 9.3 below illustrates that when these two benchmarks are utilized as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops, we found that the stops within Frank District did not fit neatly between these boundaries. The proportion of male drivers stopped was 1.3 percentage points below the lowest benchmark boundary – crash drivers. It should be noted, however, that Table 9.1 revealed that the percentage of male crash drivers and the percentage of male drivers stopped were within the margin of sampling error and thus were statistically similar.

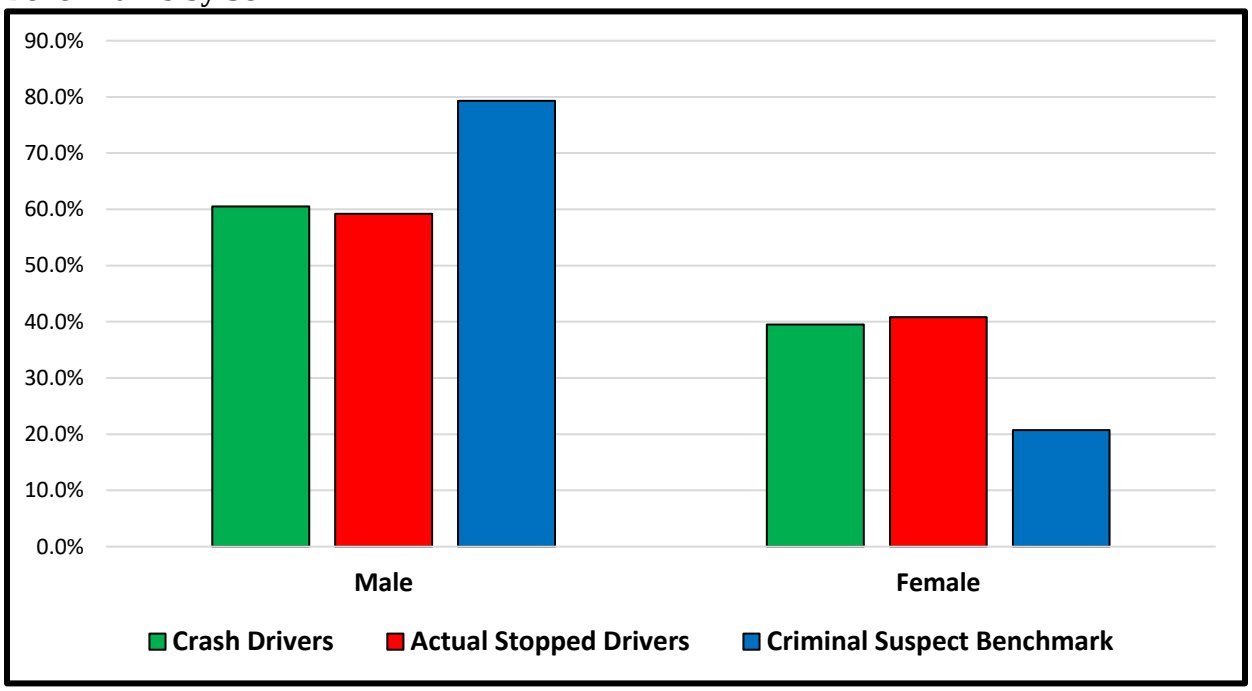
Table 9.3 Frank District Vehicle Stops by Sex using Benchmark Boundaries

Sex	Crash Drivers Benchmark	Actual Stopped Drivers	Criminal Suspect Benchmark	Within boundaries?
Male	60.5%	59.2%	79.3%	No, but within margin of sampling error.
Female	39.5%	40.8%	20.7%	No, but within margin of sampling error.

The percentage of female drivers stopped was 1.3 percentage points above the highest benchmark boundary – crash drivers. It should again be noted, however, that Table 9.1 revealed that the percentage of female crash drivers and the percentage of female drivers stopped by the police were within the margin of sampling error and thus were statistically similar. Nevertheless, they did not fit neatly within these boundaries and leaned toward female drivers being disproportionately more likely to be stopped than expected, and male drivers being disproportionately less likely to be stopped than expected.

Figure 9.1 below provides a visual illustration of the information contained within Table 9.3. This figure is a bar graph representing the percentages of stops by sex, bracketed by the percentages of the two benchmarks. As this figure reveals, the percentage of stops for each sex does not rest between the two extremes of the benchmark measures. For each sex, the percentage of drivers stopped comes close to the percentage of crash drivers benchmark (and both were within the statistical margin of error), but still rests farther above or below that benchmark than we would have expected.

Figure 9.2 Frank District Vehicle Stops Compared to Crash Driver and Criminal Suspect Benchmarks by Sex



We also utilized the veil-of-darkness benchmark method to compare stops made during daylight hours and times of darkness. During daylight it was assumed to be easier to determine the sex of the driver prior to stop. Stops made during hours of darkness, it was assumed, occur when it was harder to determine driver characteristics prior to stop and less likely for officers to discriminate based on driver characteristics. A total of 1,481 vehicle stops occurred during daylight hours, defined as between 30 minutes before official sunrise and 30 minutes after official sunset. An additional 1,059 vehicle stops occurred during the remaining hours of the day that were classified as darkness. Table 9.4 reveals the details of this veil-of-darkness analysis by sex for Frank District.

As Table 9.4 reveals, males were less likely to be stopped than expected, and females were stopped more often than expected. While 56.0% of the drivers who were stopped during the daylight hours were male, 63.6% of the drivers stopped during hours of darkness were male. Even after controlling for sampling error, the binomial test found this difference to be statistically significant. While 44.0% of the drivers who were stopped during the daylight hours were female, only 36.4% of the drivers stopped during hours of darkness were female. Even after controlling for sampling error, the binomial test found this difference to be statistically significant.

One possible counter explanation that could be offered for this disparity would be the suggestion that females are less likely than males to drive at night. To respond to the counter claim, we examined our crash driver data by daylight and darkness. In Frank District, we found that females made up 38.7% of crash drivers during daylight hours, and 42.9% of crash drivers during hours of darkness. This was a difference of 4.2 percentage points, and the binomial test revealed that this difference was within the margin for sampling error (p = .571). Therefore, we found that females

did not make up a larger percentage of drivers on the roadways during daylight, and a smaller proportion of drivers during darkness. Therefore, differences by sex in driving behavior from daylight to darkness ***did not*** explain this disproportionality.

Table 9.4 Frank District Vehicle Stops by Sex (Veil of Darkness Benchmark)

Sex	Daylight Stopped Drivers (number)	Benchmark Darkness Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	56.0% (830)	63.6% (673)	-7.6	< .001	Yes, but ***less*** likely to be stopped than expected.
Female	44.0% (651)	36.4% (386)	+7.6	< .001	Yes. More likely to be stopped than expected.

In actual human terms, however, how great was this disparity of female drivers? There were 1,471 drivers stopped during daylight. Female drivers constituted 36.4% of drivers stopped during hours of darkness, when the opportunity for bias in stops was less present. If 36.4% of the daylight stops had been female drivers, this would have amounted to 535 female drivers stopped during daylight. As it was, 651 female drivers were stopped during daylight, a difference of 116 drivers. By this estimate, during the 12-month period of study there were, on average, 10 more female drivers stopped each month within Frank District than would have been predicted by the darkness benchmark.

In summary, our analysis suggested mixed results regarding stop disparity by sex. Utilizing the crash driver benchmark and criminal suspect benchmarks as boundaries for the true (unknown) benchmark for the combination of traffic violation and criminal investigative stops revealed stops of female drivers were slightly higher than either benchmark would have predicted, but still within the margin of sampling error. Furthermore, the veil-of-darkness method revealed that female drivers were more likely to be stopped than expected during daylight hours, when it is hypothetically easier for officers to determine the driver's characteristics prior to stop. An examination of patterns of crash drivers by daylight and darkness revealed no evidence that this was the result of females being represented in greater numbers during daylight hours. This suggested that officers disproportionately stop female drivers during hours of daylight within Frank District, at an estimated rate of 10 more stops than expected every month.

9.1.2 Driver Race and Ethnicity

During the 12-month period of study, 2,516 vehicle stops took place within Frank District in which the driver's race and ethnicity were recorded by the officer. During that same period, race and ethnicity data were available for 223 drivers involved in crashes within Frank District. These crash drivers served as a driving population benchmark estimate. Descriptions of a total of 203 criminal suspects were provided to the police by members of the public reporting crimes that had occurred within Frank District, serving as a criminal offender population benchmark.

Again, as the Carmel Police Department stops contained a mixture of traffic stops and criminal investigative stops of unknown proportions, it was necessary to compare these stops

against both benchmarks, under the assumption that the correct (unknown) benchmark would lie somewhere between these two benchmark measures.

Table 9.5 below reveals the analysis of the stopped drivers within Frank District, by race and Hispanic ethnicity, using the crash driver benchmark. As this table reveals, 0.4% of the drivers stopped by the Carmel Police Department within Frank District were Alaskan Native / American Indian, and exactly 0.4% of the crash drivers were also Alaskan Native / American Indian. As these proportions were identical, there was no evidence of disparity of stops when using this benchmark designed for traffic violation stops only.

Asian / Pacific Islander drivers made up 4.1% of the stopped drivers and 4.9% of the crash drivers, a difference of less than one percentage point. Thus, no disparity was suggested. African-American drivers made up 20.2% of the stopped drivers and 16.1% of the crash drivers. This difference of 4.1 percentage points was still within the margin of sampling error according to the binomial test.

Table 9.5 Frank District Vehicle Stops by Race / Ethnicity (Crash Driver Benchmark)

Race or Ethnicity	Stopped Drivers (number)	Benchmark Crash Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.4% (9)	0.4% (1)	0.0	.591	No – no disparity.
Asian / Pacific Islander	4.1% (102)	4.9% (11)	-0.8	.309	No – no disparity.
African-American / Black	20.2% (507)	16.1% (36)	+4.1	.085	No – no disparity.
Caucasian / White	75.4% (1,898)	78.5% (175)	-3.1	.161	No – no disparity.
Hispanic Ethnicity	6.3% (159)	4.9% (11)	+1.4	.309	No – no disparity.

Caucasian / White drivers made up 75.4% of stopped drivers, and 78.5% of crash drivers. This difference of 3.1 percentages points was within the margin of sampling error. Finally, Hispanic ethnicity drivers made up 6.3% of the stopped drivers, and 4.9% of the crash drivers, a difference of only 1.4 percentage points that was within the margin of sampling error. The comparison with this benchmark that estimated the driving population within Frank District revealed no race or ethnicity was disproportionately more likely to be stopped, after controlling for sampling error.

