Appendix I
Methodology Notes

Throughout this report, various references are made to state and local population data used to calculate the Disparity Indexes (DIs) for different racial and ethnic groups involved in traffic stops. Additionally, stop DIs for individual agencies are calculated differently from DIs calculated for geographic regions such as a "local area" depicted in map Figures 6–8 and Figures 14–16. This appendix provides an explanation of the population data used and the DI calculations for geographic regions made in this report.

Census Data used to Calculate Traffic Stop Disparity Indexes

Data Source: Vintage 2021 Annual County Resident Population Estimates by Age, Sex, Race, and Hispanic Origin: July 1, 2021. File: 7/1/2021 County Characteristics Resident Population Estimates. U.S. Census Bureau, Population Division Release Date: June 2022. Available from: https://www2.census.gov/programs-surveys/popest/datasets/2020-2021/counties/asrh/cc-est2021-alldata-51.csv as of May 15, 2023.

In prior reports, DCJS used the NCHS bridged race population estimates derived from the same Annual County Resident Population Estimates in partnership with the US Census Bureau. The Vintage 2020 release was the final version of the NCHS bridged race dataset. The Vintage 2021 dataset used in this year's benchmarks is largely similar to the NCHS version, reporting city and county counts by sex, race, ethnicity, and 18 binned age groups (rather than the single year of age categories used in the NCHS data). The key difference in datasets is that the non-bridged data retains multi-race population estimates rather than recoding each multi-race value into a single-race category. DCJS has excluded the residual multi-race estimates from CPA benchmarking, resulting in slightly lower overall estimated population counts compared to last year's report benchmarks. Estimates for 2021 were used because they were the most recent available as this report was being prepared.

The four youngest age groups—together spanning ages 0-14—were dropped from the benchmark estimates, leaving a driving-age sample of individuals ages 15 and older. Sex was reported as either male or female. For race and ethnicity, the following table presents the Census Bureau Variable Name and Description used for each CPA race/ethnicity value based on the VSP technical specifications:

Table I-1: CPA Benchmarking Vintage 2021 Source Variable Key

USCB Vintage 2021 Variable Name	USCB Vintage 2021 Variable Description	Community Policing Act Race/Ethnicity Category Benchmarked
NHWA_MALE	Not Hispanic, White alone male population	White
NHWA_FEMALE	Not Hispanic, White alone female population	
NHBA_MALE	Not Hispanic, Black or African American alone male population	Black or African American

NHBA_FEMALE	Not Hispanic, Black or African American alone female population	
NHIA_MALE	Not Hispanic, American Indian and Alaska Native alone male population	American Indian or Alaska Native
NHIA_FEMALE	Not Hispanic, American Indian and Alaska Native alone female population	
NHAA_MALE	Not Hispanic, Asian alone male population	Asian or Native Hawaiian or Other Pacific Islander
NHAA_FEMALE	Not Hispanic, Asian alone female population	
NHNA_MALE	Not Hispanic, Native Hawaiian and Other Pacific Islander alone male population	
NHNA_FEMALE	Not Hispanic, Native Hawaiian and Other Pacific Islander alone female population	
H_MALE	Hispanic male population	Hispanic or Latino
H_FEMALE	Hispanic female population	

Because NCHS did not release a bridged-race version of this year's Vintage estimates, multi-race categories persist as standalone counts in the dataset rather than being collapsed into bridged single race aggregates. These categories are reported in overlapping variables: first, each named racial category has both an "alone" group and an "or in combination" group, the latter representing that the individual was identified under at least one other racial category. Secondly, there is a "Two or more races" category to denote individuals who are multiracial without specifying any racial group. For the CPA benchmarks, all of the multiracial categories were excluded to retain estimates most likely to align identified and perceived race; for individuals identified under one race alone, we can be more confident that they would be identified as the same race in a hypothetical CPA traffic stop record and therefore single-race records are able to better serve as reliable benchmark estimates. To replicate the race recoding used for the CPA data values, Hispanic totals were not adjusted based on race values. As a result of the multi-race exclusions, some percentage of the total estimated population count was excluded from each city and county. This marks a difference from last year's incorporation of the bridged-race data, and one potential area for a minor difference in disparity indices due to a change in benchmarking methods. Table XX below reports the percent of Vintage 2021 total estimate count retained per city/county benchmark once the multi-racial categories were excluded. The higher the rate reported, the lower the relative estimate count for the non-Hispanic multi-racial population excluded from that locality.

These population estimates are post-census estimates produced by the U.S. Census Bureau, with base populations sourced from the 2020 decennial census. The base decennial population is adjusted with vital statistics (births and deaths) and migration data for each year to produce each annual estimate. Due to delays and accuracy concerns driven by COVID-19 in the 2020 Census, the decennial population

data was blended with Vintage 2020 estimates to construct the Vintage 2021 base population.[1] The Census produces population estimates for Virginia counties alone as well as an aggregated population estimate for Virginia counties that includes the population of towns located within the geographic boundary of the county (if a county has no towns located within its borders, then the county population alone is equal to the aggregated county population). The aggregated county population estimate serves as the basis for the bridged-race county population estimates produced by NCHS. The Census Bureau Population Division does not produce bridged-race population estimates by age–race–ethnicity for Virginia towns, so there is no way to subtract town age–race–ethnicity population from the aggregated county age–race–ethnicity population data. This means that the population used to calculate stop DIs for Virginia county agencies includes town populations.