Next, we examined stops by race and ethnicity using the criminal suspect description benchmark within Frank District. Remember that this benchmark was designed for comparison only to criminal investigative stops, but the stop data being analyzed was a combination of traffic offense stops and criminal offense-related stops. Table 9.6 reveals the details of that analysis. In this analysis, we found that within Frank District 0.0% of the criminal suspects described by members

of the public were Alaskan Native / American Indian, and 0.4% of the vehicle stops (criminal and traffic stops combined) involved an Alaskan Native / American Indian drivers. As this difference of less than a percentage point was within the margin of sampling error, the stops and the criminal benchmark were not statistically different. All of the rest of the race and ethnicity categories, however, revealed statistically significant differences from this benchmark intended for use with only criminal investigative stops.

White and Asian / Pacific Islander drivers were more likely to be stopped than expected when compared to this benchmark designed specifically for comparison to criminal investigative stops. While 4.1% of the stopped drivers were Asians / Pacific Islanders, only 1.0% of the criminal suspects were described as Asian / Pacific Islander. The binomial test indicated that this difference was beyond the margin of sampling error. While 75.4% of stopped drivers were Caucasian / White, only 63.5% of the criminal suspects were described as Caucasian / White.

Table 9.6 Frank District Vehicle Stops by Race / Ethnicity (Criminal Suspect Benchmark)

Race or Ethnicity	Stopped Drivers (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.4% (9)	0.0% (0)	+0.4	.443	No – no disparity.
Asian / Pacific Islander	4.1% (102)	1.0% (2)	+3.1	.010	Yes. More likely to be stopped than expected.
African-American / Black	20.2% (507)	35.5% (72)	-15.3	< .001	Yes, but ***less*** likely to be stopped than expected.
Caucasian / White	75.4% (1,898)	63.5% (129)	+11.9	< .001	Yes. More likely to be stopped than expected.
Hispanic Ethnicity	6.3% (159)	14.3% (29)	-8.0	< .001	Yes, but ***less*** likely to be stopped than expected.

However, when compared to this benchmark, African-American and Hispanic ethnicity drivers were stopped less often than expected. African-American / Black drivers only made up 20.2% of the vehicle stops, yet were described as 35.5% of the criminal suspects within the district. Caucasian / White drivers consisted of 75.4% of the stops, but 63.5% of the criminal suspects. Hispanic ethnicity drivers constituted only 6.3% of the stops, yet they were 14.3% of the criminal suspects described. Under this benchmark comparison, African-American and Hispanic drivers were disproportionately less likely (not more likely) to be stopped than expected, while white and Asian / Pacific Islander drivers were stopped more often than expected.

The reader should remember, however, that the vehicle stops being examined were a mixture of unknown proportions of traffic violation stops (appropriate for a crash driver benchmark) and criminal investigative stops (appropriate for a criminal suspect description benchmark). Each of the two benchmarks utilized was designed for only one of these types of stops. We

expected that the true benchmark for these combined stops would reside somewhere between the crash driver benchmark and the criminal suspect benchmark. Therefore, we used these two benchmarks as boundaries for the true (unknown) benchmark for a combined sample of traffic violation stops and criminal investigative stops.

Table 9.7 below illustrates the results when these two benchmarks are utilized as boundaries for the true benchmark for a combined sample of traffic violation and criminal investigative stops. For all race and ethnicity categories, we found the proportion of drivers stopped fit neatly between the proportion of each group revealed within the crash drivers benchmark and the criminal suspect descriptions benchmark.

The benchmark boundaries for the stops of Alaskan Native / American Indian drivers were 0.4% (crash drivers) and 0.0% (criminal suspects), with a midpoint of 0.2%. The actual stop percentage for this race group was 0.4%, within these two benchmark boundaries as it was exactly the same as the crash driver benchmark boundary. The benchmark boundaries for the stops of Asian / Pacific Islander drivers were 4.9% (crash drivers) and 1.0% (criminal suspects), with a midpoint of 3.5%. The actual stop percentage for this race group was 4.1%, within these two benchmark boundaries.

Table 9.7 Frank District Vehicle Stops by Race / Ethnicity using Benchmark Boundaries

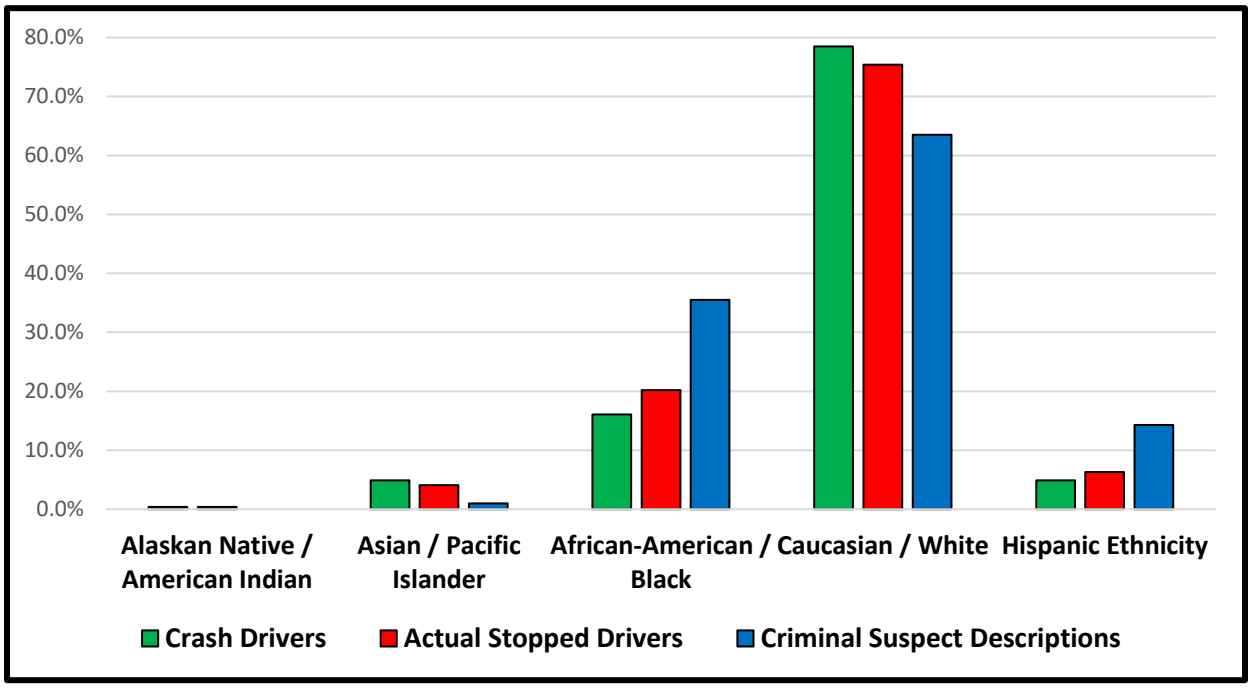
Race or Ethnicity	Crash Drivers Benchmark	Actual Stopped Drivers	Criminal Suspect Benchmark	Within boundaries?
Alaskan Native / American Indian	0.4%	0.4%	0.0%	Yes – No Disparity.
Asian / Pacific Islander	4.9%	4.1%	1.0%	Yes – No Disparity.
African-American / Black	16.1%	20.2%	35.5%	Yes – No Disparity.
Caucasian / White	78.5%	75.4%	63.5%	Yes – No Disparity.
Hispanic Ethnicity	4.9%	6.3%	14.3%	Yes – No Disparity.

The benchmark boundaries for the stops of African-American / Black drivers were 16.1% (crash drivers) and 35.5% (criminal suspects), with a midpoint of 25.8%. The actual stop percentage for African-Americans was only 20.2%, within these two boundaries and 5.6 percentage points below the midpoint. The benchmark boundaries for the stops of Caucasian / White drivers were 78.5% (crash drivers) and 63.5% (criminal suspects), with a midpoint of 71.0%. The actual stop percentage for whites was 75.4%, between these two benchmark boundaries. The benchmark boundaries for the stops of Hispanic ethnicity drivers were 4.9% (crash drivers) and 14.3% (criminal suspects), with a midpoint of 9.6%. The actual stop percentage for this race group was 6.3%, within these two benchmark boundaries and below the midpoint.

As a result, no evidence of disparity in stops was revealed within any race or ethnic group in Frank District when using these benchmarks as boundaries for the mixture of traffic offense and criminal investigative stops. Figure 9.3 below provides a visual illustration of the information contained within Table 9.7. This figure is a bar graph representing the percentages of stops by race and

ethnicity, bracketed by the percentages of the two benchmarks. This figure reveals how clearly the percentage of drivers stopped ***did*** fall neatly between these two benchmarks for each race and ethnic category. When these two different types of benchmarks are used as boundaries for the combined sample of traffic offense and criminal investigative stops, we find no disparity by race in the stops within Frank District.

Figure 9.3 Frank District Vehicle Stops Compared to Crash Driver and Criminal Suspect Benchmarks



As with the comparisons by driver sex, we also utilized the veil-of-darkness benchmark method. We examined stops made during hours of daylight, when it was assumed to be easier to determine the race of the driver prior to stop, and compared these with stops made during hours of darkness, when it was assumed to be harder to determine driver's characteristics prior to stop. A total of 1,474 vehicle stops occurred during daylight hours, and 1,042 vehicle stops occurred during the hours classified as darkness. Table 9.8 reveals the details of this veil-of-darkness analysis by race and ethnicity for Frank District.

Table 9.8 reveals that during daylight hours, when it may be easier to determine the race of the driver prior to stop, 0.3% of vehicle stops involved Alaskan Native / American Indian drivers. During hours of darkness, when it would have been harder to stop drivers in a biased manner, Alaskan Natives / American Indians made up 0.5% of the drivers stopped. This difference of less than a percentage point proved to be within the margin for sampling error, suggesting that Alaskan Native / American Indian drivers were no more or less likely to be stopped when the officer could more easily determine the driver's race before stopping. Asians / Pacific Islanders made up 3.9% of the drivers stopped during daylight, and 4.3% of the drivers stopped after dark. Again, this small difference was within the margin for sampling error, suggesting no evidence of disparity. Hispanic

drivers also revealed no signs of disparity. They made up 6.0% of drivers stopped during daylight, and 7.0% of drivers stopped during darkness, a difference of only 1.0 percentage points that was not statistically significant.

However, the veil-of-darkness method suggested that African-American / Black drivers were disproportionately ***less*** likely to be stopped than expected, and Caucasian / White drivers were disproportionately more likely to be stopped than expected. During hours of darkness, when it was assumed to be harder to stop drivers based on their characteristics, African-Americans made up 22.5% of vehicle stops. But during daylight, when it is hypothetically easier to determine the drivers' races before stopping, stops of African-Americans declined to only 18.5% of stopped drivers, a difference not explained away by sampling error.

Table 9.8 Frank District Vehicle Stops by Race / Ethnicity Comparison (Veil-of-Darkness Benchmark)

Race or Ethnicity	Daylight Stopped Drivers (number)	Benchmark Darkness Drivers (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.3% (4)	0.5% (5)	-0.2	.206	No – no disparity.
Asian / Pacific Islander	3.9% (57)	4.3% (45)	-0.4	.263	No – no disparity.
African-American / Black	18.5% (273)	22.5% (234)	-4.0	.001	Yes, but ***less*** likely to be stopped than expected.
Caucasian / White	77.3% (1,140)	72.7% (758)	+4.6	< .001	Yes. More likely to be stopped than expected.
Hispanic Ethnicity	6.0% (89)	7.0% (70)	-1.0	.220	No – no disparity.

Conversely, during hours of darkness, when it was assumed to be harder to stop drivers based on their characteristics, white drivers made up 72.7% of vehicle stops. But during daylight, when it is hypothetically easier to determine the drivers' races before stopping, stops of white drivers increased to 77.3% of stopped drivers, a difference not explained away by sampling error. White drivers appear to have been disproportionately more likely to be stopped (as compared to other races) during hours of daylight when the officers could more easily determine the driver's race before stopping. However, African-American / Black drivers were actually less likely to be stopped in comparison to other races during hours of daylight when it was easier to determine driver race prior to the stop. This suggested that officers might have elected to stop white drivers more often and elected to stop African-American drivers less often.

A counter argument could be offered that African-Americans were simply less likely to be driving during hours of daylight, and more likely to be driving during hours of darkness, thus suggesting that they are overrepresented among stops made at night. The same logic would suggest that

Caucasian / White drivers were less likely to be driving during hours of darkness, and more likely to be driving during hours of daylight, thus causing them to be overrepresented in stops during hours of daylight. To explore these counter-claims, we examined our crash driver data by daylight and darkness.

When examining all of the crash drivers within Frank District, we found that during daylight hours 16.0% of the crash drivers were African-American / Black, but during hours of darkness 16.7% of crash drivers were African-American / Black. This very small difference of less than a percentage point was within the margin for sampling error (binomial test result $p = .451$), meaning that the proportion of African-American drivers on the roadway within Frank District did not differ from daylight to darkness. The evidence suggested that officers were less likely to stop African-American drivers during daylight, when it was hypothetically possible to determine the race of the driver prior to stop. When that opportunity for bias decreased with darkness, officers stopped African-American drivers at higher percentages. The evidence suggested a tendency to stop African-American drivers **less often** than expected during daylight when it was easier to determine the race of the driver prior to stop.

As for white drivers, we found that Caucasian / White drivers made up 78.5% of crash drivers during daylight, and 78.6% of crash drivers during darkness – almost identical percentages. The binomial test of this difference produced an output of $p = .510$, meaning this difference was within the margin for sampling error. In other words, white drivers were disproportionately more likely to be stopped within Frank District during daylight hours, and this difference could not be explained by a difference from night to day in the driving patterns of white drivers. The evidence suggested a tendency to stop white drivers **more often** than expected during daylight when it was easier to determine the race of the driver prior to stop.

In actual human terms, however, how great was this disparity of white drivers? There were 1,474 drivers stopped during daylight. White drivers constituted 72.7% of drivers stopped during hours of darkness, when the opportunity for bias in stops was less present. If 72.7% of the daylight stops had been white drivers, this would have amounted to 1,072 white drivers stopped during daylight. As it was, 1,140 white drivers were stopped during daylight, a difference of 68 drivers. By this estimate, during the 12-month period of study there were, on average, 6 more white drivers stopped each month within Frank District than would have been predicted by the darkness benchmark.

9.1.3 Vehicle Stops Summary

Our analysis suggested mixed results regarding stop disparity by sex. Utilizing the crash driver benchmark and criminal suspect benchmarks as boundaries for the true (unknown) benchmark for the combination of traffic violation and criminal investigative stops revealed stops of female drivers were slightly higher than either benchmark would have predicted, but still within the margin of sampling error. Furthermore, the veil-of-darkness method revealed that female drivers were more likely to be stopped than expected during daylight hours, when it is hypothetically easier for officers to determine the driver's characteristics prior to stop. An examination of patterns of crash drivers by daylight and darkness revealed no evidence that this was the result of females being represented in greater numbers during daylight hours. This suggested that officers disproportionately stopped female drivers during hours of daylight within Frank District, at an estimated rate of 10 more stops than expected every month.

Regarding race and ethnicity, our analysis suggested no evidence that persons of color were disproportionately more likely to be stopped within Frank District. Utilizing the crash driver benchmark and criminal suspect benchmarks as boundaries for the true (unknown) benchmark for the combination of traffic violation and criminal investigative stops, we found all race and ethnicity categories fit neatly between these two boundaries. When the veil-of-darkness method was employed, we found that African-American drivers were ***less*** likely to be stopped than expected, and white drivers more likely to be stopped than expected, during hours of daylight. When it was potentially easier to see the driver's characteristics prior to stop, officers appeared more likely to select white drivers for stop and avoid stops of African-American drivers. At night, when it was harder to determine the race of the drivers prior to stop, this disparity went away. It was estimated that this disparity resulted in an average of 6 more stops of white drivers each month than had been expected.

9.2 Post-Stop Citations

We examined equity in the treatment of drivers (in terms of citations) after they had already been stopped. As described in earlier sections of this report, we considered stops with similar offense seriousness and number of offenses committed. Once these one-violation stops were isolated, stops for the same reason were then compared with one another. Of the 2,541 individual vehicle stops that occurred within Frank District, 2,282 (89.8%) involved only one traffic violation. As before, we only examined post-stop citations for the five most common reasons for stop across the city: 1.) Speeding; 2.) Expired license plate; 3.) Improper headlights; 4.) None or improper taillights; and 5.) Failure to signal lane change or intent to turn. These five reasons for stop totaled 1,993 of the one-violation stops within Frank District, making up 78.4% of all stops within Frank District, and 87.3% of the one-violation stops within the district.

As the benchmark for each of these categories of stops, we used the outcomes for male drivers as the benchmark for stops of female drivers. The percentage of females cited for that violation was compared to the males to see if females were treated more punitively than males. For the examination by race and Hispanic ethnicity, we used the outcome for white drivers as the benchmark for comparison to all other racial categories and Hispanic ethnicity. The assumption for this comparison was that if officers were not biased, males and females would receive citations at a similar rate for similar offenses, and persons of color would receive citations at a similar rate as whites for similar offenses.

9.2.1 Driver Sex

Speeding offenses were examined first. Speeding was by far the most common reason for stop within Frank District with 1,542 one-violation vehicle stops for speeding that contained data on the driver's sex. Of these stops, 57.9% (893) involved a male driver. Of these 893 speeding stops of male drivers, 205 (23.0%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure in Frank District for stops of female drivers for speeding. Table 9.9 displays the details of that analysis.

In Frank District, there were 649 female one-violation stops for speeding, 111 (17.1%) of which received a traffic citation. Compared to the 23.0% percentage of males cited, female drivers were

cited 9.9 percentage points ***less*** often than males. The binomial test indicated that this difference could not be explained away by sampling error. Females were cited for speeding within Frank District ***less*** often than were male drivers during this period of analysis. Female drivers appeared to have been treated more leniently than male drivers with regard to speeding citations.

Table 9.9 Frank District Speeding Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	17.1% (649 / 111)	23.0% (893 / 205)	-5.9	< .001	Yes, but were ***less*** likely to be cited than males.

Next, we examined stops for having an expired license plate. There were 167 one-violation vehicle stops within Frank District for having an expired license plate. Of these stops, 50.3% (84) involved a male driver. Of these 84 expired license plate stops of male drivers, 20 stops (23.8%) resulted in the issuance of a traffic citation, while the remaining 64 resulted in the issuance of only a warning. This percentage served as the benchmark measure in Frank District for stops of female drivers for having an expired license plate. Table 9.10 below displays the details of that analysis.

Table 9.10 Frank District Expired Plates Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	13.3% (83 / 11)	23.8% (84 / 20)	-10.5	.010	Yes, but ***less*** likely to be cited than males.

Of Frank District's one-violation vehicle stops, there were 83 female drivers stopped for having an expired license plate, 11 (13.3%) of which received a traffic citation for that offense. This differed from the percentage of male drivers cited by 10.5 percentage points, and the binomial test confirmed that this difference was beyond the margin of sampling error. Females were cited for their expired license plates within Frank District ***less*** often than were male drivers during this period of analysis. Female drivers appeared to have been treated more leniently than male drivers with regard to expired license plate citations.

Improper headlight stops were next, the analysis of which is displayed in Table 9.11. Among the one-offense stops, there were 132 vehicle stops within Frank District for improper headlights. Of these stops, 60.6% (80) involved a male driver. Of these 80 improper headlight stops of male drivers, none (0.0%) resulted in the issuance of a traffic citation, as all resulted in the issuance of only a warning. This percentage served as the benchmark measure in Frank District for stops of female drivers for having an improper headlight.

There were 52 one-violation stops of female drivers within Frank District for having an improper headlight, none of which (0.0%) received a traffic citation. This was exactly the same percentage as the male drivers who received a citation for this offense within Frank District. This outcome revealed that males and females were cited equally when stopped for operating with an improper headlight. There was no evidence of disparity in the treatment of female drivers in this regard within Frank District for this offense.

Table 9.11 Frank District Improper Headlights Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (52 / 0)	0.0% (80 / 0)	0.0	.949	No – no disparity.

The fourth offense we examined was stops for having improper taillights. There were 108 single-violation vehicle stops within Frank District for improper taillights. Of these stops, 59.3% (64) involved a male driver. Of these 64 improper taillight stops of male drivers, none (0.0%) resulted in the issuance of a traffic citation. This percentage served as the benchmark measure within Frank District for stops of female drivers for having an improper taillight. Table 9.12 displays the details of that analysis.

Table 9.12 Frank District Improper Taillights Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	0.0% (44 / 0)	0.0% (64 / 0)	0.0	.957	No – no disparity.

Among Frank District's one-violation stops there were 44 female drivers stopped for having an improper taillight, none of which (0.0%) received a traffic citation for that offense. This was the same citation rate for male drivers for this offense within Frank District. This outcome revealed that males and females were cited equally when stopped for operating with an improper taillight. There was no evidence of disparity in the treatment of female drivers in this regard within Frank District for this offense.

The final offense we examined was stops for failure to signal, of which there were 44 such one-violation stops within Frank District. Of these stops, 77.3% (34) involved a male driver. Of these 34 failure to signal stops of male drivers, 3 stops (8.8%) resulted in the issuance of a traffic citation, and the rest resulted in the issuance of only a warning. This percentage served as the benchmark measure in Frank District for stops of female drivers for failing to signal properly. Table 9.13 displays the details of this analysis. Among the single-violation stops within Frank District, there were 10 female drivers stopped for failing to signal, only 1 of which (10.0%) received a traffic

citation for that offense. This difference of 1.5 percentage points was within the margin for sampling error. The binomial test result was .602, greater than .01, so these two percentages were statistically similar. This outcome revealed that males and females were basically cited equally when stopped for failing to signal within Frank District.

Table 9.13 Frank District Failure to Signal Stops Citations

Sex	% Drivers Cited (Stops / Cited)	Benchmark % Male Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Female	10.0% (10 / 1)	8.8% (34 / 3)	+1.2	.602	No.

After controlling for number of violations committed, seriousness of offense, and sampling error, we found that female drivers were less likely than males to receive a citation for speeding, or for an expired license plate. Regarding headlight, taillight, and failure to signal violations, males and females were cited equally when stopped under similar conditions.

9.2.2 Driver Race and Ethnicity

Next we examined citation rates within Frank District based on driver race or Hispanic ethnicity. As with the sex analysis, we began with speeding offenses. Within Frank District, there were 1,527 one-violation vehicle stops for speeding that contained data on the driver's race and Hispanic ethnicity. Of these one-offense speeding stops, 77.1% (1,177) involved a Caucasian / White driver. Of these 1,177 speeding stops of Caucasian / White drivers, 225 (19.1%) resulted in the issuance of a traffic citation. This percentage for white drivers served as the benchmark measure within Frank District for the one-violation speeding stops of drivers for other races and Hispanic ethnicity. Table 9.14 displays the details of that analysis.

Table 9.14 Frank District Speeding Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	33.3% (6 / 2)	19.1% (1,177 / 225)	+14.2	.088	No – no disparity.
Asian / Pacific Islander	25.5% (55 / 14)	19.1% (1,177 / 225)	+6.4	.152	No – no disparity.
African-American / Black	24.2% (289 / 70)	19.1% (1,177 / 225)	+5.1	.018	No – no disparity.
Hispanic Ethnicity	28.4% (74 / 21)	19.1% (1,177 / 225)	+9.3	.034	No – no disparity.

Among Frank District's one-violation stops, there were only 6 Alaskan Native / American Indian drivers stopped for speeding, 2 of whom (33.3%) received a traffic citation for that offense. Although this citation rate was 14.2 percentage points higher than the citation rate for Caucasian /

White drivers, the binomial test revealed this was still within the margin for sampling error. The reader should note that with only 6 drivers stopped, each stop makes up 16.7% of the sample of Alaskan Native / American Indian drivers. One single extra citation in the sample due to sampling error alone inflated the citation rate by 16.7 percentage points. This explains why the binomial test still considered this width of a separation in percentages to be within the margin of sampling error.

There were 55 Asian / Pacific Islander drivers stopped for speeding, 14 of whom (25.5%) received a traffic citation. This citation rate differed from the percentage of Caucasian / White drivers cited for speeding by 6.4 percentage points, which the binomial test indicated was within the margin for sampling error. A total of 289 African-American / Black drivers were stopped for speeding, 70 (24.2%) of whom received a citation. This differed from the citation rate for Caucasian / White drivers by 5.1 percentage points, and the binomial test indicated that this was within the margin of sampling error. There were 74 one-violation stops of Hispanic ethnicity drivers for speeding, 21 of whom (28.4%) received a traffic citation for that offense. The binomial test indicated that the percentage of Hispanic ethnicity drivers cited for speeding, and the percentage of Caucasian / White drivers cited for speeding, were still within the margin for sampling error.

Next, we examined stops for having an expired license plate. There were 163 one-violation vehicle stops within Frank District for having an expired license plate. Of these stops, 77.9% (127) involved a Caucasian / White driver. Of these 127 expired license plate stops of Caucasian / White drivers, 25 stops (19.7%) resulted in the issuance of a traffic citation. This white driver citation percentage served as the benchmark measure within Frank District for the expired license plate stops of drivers of other races and Hispanic ethnicity. Table 9.15 displays the details of that analysis.

Table 9.15 Frank District Expired Plates Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	19.7% (127 / 25)	-19.7	---	No – no disparity. None were even stopped.
Asian / Pacific Islander	20.0% (5 / 1)	19.7% (127 / 25)	+0.3	.666	No – no disparity.
African-American / Black	12.9% (31 / 4)	19.7% (127 / 25)	-6.8	.241	No – no disparity.
Hispanic Ethnicity	25.0% (8 / 2)	19.7% (127 / 25)	+5.3	.488	No – no disparity.

In Frank District's one-violation stops, there were no Alaskan Native / American Indian drivers stopped for having an expired license plate, and none received a traffic citation for that offense. As none were even stopped, there was no evidence of disparate treatment of this group. There were 5 Asian / Pacific Islander drivers stopped for having an expired license plate, 1 of whom (20.0%) received a traffic citation. This citation rate differed from the percentage of Caucasian / White drivers cited for speeding by less than a percentage point, which the binomial test indicated was within the margin for sampling error. There were 31 African-American / Black drivers stopped for

having an expired license plate, 4 of whom (12.9%) received a traffic citation. This citation rate was 6.8 percentage points ***lower*** than the percentage of Caucasian / White drivers cited for this offense. There were 8 Hispanic ethnicity drivers stopped for having an expired license plate, 2 of whom (25.0%) received a traffic citation. This citation rate was 5.3 percentage points different than the percentage of Caucasian / White drivers cited for this offense, which the binomial test indicated was within the margin for sampling error. Therefore, we found no evidence to suggest that any racial or ethnic group was cited more often than whites for expired license plates within Frank District.

Third, we examined stops for having improper headlights. There were 130 one-violation vehicle stops within Frank District for an improper headlights violation. Of these stops, 75.4% (98) involved a Caucasian / White driver. Of these 98 improper headlight stops of Caucasian / White drivers, none (0.0%) resulted in the issuance of a traffic citation. This percentage of white drivers cited served as the benchmark measure within Frank District for stops involving an improper headlight, for examining the citation rates for other races and Hispanic ethnicity. Table 9.16 displays the details of that analysis.

Table 9.16 Frank District Improper Headlights Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	0.0% (98 / 0)	0.0	---	No – no disparity. None were stopped.
Asian / Pacific Islander	0.0% (9 / 0)	0.0% (98 / 0)	0.0	.991	No – no disparity.
African-American / Black	0.0% (23 / 0)	0.0% (98 / 0)	0.0	.997	No – no disparity.
Hispanic Ethnicity	0.0% (9 / 0)	0.0% (98 / 0)	0.0	.991	No – no disparity.

Among the one-violation stops, Frank District saw no Alaskan Native / American Indian drivers, 9 Asian / Pacific Islander drivers, 23 African-American drivers, and 9 Hispanic ethnicity drivers stopped for having an improper headlight. Just as was the case with the Caucasian / White drivers, none of the drivers within these other categories received a citation during these stops. Therefore, we found no evidence to suggest that any racial or ethnic group was cited at a higher rate than white drivers for having an improper headlight within Frank District.

Fourth, we examined stops for improper taillights. Among the single-violation stops within Frank District, there were 107 vehicle stops for improper taillights. Of these stops, 73.8% (79) involved a Caucasian / White driver. Of these 79 improper taillight stops of Caucasian / White drivers, none (0.0%) resulted in the issuance of a traffic citation. This white driver citation percentage (0.0%) served as the benchmark measure in Frank District for single-offense stops involving an improper taillight when examining the citation rates for other races and Hispanic ethnicity. Table 9.17 displays the details of that analysis.

Table 9.17 Frank District Improper Taillights Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	0.0% (79 / 0)	0.0	---	No – no disparity. None were stopped.
Asian / Pacific Islander	0.0% (7 / 0)	0.0% (79 / 0)	0.0	.993	No – no disparity.
African-American / Black	0.0% (21 / 0)	0.0% (79 / 0)	0.0	.979	No – no disparity.
Hispanic Ethnicity	0.0% (7 / 0)	0.0% (79 / 0)	0.0	.993	No – no disparity.

Among the one-violation stops, Frank District saw no Alaskan Native / American Indian drivers, 7 Asian / Pacific Islander drivers, 21 African-American drivers, and 7 Hispanic ethnicity drivers stopped for having an improper taillight. Just as was the case with the Caucasian / White drivers, none of the drivers within these other categories received a citation during these stops. Therefore, we found no evidence to suggest that any racial or ethnic group was cited at a higher rate than white drivers for having an improper taillight within Frank District.

The final offense we examined was stops for failure to signal. There were 43 one-violation vehicle stops within Frank District for failing to signal that contained race and ethnicity data. Of these stops, 32 (74.4%) involved a Caucasian / White driver. Of these 32 failure to signal stops of Caucasian / White drivers, 2 (9.4%) resulted in the issuance of a traffic citation. This white driver percentage served as the benchmark measure within Frank District for stops involving drivers of other races and Hispanic ethnicity. Table 9.18 displays the details of that analysis.

Of the one-violation stops within Frank District, there were no stops of Alaskan Native / American Indian drivers for a failure to signal violation, and thus none received a traffic citation for that offense. There were only 2 Asian / Pacific Islander drivers stopped for this violation, and none (0.0%) received a citation. There were also 3 Hispanic ethnicity drivers stopped for a failure to signal violation, and none received a citation. These three groups were cited at a rate ***lower*** than that of white drivers, but their binomial tests revealed these differences were within the margin for sampling error.

A total of 9 African-American / Black drivers were stopped for a failure to signal violation, and only 1 (11.1%) received a traffic citation for that offense. This differed from the white driver citation rate by only 1.7 percentage points, which the binomial test revealed was within the margin for sampling error. Therefore, no evidence was found that officers disproportionately cited persons of color more often than white drivers for failure to signal violations within Frank District, once seriousness of offense, number of violations, and sampling error were controlled.

Table 9.18 Frank District Failure to Signal Stops Citations

Race or Ethnicity	% Drivers Cited (Stops / Cited)	Benchmark % White Drivers Cited (Stops / Cited)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0 / 0)	9.4% (32 / 2)	-9.4	---	No – no disparity. None were stopped.
Asian / Pacific Islander	0.0% (2 / 0)	9.4% (32 / 2)	-9.4	.821	No – no disparity.
African-American / Black	11.1% (9 / 1)	9.4% (32 / 2)	+1.7	.589	No – no disparity.
Hispanic Ethnicity	0.0% (3 / 0)	9.4% (32 / 2)	-9.4	.744	No – no disparity.

Regarding citation decisions and driver race or ethnicity, we found consistent results within Frank District. We found no evidence to suggest that members of any racial or ethnic group were more likely than white drivers to receive a citation when stopped for similar offenses under similar circumstances. We found no evidence of disproportionately harsh treatment toward any racial or ethnic group in the citations issued within Frank District.

9.2.3 Post-Stop Citations Summary

We found no evidence to suggest that female drivers were more likely to receive citations within Frank District. When stops of similar type and seriousness were compared, there was no evidence that female drivers disproportionately received traffic citations more often than males, and in stops for speeding or expired license plates, female drivers were found to be significantly less likely to receive a citation. Regarding treatment by race or ethnicity, we found no evidence to suggest that African-American drivers, or other persons of color, were more likely than white drivers to receive a citation when stopped within Frank District.

9.3 Criminal Arrests

We examined the criminal arrests made by the Carmel Police Department to determine if evidence existed of disproportionately punitive treatment of any particular sex or racial group. From July 1, 2020, through June 30, 2021, there were 138 individuals arrested within Frank District for criminal offenses. These arrests were compared against the benchmark measure of criminal suspect descriptions mentioned earlier regarding the vehicle stops. There were 203 criminal suspect descriptions received from members of the public within Frank District during this period of evaluation.

9.3.1 Arrestee Sex

The results of the analysis by sex are displayed in Table 9.19 below. Of the 138 individuals arrested within Frank District during the period of study, 111 (80.4%) were male. Among the 203 criminal suspect descriptions received from the public within Frank District during the period of study, 161 (79.3%) were male. The arrests differed from the benchmark by only 1.1 percentage points, and the result of the binomial test was greater than .01, revealing the difference was within the margin for sampling error for males. The same was true for females. Exactly 27 (19.6%) of the arrested

individuals were female, and 42 (20.7%) of the criminal suspects within the benchmark were female, a difference of 1.1 percentage points. This difference was also within the margin of sampling error. As a result, we found no evidence to suggest that females (or males for that matter) were disproportionately more or less likely to be arrested when compared to a benchmark measure of the criminal offender population active within Frank District.

Table 9.19 Frank District Criminal Arrests Sex Comparison

Sex	Arrested Individuals (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Male	80.4% (111)	79.3% (161)	+1.1	.419	No – no disparity.
Female	19.6% (27)	20.7% (42)	-1.1	.419	No – no disparity.

9.3.2 Arrestee Race and Ethnicity

The results of the arrests analysis by race and ethnicity are displayed in Table 9.20 below. Of the 138 individuals arrested within Frank District during the period of study, none (0.0%) were Alaskan Natives / American Indians. Likewise, there were no Alaskan Native / American Indian persons described within the criminal suspect descriptions from Frank District. As a result, there was no evidence that individuals of this race category were arrested at all within Frank District, much less at a disproportionate rate.

There were 2 Asian / Pacific Islander individuals arrested within Frank District, making up 1.4% of the arrests. This racial group also made up 1.0% of the criminal suspect descriptions benchmark, a difference of less than a percentage point. This difference was easily within the margin of sampling error, thus there was no evidence to suggest that Asians / Pacific Islanders were disproportionately arrested within Frank District when compared to the offender population active within Frank District.

African-American individuals constituted 35.5% of the people arrested within Frank District (49 individuals arrested). African-Americans also made up exactly 35.5% of the criminal suspect descriptions reported to the police within Frank District during the period of study. These percentages were identical, even without the binomial test that revealed that this was within the margin for sampling error. Therefore, there was no evidence to suggest that African-Americans were disproportionately arrested within Frank District, when compared to the criminal offending population within Frank District.

As was the case with African-Americans, Caucasian / White individuals were also arrested at a rate almost identical to their representation within the criminal suspect benchmark. Whites made up 63.0% of the arrested individuals, and 63.5% of the suspects described in the benchmark. This difference of half a percentage point was within the margin of sampling error, so no disparity in the arrests of white individuals was revealed. Finally, 25 Hispanic ethnicity individuals were arrested, making up 17.4% of the arrests. Hispanic individuals also made up 14.3% of the criminal suspect descriptions during the same period, a difference of only 3.1 percentage points. Again, this

small difference was within the margin of sampling error, revealing Hispanic individuals were not disproportionately arrested within Frank District.

Table 9.20 Frank District Criminal Arrests Race / Ethnicity Comparison

Race or Ethnicity	Arrested Individuals (number)	Benchmark Criminal Suspects (number)	Difference of Percentage Points	Binomial test *p* value	Is the difference statistically significant?
Alaskan Native / American Indian	0.0% (0)	0.0% (0)	0.0	.871	No – no disparity.
Asian / Pacific Islander	1.4% (2)	1.0% (2)	+0.4	.402	No – no disparity.
African-American / Black	35.5% (49)	35.5% (72)	0.0	.531	No – no disparity.
Caucasian / White	63.0% (87)	63.5% (129)	-0.5	.485	No – no disparity.
Hispanic Ethnicity	17.4% (24)	14.3 (29)	+3.1	.237	No – no disparity.

9.3.3 Criminal Arrests Summary

Comparisons of arrests by sex within Frank District revealed that females and males were arrested at percentages fairly equal to the percentages of the sexes within the criminal suspect description benchmark for Frank District. Likewise, all of the racial groups examined, and Hispanic ethnicity, were arrested at similar proportions as they were represented within the criminal suspect description benchmark. We found no evidence to suggest any sex, race, or ethnic group was disproportionately arrested more often within Frank District when compared to the offender population active within Frank District.

9.4 Frank District Summary

Our analysis of vehicle stops by sex revealed mixed results. Utilizing the crash driver benchmark and criminal suspect benchmark as boundaries for the true (unknown) benchmark for the combination of traffic violation and criminal investigative stops, revealed stops of female drivers were slightly higher than either benchmark would have predicted. Nevertheless, the percentage of stops was still within the margin of sampling error for similarity to the crash driver benchmark. The veil-of-darkness method revealed that female drivers were more likely to be stopped than expected during daylight hours, when it was hypothetically easier for officers to determine the driver's characteristics prior to stop. An examination of patterns of crash drivers by daylight and darkness revealed no evidence that this was the result of females being represented in greater numbers during daylight hours, for that was not true. This suggested that officers disproportionately stopped female drivers during hours of daylight within Frank District, at an estimated rate of 10 more stops than expected every month.

When examining the decision to issue a citation, we found no evidence to suggest that female drivers were more likely to receive citations within Frank District. When stops of similar type and seriousness were compared, there was no evidence that female drivers disproportionately received traffic citations more often than males. In fact, in stops for speeding or expired license plates, female drivers were found to be significantly ***less*** likely to receive a citation. Likewise, comparisons of arrests by sex within Frank District revealed that females and males were arrested at percentages statistically equal to the percentages of the sexes within the criminal suspect description benchmark for Frank District.

Regarding race and ethnicity, our analysis of vehicle stops suggested no evidence that persons of color were disproportionately more likely to be stopped within Frank District. Utilizing the crash driver benchmark and criminal suspect benchmarks as boundaries for the true (unknown) benchmark for the combination of traffic violation and criminal investigative stops, we found all race and ethnicity categories fit neatly between these two boundaries. When the veil-of-darkness method was employed, we found that African-American drivers were ***less*** likely to be stopped than expected, and white drivers ***more*** likely to be stopped than expected, during hours of daylight. When it was potentially easier to see the driver's characteristics prior to stop (daylight), officers appeared more likely to select white drivers for stop and avoid stops of African-American drivers. At night, when it was harder to determine the race of the drivers prior to stop, this disparity went away. It was estimated that this disparity resulted in an average of 6 more stops of white drivers each month than had been expected.

Regarding citation decisions by race or ethnicity, we found no evidence to suggest that African-American drivers, or other persons of color, were more likely than white drivers to receive a citation when stopped within Frank District. Likewise, all of the racial groups examined, and Hispanic ethnicity, were arrested at similar proportions as they were represented within the criminal suspect description benchmark. We found no evidence to suggest any race or ethnic group was disproportionately cited or arrested more often within Frank District.

10. SUMMARY AND CONCLUSIONS

This report has covered a large amount of detailed, statistically complex information. This final chapter summarizes the findings as concisely as possible and identify the general patterns that emerged from the analyses. However, it is crucial that the reader read the earlier sections of the report before reading this section in order to understand the methodology employed and the scientific support for the uses of these methods. Below, we will first examine the overall findings by each demographic group, beginning with males and females, and then examining each racial and ethnic group category. We will then conclude with what these findings mean.

10.1 Review of the Methods

The greatest limitation to our study was the fact that within our vehicle stop data we could not easily differentiate between vehicle stops that occurred for the purposes of traffic enforcement only, and vehicle stops that occurred with a criminal investigative purpose based on reasonable suspicion or probable cause (as defined by the U.S. Supreme Court). These two different types of stop motives aligned with two different populations legitimately at risk for stops. As the vast majority of the public commits minor traffic violations throughout the course of our weekly lives, the general driving population within the area being studied represents the population at risk for a traffic violation stop, if no officer bias exists. As we demonstrated, the crash driver benchmark sufficed in estimating that general driving population.

However, decades of criminological research has revealed that the segment of the population that engages in crime is very small and differs from the general population on several demographic measures, including sex. Therefore, the population that should legitimately be at risk for criminal investigative stops should be the criminal population active within the area being studied. The criminal suspect description benchmark, derived from members of the public who witnessed real crimes, served as the estimate of the criminal population active within the area.

Each type of stop (traffic versus criminal investigative) should have been compared to its own respective benchmark. As this was not possible, we assumed that the mixture of these two types of stops would correspond to a mixture of these two types of benchmarks. Therefore, we compared how the percentage of police stops of each demographic group compared to the representation of that group within each of the two benchmarks. Basically, we assumed that the percentage of actual stops would land somewhere between these two benchmarks, or be at least equal to one of these two benchmarks.

Because this method for examining vehicle stops was less than perfect, we also utilized the veil-of-darkness measure to compare stops between daylight and darkness. This method assumed that during daylight it would be easier for officers to determine the characteristics of the driver prior to stop, thus creating the opportunity for biased officers to act on their bias. This method also assumed that during darkness it would be harder for officers to determine the characteristics of the driver prior to stop, thus reducing the opportunity for biased officers to act on their bias. When disparity appeared between the daylight and darkness stops, however, we used our crash driver benchmark data to double-check the result. In these cases we examined if the disparity was simply due to the

fact that this particular demographic group made up a larger or smaller proportion of individuals on the roadway during hours of daylight and darkness.

The examining of post-stop outcomes in terms of who received a citation after being stopped was far more straightforward. We needed to compare drivers stopped under similar circumstances by controlling for the number of traffic offenses observed and the seriousness of the offense. To do this, we only examined the five most commonly encountered reasons for stop (which made up more than three-quarters of all vehicle stops), and only examined stops that involved one traffic violation (again, which made up more than three-quarters of all vehicle stops). We could then compare drivers stopped for the same offense and under similar circumstances (i.e., only one traffic violation observed).

This method still could not control for differences between stops in such things as each driver's prior driving record, demeanor toward the officer, or other aspects of seriousness (such as speeding with pedestrian children present versus speeding on a major highway). Nevertheless, the method we used did control for most of the differences between vehicle stops that would have significantly influenced whether or not a citation was issued, such as a one-violation stop versus a multiple-violation stop, or a serious moving violation stop versus a minor non-moving violation stop.

Likewise, our analyses of criminal arrests were also straightforward. Just as with the criminal investigative vehicle stops, the population legitimately at risk of arrest for a criminal offense should be the population of criminal offenders actively engaging in crimes within the areas. The demographic characteristics of the individuals arrested and charged with crimes, therefore, should match the demographic characteristics of that offender population.

In conducting all of these analyses, we controlled for aggregation bias by examining the proactive police activities by each individual district. The veil-of-darkness method also provided further disaggregation by time of day. We determined that the proportional representation of each of the six districts differed across the stop data, arrest data, crash driver data, and suspect description data. If a greater proportion of benchmark data came from one district, and a greater proportion of the stop data came from another district, any differences between those two districts would cause aggregation bias if the data were examined citywide. This was, in fact, the case within Carmel. We also controlled for sampling error through the use of the binomial statistical test. As was demonstrated several times, when we found percentages were calculated from samples of only a few stops, the true estimate in the population was not mathematically possible to achieve. Any analysis that did not control for sampling error would be fundamentally flawed.

10.2 Treatment of Females

Once one steps back and looks at the summary of outcomes for females, a clearer picture starts to develop. Table 10.1 below reveals the outcomes by district and method for the stops of female drivers. Regarding vehicle stops, we found that when we used the crash driver benchmark and the criminal suspect benchmark as boundaries, the proportion of drivers stopped who were female either fell neatly between these two boundaries (Adam, Baker, and Charles), or were statistically similar to the crash driver benchmark boundary after controlling for sampling error (David, Edward, and Frank). In other words, this method suggested no evidence that female drivers were disproportionately more likely to be stopped than expected.

However, the veil-of-darkness method consistently revealed that female drivers were stopped more often than expected during daylight when using stops during darkness as the benchmark. In only one district (Edward) did we find a statistically significant difference in female driving patterns from daylight to darkness, so for the remaining five districts this could not be explained away by the suggestion that females make up a greater proportion of the driving population during daylight than they do after dark.

Table 10.1 Female Vehicle Stops

District	Crash Driver & Criminal Suspect Boundaries	Veil-of-Darkness Method
Adam District	No disparity.	Females, on average, were stopped more often than expected during daylight, by about 10 extra stops per month.
Baker District	No disparity.	Females, on average, were stopped more often than expected during daylight, by about 8 extra stops per month.
Charles District	No disparity.	Females, on average, were stopped more often than expected during daylight, by about 27 extra stops per month.
David District	No disparity after controlling for sampling error.	Females, on average, were stopped more often than expected during daylight, by about 13 extra stops per month.
Edward District	No disparity after controlling for sampling error.	No disparity after controlling for driving patterns daylight to darkness.
Frank District	No disparity after controlling for sampling error.	Females, on average, were stopped more often than expected during daylight, by about 10 extra stops per month.

The results suggested a general pattern of female drivers stopped at higher rates than expected during daylight hours, when it was potentially easier to determine the driver's characteristics prior to stop. Depending on the district, this stop disparity resulted in between 8 and 27 more female drivers stopped per month during daylight hours than would have been expected. These were substantive amounts of disparity. Depending on the district, the Carmel Police Department stopped between 152 and 419 drivers on average per month within each district. This finding suggested evidence for concern that some officers may at times have selected female drivers for stops, and avoided stopping male drivers, when the characteristics of the drivers were more easily discernable prior to stop.

Once stopped, however, the evident pattern was that officers showed greater leniency toward female drivers during speeding stops. Table 10.2 below reveals the citation outcomes by district

and offense for the stops of female drivers. Across all but one district, female drivers were less likely to be cited than male drivers for speeding, even after being stopped under similar circumstances. Within Frank District, female drivers were less likely to be cited than male drivers for having an expired license plate. For all of the other districts, and all of the other traffic offenses examined, no disparity by sex was revealed, with female and male drivers being treated generally equally in terms of citation rates.

Table 10.2 Female Citations Issued

District	Speeding	Expired Plates	Improper Headlights	Improper Taillights	Failure to Signal
Adam District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Baker District	Cited ***less*** often than males.	No disparity.	No disparity.	No disparity.	No disparity.
Charles District	Cited ***less*** often than males.	No disparity.	No disparity.	No disparity.	No disparity.
David District	Cited ***less*** often than males.	No disparity.	No disparity.	No disparity.	No disparity.
Edward District	Cited ***less*** often than males.	No disparity.	No disparity.	No disparity.	No disparity.
Frank District	Cited ***less*** often than males.	Cited ***less*** often than males.	No disparity.	No disparity.	No disparity.

Finally, Table 10.3 below reveals the outcomes by district for the criminal arrests of female individuals. As this table reveals, no disparity by sex was revealed in terms of criminal arrests. Within each district, female individuals were arrested at percentages similar to the female percentage of criminal suspect descriptions encountered within that district.

Table 10.3 Female Criminal Arrests

District	Criminal Arrests
Adam District	No disparity.
Baker District	No disparity.
Charles District	No disparity.
David District	No disparity.
Edward District	No disparity.
Frank District	No disparity.

In summary, we found evidence that female drivers were disproportionately more likely to be stopped during daylight hours within all but one of the districts. We found evidence that after being stopped, female drivers were either shown more leniency when compared to male drivers, or were treated in a manner equal to male drivers in terms of the decision to issue a traffic citation. Finally, we found no evidence of disparity by sex with regards to criminal arrests.

10.3 Treatment of Males

As males and females were measured in a binary manner, the findings for males were generally the reciprocal outcome for the findings for females. Table 10.4 below reveals the outcomes by district and method for the stops of male drivers. Regarding vehicle stops, we found that when we used the crash driver benchmark and the criminal suspect benchmark as boundaries, the proportion of drivers stopped who were male either fell neatly between these two boundaries (Adam, Baker, Charles, and David), or were statistically similar to the crash driver benchmark boundary after controlling for sampling error (Edward and Frank). In other words, this method suggested no evidence that male drivers were disproportionately more or less likely to be stopped than expected.

Table 10.4 Male Vehicle Stops

District	Crash Driver & Criminal Suspect Boundaries	Veil-of-Darkness Method
Adam District	No disparity.	Stopped ***less*** often than expected during daylight.
Baker District	No disparity.	Stopped ***less*** often than expected during daylight.
Charles District	No disparity.	Stopped ***less*** often than expected during daylight.
David District	No disparity.	No disparity after controlling for sampling error.
Edward District	No disparity after controlling for sampling error.	No disparity after controlling for driving patterns daylight to darkness.
Frank District	No disparity after controlling for sampling error.	No disparity after controlling for driving patterns daylight to darkness.

However, the veil-of-darkness method revealed that male drivers were stopped less often than expected during daylight when using stops during darkness as the benchmark. In two districts (Edward and Frank) we found a statistically significant difference in male driving patterns from daylight to darkness. In the remaining four districts the disparity could not be explained away by the suggestion that males make up a smaller proportion of the driving population during daylight than they do after dark.

The results suggested a general pattern opposite that of female drivers. Males were generally stopped at lower rates than expected when it was potentially easier to determine the driver's characteristics prior to stop. This finding suggested evidence for concern that some officers may, at times, have selected female drivers for stops, and avoided stopping male drivers, when the characteristics of the drivers were more easily discernable prior to stop.

Table 10.5 below reveals the citation outcomes by district and offense for the stops of male drivers. Once the drivers were stopped, the general pattern was that officers were either more likely to cite male drivers than female drivers, or males and females were treated equally. Across five districts, male drivers were more likely to be cited than female drivers for speeding, even after being stopped under similar circumstances. Within Frank District, male drivers were also more likely to be cited

than female drivers for having an expired license plate. For all of the other districts, and all of the other traffic offenses examined, no disparity by sex was revealed, with female and male drivers being treated generally equally in terms of citation rates.

Table 10.5 Male Citations Issued

District	Speeding	Expired Plates	Improper Headlights	Improper Taillights	Failure to Signal
Adam District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Baker District	Cited more often than females.	No disparity.	No disparity.	No disparity.	No disparity.
Charles District	Cited more often than females.	No disparity.	No disparity.	No disparity.	No disparity.
David District	Cited more often than females.	No disparity.	No disparity.	No disparity.	No disparity.
Edward District	Cited more often than females.	No disparity.	No disparity.	No disparity.	No disparity.
Frank District	Cited more often than females.	Cited more often than females.	No disparity.	No disparity.	No disparity.

Finally, Table 10.6 below reveals the outcomes by district for the criminal arrests of male individuals. As this table reveals, no disparity by sex was revealed in terms of criminal arrests. Within each district, male individuals were arrested at percentages similar to the male percentage of criminal suspect descriptions encountered within that district.

Table 10.6 Male Criminal Arrests

District	Criminal Arrests
Adam District	No disparity.
Baker District	No disparity.
Charles District	No disparity.
David District	No disparity.
Edward District	No disparity.
Frank District	No disparity.

In summary, we found evidence that male drivers were less likely to be stopped during daylight hours within all but one of the districts. We found evidence that after being stopped, male drivers were either more likely than female drivers to receive a citation, or were treated in a manner equal to female drivers. Finally, we found no evidence of disparity by sex with regards to criminal arrests.

10.4 Treatment of Alaskan Natives / American Indians

In each district, individuals falling into the Alaskan Native / American Indian category were the least represented among the data, and made up very small percentages of the stops, benchmarks, and arrests. Table 10.7 below reveals the outcomes by district and method for the stops of Alaskan Native / American Indian drivers. We found that when we used the crash driver benchmark and the criminal suspect benchmark as boundaries, the proportion of drivers stopped who were Alaskan Native / American Indian either fell neatly between these two boundaries (Adam, Charles, David, Edward, and Frank), or were statistically similar to the crash driver benchmark boundary after controlling for sampling error (Baker). In other words, this method suggested no evidence that Alaskan Native / American Indian drivers were disproportionately more likely to be stopped than expected.

The veil-of-darkness method revealed a similar finding. Alaskan Native / American Indian drivers were stopped during daylight at percentages similar to the percentages they were stopped during darkness. The results suggested no evidence that Alaskan Native / American Indian drivers were disproportionately more likely to be stopped within any district.

Table 10.7 Alaskan Native / American Indian Vehicle Stops

District	Crash Driver & Criminal Suspect Boundaries	Veil-of-Darkness Method
Adam District	No disparity.	No disparity.
Baker District	No disparity after controlling for sampling error.	No disparity.
Charles District	No disparity.	No disparity.
David District	No disparity.	No disparity.
Edward District	No disparity.	No disparity.
Frank District	No disparity.	No disparity.

Once stopped and the citation decision was made, the pattern or evidence was that officers either showed greater leniency toward Alaskan Native / American Indian drivers (during speeding stops within Adam and Charles Districts), or treated Alaskan Native / American Indian drivers in a manner equal to white drivers. Table 10.8 below reveals the citation outcomes by district and offense for the stops of Alaskan Native / American Indian drivers. We found no evidence to suggest that Alaskan Native / American Indian drivers were more likely than white drivers to receive a citation when stopped for the same offense under similar circumstances.

Table 10.8 Alaskan Native / American Indian Citations Issued

District	Speeding	Expired Plates	Improper Headlights	Improper Taillights	Failure to Signal
Adam District	Cited ***less*** often than whites.	No disparity.	No disparity.	No disparity.	No disparity.
Baker District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Charles District	Cited ***less*** often than whites.	No disparity.	No disparity.	No disparity.	No disparity.
David District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Edward District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Frank District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.

Finally, Table 10.9 below reveals the outcomes by district for the criminal arrests of Alaskan Native / American Indian individuals. As this table reveals, no disparity was revealed in terms of criminal arrests. Within each district, Alaskan Native / American Indian individuals were arrested at percentages similar to the Alaskan Native / American Indian percentage of criminal suspect descriptions encountered within that district.

Table 10.9 Alaskan Native / American Indian Criminal Arrests

District	Criminal Arrests
Adam District	No disparity.
Baker District	No disparity
Charles District	No disparity.
David District	No disparity.
Edward District	No disparity.
Frank District	No disparity.

In summary, we found no evidence that Alaskan Native / American Indian individuals were treated with bias by the Carmel Police Department. Individuals of this category were not disproportionately more likely to be stopped than expected in any of the districts, even after using multiple methods of analysis. After being stopped, Alaskan Native / American Indian drivers were either less likely than white drivers to receive a citation, or were treated in a manner equal to white drivers. Finally, we found no evidence of disparity or bias with regard to the criminal arrests of Alaskan Native / American Indian individuals.

10.5 Treatment of Asians / Pacific Islanders

In each district, individuals falling into the Asian / Pacific Islander category also made up small percentages of the stops, benchmarks, and arrests. Table 10.10 below reveals the outcomes by district and method for the stops of Asian / Pacific Islander drivers. We found that when we used the crash driver benchmark and the criminal suspect benchmark as boundaries, the proportion of drivers stopped who were Asian / Pacific Islander either fell neatly between these two boundaries (Baker, Charles, David, Edward, and Frank), or were statistically similar to the crash driver benchmark boundary after controlling for sampling error (Adam). In other words, this method

suggested no evidence that Asian / Pacific Islander drivers were disproportionately more likely to be stopped than expected.

The veil-of-darkness method revealed a similar finding. Asian / Pacific Islander drivers were stopped during daylight at percentages similar to the percentages they were stopped during darkness in all districts except Baker District. An examination of the crash drivers within Baker District found that the difference between daylight and darkness stops within that district could be explained by the fact the proportion of Asian / Pacific Islanders on the roadway differed between night and day. The results suggested no evidence that Asian / Pacific Islander drivers were disproportionately more likely to be stopped within any district.

Table 10.10 Asian / Pacific Islander Vehicle Stops

District	Crash Driver & Criminal Suspect Boundaries	Veil-of-Darkness Method
Adam District	No disparity after controlling for sampling error.	No disparity.
Baker District	No disparity.	No disparity after controlling for driving patterns daylight to darkness.
Charles District	No disparity.	No disparity.
David District	No disparity.	No disparity.
Edward District	No disparity.	No disparity.
Frank District	No disparity.	No disparity.

Once stopped, and the citation decision was made, the pattern of evidence was clear that officers treated Asian / Pacific Islander drivers in a manner equal to white drivers. Table 10.11 below reveals the citation outcomes by district and offense for the stops of Asian / Pacific Islander drivers. We found no evidence to suggest that Asian / Pacific Islander drivers were more likely than white drivers to receive a citation, when stopped for the same offense under similar circumstances.

Table 10.11 Asian / Pacific Islander Citations Issued

District	Speeding	Expired Plates	Improper Headlights	Improper Taillights	Failure to Signal
Adam District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Baker District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Charles District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
David District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Edward District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Frank District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.

Finally, Table 10.12 below reveals the outcomes by district for the criminal arrests of Asian / Pacific Islander individuals. As this table reveals, no disparity was revealed in terms of criminal arrests. Within each district, Asian / Pacific Islander individuals were arrested at percentages

similar to that category's percentage of criminal suspect descriptions encountered within each district.

In summary, we found no evidence that Asian / Pacific Islander individuals were treated with bias by the Carmel Police Department. Individuals of this category were not disproportionately more likely to be stopped than expected in any of the districts, even after using multiple methods of analysis. After being stopped, Asian / Pacific Islander drivers were treated in a manner equal to white drivers. Finally, we found no evidence of disparity or bias with regard to the criminal arrests of Asian / Pacific Islander individuals.

Table 10.12 Asian / Pacific Islander Criminal Arrests

District	Criminal Arrests
Adam District	No disparity.
Baker District	No disparity.
Charles District	No disparity.
David District	No disparity.
Edward District	No disparity.
Frank District	No disparity.

10.6 Treatment of African-Americans

The claim by several Indianapolis area media outlets and the Indiana ACLU that African-Americans were racially profiled and targeted for stops and citations within Carmel was the primary impetus for this analysis. After using the wisely accepted scientific best practices for properly analyzing such claims, we failed to find evidence to support these allegations. Table 10.13 below reveals the outcomes by district and method for the stops of African-American drivers. We found that when we used the crash driver benchmark and the criminal suspect benchmark as boundaries, the proportion of drivers stopped who were African-American either fell neatly between these two boundaries (Adam, Baker, Charles, David, and Frank), or were statistically similar to the crash driver benchmark boundary after controlling for sampling error (Edward).

Table 10.13 African-American Vehicle Stops

District	Crash Driver & Criminal Suspect Boundaries	Veil-of-Darkness Method
Adam District	No disparity.	Stopped ***less*** often than expected during daylight.
Baker District	No disparity.	Stopped ***less*** often than expected during daylight.
Charles District	No disparity.	No disparity (less likely to be stopped) after controlling for driving patterns daylight to darkness.
David District	No disparity.	No disparity (less likely to be stopped) after controlling for driving patterns daylight to darkness.
Edward District	No disparity (less likely to be stopped) after controlling for sampling error.	Stopped ***less*** often than expected during daylight.
Frank District	No disparity.	Stopped ***less*** often than expected during daylight.

Even in this one instance when the percentage of African-American drivers that were stopped did not fit exactly between these two benchmark boundaries in Edward District, it was because the proportion of African-American drivers stopped was ***lower*** (not higher) than both benchmark measures. In other words, African-American drivers were less likely to be stopped within that district than either benchmark would have predicted.

The veil-of-darkness method revealed that African-American drivers were stopped less often than expected during daylight when using stops during darkness as the benchmark. In only two districts (Charles and David) did we find a statistically significant difference in African-American driving patterns from daylight to darkness, so for the remaining four districts this could not be explained away by the suggestion that African-Americans make up a smaller proportion of the driving population during daylight than they do after dark.

The results suggested a general pattern or African-American drivers stopped at lower rates than expected during daylight hours, when it was potentially easier to determine the driver's characteristics prior to stop. This finding suggested evidence for concern that some officers may, at times, have avoided stopping African-American drivers when the characteristics of the drivers were more easily discernable prior to stop.

When we examined the decision to issue a citation after the vehicle was stopped, we found fairly consistent evidence that officers treated African-American drivers the same way they treated white drivers. Table 10.14 below reveals the citation outcomes by district and offense for the stops of African-American drivers. Across all districts and offenses except one, African-American drivers were equally likely to be cited as white drivers.

10.14 African-American Citations Issued

District	Speeding	Expired Plates	Improper Headlights	Improper Taillights	Failure to Signal
Adam District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Baker District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Charles District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
David District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Edward District	Cited more often than whites, by 1.5 citations per month.	No disparity.	No disparity.	No disparity.	No disparity.
Frank District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.

The only exception was Edward District, where African-American drivers stopped for speeding were more likely to receive a citation than were white drivers stopped for the same offense under similar conditions. Even in this instance, however, the substantive amount of disparity only averaged out to be less than two more citations issued per month than was expected. In all of the other districts, and all of the other traffic offenses examined, no bias against African-Americans was revealed in terms of citation rates once stops with similar offenses and number of violations were equally compared.

Finally, Table 10.15 below reveals the outcomes by district for the criminal arrests of African-American individuals. As this table reveals, no disparity was revealed in terms of criminal arrests. Within each district, African-Americans were arrested at percentages similar to (and usually lower than) the African-American percentage of criminal suspect descriptions encountered within each district. We found no evidence to support the claim that African-American's were disproportionately targeted for arrest by the Carmel Police Department.

Table 10.15 African-American Criminal Arrests

District	Criminal Arrests
Adam District	No disparity.
Baker District	No disparity.
Charles District	No disparity.
David District	No disparity.
Edward District	No disparity.
Frank District	No disparity.

The racial bias claims made by the news media sources around the Indianapolis metro area based their arguments on the U.S. Census population for the city of Carmel. As we have seen, this resident population is in no way related to the demographic characteristics of the driving population found within Carmel, or the criminal offending population active within the jurisdiction. The crash driver benchmark estimate revealed that the percentage of drivers on the

roadway who were ***not*** residents of Carmel varied from 56.9% to 76.9%, depending on the patrol district. While the U.S. Census resident population of Carmel may have been 2.7% African-American, the percentage of African-American drivers involved in crashes on the roadways within Carmel ranged from 9.1% to 16.9%, depending on the patrol district – three to sixteen times greater than the Census percentage. Furthermore, the criminal suspect descriptions received from members of the public who were crime victims and witnesses ranged from 25.3% African-American suspects to as high as 54.6% African-American suspects, depending on the patrol district. The African-American representation within Carmel among its visitors, shoppers, and employees was much higher than the Census resident population would suggest.

The evidence revealed that African-Americans were less likely than members of other races to be stopped by the police within Carmel. The evidence revealed that when stopped under similar circumstances, white and African-American drivers were equally likely to receive a citation for their traffic offense, with the exception of speeding offenses within one district where between one and two more African-American drivers were more likely to receive a speeding citation each month. The evidence revealed that the arrests of African-Americans within each district was similar to the percentage of the active offender population within that district that was African-American.

10.7 Treatment of Hispanics

Table 10.16 below reveals the outcomes by district and method for the stops of Hispanic ethnicity drivers. We found that when we used the crash driver benchmark and the criminal suspect benchmark as boundaries, the proportion of drivers stopped who were Hispanic fell neatly between these two boundaries for all districts. In other words, this method suggested no evidence that Hispanic drivers were disproportionately more likely to be stopped than expected. The veil-of-darkness method revealed a similar finding. Hispanic drivers were stopped during daylight at percentages similar to the percentages they were stopped during darkness in all six districts. These results suggested no evidence that Hispanic drivers were disproportionately more likely to be stopped within any district.

10.16 Hispanic Ethnicity Vehicle Stops

District	Crash Driver & Criminal Suspect Boundaries	Veil-of-Darkness Method
Adam District	No disparity.	No disparity.
Baker District	No disparity.	No disparity.
Charles District	No disparity.	No disparity.
David District	No disparity.	No disparity.
Edward District	No disparity.	No disparity.
Frank District	No disparity.	No disparity.

When we examined the decision to issue a citation after the vehicle was stopped, we found fairly consistent evidence that officers treated Hispanic drivers the same way they treated white drivers (with one exception), or more leniently than they treated white drivers. Table 10.17 below reveals the citation outcomes by district and offense for the stops of Hispanic drivers. Within Charles District, we found that Hispanic drivers stopped for speeding were more likely than similarly

stopped white drivers to receive a citation. However, this disparity only amounted to less than two extra Hispanic drivers cited each month.

10.17 Hispanic Ethnicity Citations Issued

District	Speeding	Expired Plates	Improper Headlights	Improper Taillights	Failure to Signal
Adam District	No disparity.	Cited ***less*** often than whites	No disparity.	No disparity.	No disparity.
Baker District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Charles District	Cited more often than whites, by 1.5 citations per month.	Cited ***less*** often than whites	No disparity.	No disparity.	No disparity.
David District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Edward District	No disparity.	Cited ***less*** often than whites	No disparity.	No disparity.	No disparity.
Frank District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.

Furthermore, we also found that within Adam, Charles, and Edward Districts, Hispanic drivers were less likely to be cited than were similarly stopped white drivers when the offense was an expired license plate. For all other offenses and in all other districts, Hispanic drivers received citations at similar rates to whites when stopped for the same offense under similar circumstances.

Finally, Table 10.18 below reveals the outcomes by district for the criminal arrests of Hispanic ethnicity individuals. As this table reveals, no disparity was revealed in terms of criminal arrests. Within each district, Hispanic individuals were arrested at percentages similar to the percentage of criminal suspect descriptions encountered within each district that were described as Hispanic.

In summary, we found little evidence that Hispanic individuals were treated with bias by the Carmel Police Department. Individuals of this category were not disproportionately more likely to be stopped than expected in any of the districts, even after using multiple methods of analysis. After being stopped, Hispanic drivers were slightly more likely to receive a citation for speeding within one district, less likely to receive a citation for expired plates within three districts, and in all other cases were treated in a manner equal to white drivers. Finally, we found no evidence of disparity or bias with regards to the criminal arrests of Hispanic ethnicity individuals.

10.18 Hispanic Ethnicity Criminal Arrests

District	Criminal Arrests
Adam District	No disparity.
Baker District	No disparity
Charles District	No disparity.
David District	No disparity.
Edward District	No disparity.
Frank District	No disparity.

10.8 Treatment of Caucasians / Whites

After female drivers, Caucasian / White drivers were the category with the second greatest amount of evidence of biased treatment. Table 10.19 below reveals the outcomes by district and method for the stops of Caucasian / White drivers. We found that when we used the crash driver benchmark and the criminal suspect benchmark as boundaries, the proportion of Caucasian / White drivers stopped fell neatly between these two boundaries for all districts. In other words, this method suggested no evidence that white drivers were disproportionately more likely to be stopped than expected.

The veil-of-darkness method, however, revealed a different pattern of findings. In every district, we found that white drivers were stopped during daylight (when it was believed easier to determine the characteristics of the driver prior to stop) at percentages higher than the percentages they were stopped during darkness (when it was harder to determine the characteristics of the driver prior to stop). In three of these districts (Baker, Charles, and David), we were able to determine that this was because the percentage of white drivers on the roadways was higher during daylight. In the remaining three districts (Adam, Edward, and Frank), this was not the case. The proportion of white crash drivers was similar for both daylight and darkness. This meant that white drivers were disproportionately more likely to be stopped than expected during daylight hours (when driver race is easier to distinguish) within Adam, Edward, and Frank Districts.

These stop disparities resulted in an estimated 6 extra white driver stops per month within Frank District, 7 extra white driver stops per month within Adam District, and 30 extra white driver stops per month within Edward District. This finding suggested evidence for concern that some officers may, at times, have selected white drivers for stops, and avoided stopping drivers of other races, when the characteristics of the drivers were more easily discernable prior to stop.

Table 10.19 Caucasian / White Vehicle Stops

District	Crash Driver & Criminal Suspect Boundaries	Veil-of-Darkness Method
Adam District	No disparity.	Whites, on average, were stopped more often than expected during daylight, by about 7 extra stops per month.
Baker District	No disparity.	No disparity after controlling for driving patterns daylight to darkness.
Charles District	No disparity.	No disparity after controlling for driving patterns daylight to darkness.
David District	No disparity.	No disparity after controlling for driving patterns daylight to darkness.
Edward District	No disparity.	Whites, on average, were stopped more often than expected during daylight, by about 20 extra stops per month.
Frank District	No disparity.	Whites, on average, were stopped more often than expected during daylight, by about 6 extra stops per month.

Table 10.20 below reveals the citation outcomes by district and offense for the stops of Caucasian / White drivers. While female drivers also showed a likelihood of being disproportionately stopped during daylight, female drivers were consistently shown greater leniency once stopped. This was not the case for Caucasian / White drivers. Regarding speeding stops within Adam District, white drivers were more likely to have received a citation than were Alaskan Native / American Indian drivers stopped for the same offense under similar circumstances. In Adam, Charles, and Edward Districts, white drivers stopped for having an expired license plate were more likely to receive a citation than Hispanic drivers stopped for the same reason under similar circumstances. However, for all of the other districts, and all of the other traffic offenses examined, no other disparities regarding Caucasian / White drivers were revealed. In all these other circumstances, Caucasian / White drivers were treated equally with other racial groups in terms of citation rates.

10.20 Caucasian / White Citations Issued

District	Speeding	Expired Plates	Improper Headlights	Improper Taillights	Failure to Signal
Adam District	Cited more often than Alaskan Natives / American Indians.	Cited more often than Hispanics.	No disparity.	No disparity.	No disparity.
Baker District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Charles District	No disparity.	Cited more often than Hispanics.	No disparity.	No disparity.	No disparity.
David District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.
Edward District	No disparity.	Cited more often than Hispanics.	No disparity.	No disparity.	No disparity.
Frank District	No disparity.	No disparity.	No disparity.	No disparity.	No disparity.

Finally, Table 10.21 below reveals the outcomes by district for the criminal arrests of Caucasian / White individuals. As this table reveals, no disparity was revealed in terms of criminal arrests. Within each district, Caucasian / White individuals were arrested at percentages similar to the percentage of criminal suspect descriptions encountered within each district that were described as white.

10.21 Caucasian / White Criminal Arrests

District	Criminal Arrests
Adam District	No disparity.
Baker District	No disparity.
Charles District	No disparity.
David District	No disparity.
Edward District	No disparity.
Frank District	No disparity.

In summary, we found evidence to suggest that Caucasian / White drivers were disproportionately more likely to be stopped during daylight hours within half of the districts in the city. We also found evidence that, after being stopped, Caucasian White drivers were more likely to receive a citation than Alaskan Natives / American Indians for speeding within one district, and more likely than Hispanic drivers to receive a citation for an expired plate within three districts. Nevertheless, for other offenses, Caucasian / White drivers were no more or less likely to be cited than drivers from other racial groups. Finally, we found no evidence of disparity for Caucasian / White individuals with regard to criminal arrests.

10.9 Final Conclusions

In general, we found no evidence that members of the Carmel Police Department target persons of color for vehicle stops, citations, or arrests. In fact, we found evidence to suggest a small degree of hesitancy on the part of officers to stop African-American males, thus creating disparity in the stops of females and whites. Our overall conclusion is that we found no evidence of a pattern or practice of disproportionately stopping, citing, or arresting African-Americans, nor any other racial minority group.

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