Table I-2: Vintage 2021 Estimate Use Rate in CPA Benchmark Estimates by City/County

City or County Name	Use Rate	City or County Name	Use Rate
Accomack County	98.73%	Lancaster County	99.22%
Albemarle County	98.15%	Lee County	99.22%
Alexandria City	97.66%	Lexington City	97.96%
Alleghany County	98.71%	Loudoun County	97.23%
Amelia County	98.59%	Louisa County	98.36%
Amherst County	98.35%	Lunenburg County	98.31%
Appomattox County	98.69%	Lynchburg City	98.31%
Arlington County	97.55%	Madison County	98.33%
Augusta County	98.99%	Manassas City	98.04%
Bath County	99.13%	Manassas Park City	97.88%
Bedford County	98.92%	Martinsville City	98.45%
Bland County	99.16%	Mathews County	98.08%
Botetourt County	98.81%	Mecklenburg County	98.74%
Bristol City	98.51%	Middlesex County	98.30%
Brunswick County	99.13%	Montgomery County	97.91%
Buchanan County	99.38%	Nelson County	98.60%
Buckingham County	98.58%	New Kent County	97.93%
Buena Vista City	98.02%	Newport News City	97.11%
Campbell County	98.62%	Norfolk City	97.24%
Caroline County	97.72%	Northampton County	98.74%
Carroll County	99.22%	Northumberland County	98.83%
Charles City County	97.19%	Norton City	98.25%
Charlotte County	98.78%	Nottoway County	99.00%
Charlottesville City	97.51%	Orange County	97.95%
Chesapeake City	97.50%	Page County	99.02%
Chesterfield County	98.10%	Patrick County	99.21%
Clarke County	98.26%	Petersburg City	98.35%
Colonial Heights City	98.21%	Pittsylvania County	99.14%
Covington City	98.04%	Poquoson City	98.46%
Craig County	99.09%	Portsmouth City	97.78%
Culpeper County	98.00%	Powhatan County	98.93%

[1] See the Census Bureau's Vintage 2021 population estimates methodology notes for composition details and handling of COVID-19 data issues: https://www2.census.gov/programs-surveys/popest/technical-documentation/methodology/2020-2021/methods-statement-v2021.pdf

City or County Name	Use Rate	City or County Name	Use Rate
Cumberland County	98.22%	Prince Edward County	98.66%
Danville City	98.99%	Prince George County	98.25%
Dickenson County	99.47%	Prince William County	96.90%
Dinwiddie County	98.79%	Pulaski County	98.80%
Emporia City	98.93%	Radford City	97.99%
Essex County	97.89%	Rappahannock County	98.41%
Fairfax City	97.70%	Richmond City	98.14%
Fairfax County	97.20%	Richmond County	98.37%
Falls Church City	97.28%	Roanoke City	97.91%
Fauquier County	98.18%	Roanoke County	98.63%
Floyd County	98.79%	Rockbridge County	98.71%
Fluvanna County	98.18%	Rockingham County	98.92%
Franklin City	98.42%	Russell County	99.37%
Franklin County	99.06%	Salem City	98.44%
Frederick County	98.39%	Scott County	99.30%
Fredericksburg City	97.04%	Shenandoah County	98.75%
Galax City	98.45%	Smyth County	99.10%
Giles County	99.01%	Southampton County	98.82%
Gloucester County	98.27%	Spotsylvania County	97.52%
Goochland County	98.77%	Stafford County	97.09%
Grayson County	98.96%	Staunton City	97.76%
Greene County	98.27%	Suffolk City	98.08%
Greensville County	99.23%	Surry County	98.47%
Halifax County	99.10%	Sussex County	99.06%
Hampton City	97.10%	Tazewell County	99.22%
Hanover County	98.66%	Virginia Beach City	97.18%
Harrisonburg City	98.00%	Warren County	98.15%
Henrico County	98.13%	Washington County	99.29%
Henry County	98.76%	Waynesboro City	98.03%
Highland County	99.65%	Westmoreland County	98.12%
Hopewell City	97.84%	Williamsburg City	97.40%
Isle of Wight County	98.32%	Winchester City	97.86%
James City County	98.13%	Wise County	99.23%
King and Queen County	97.63%	Wythe County	98.90%
King George County	97.57%	York County	97.40%
King William County	98.21%	York-Poquoson[2]	97.57%

Similar methods as above were used to produce the statewide benchmark estimates using the state equivalent file available at https://www2.census.gov/programs-surveys/popest/datasets/2020-2021/state/asrh/sc-est2021-alldata6.csv as of May 15 2023. Single year of age counts were excluded to values ages 15 and older, and "two or more races" and "*X race* in combination" counts were also excluded. Hispanic groups of any race were counted as Hispanic. July 1, 2021 estimates were again used for each count. Out of 7,086,705 total individuals estimated for the 15 and older population in the Vintage 2021 file, 6,909,970 were used in the DCJS statewide benchmark count for a use rate of 97.51%.

[2] York-Poquoson is a synthetic locality composed of the combined estimates of York County and Poquoson City, representing the joint jurisdiction of York-Poquoson Sheriff's Office.

Removing Incarcerated Populations from Estimates

To improve the precision of population benchmarks utilized for developing locality disparity indices, DCJS acquired annual race-aggregated incarceration facility population data (single day count from June 30, 2022) from the Virginia Department of Corrections to remove these populations from the estimated pool of potential drivers in each facility's jurisdiction.

Following US decennial Census methodology, the Vintage 2021 estimates count incarcerated individuals as residing in the city or county where their incarceration facility is located. For the purposes of this report, including these individuals in population benchmarks leads to an overestimate in the number of potential drivers in facility jurisdictions and can especially overstate the proportion of non-white potential drivers. After collecting the Vintage 2021 age-restricted counts for each city and county by race, DCJS removed the VADOC aggregated incarceration counts for each race/ethnicity from cities and counties with an incarceration facility, effectively removing 26,066 total incarcerated individuals from driver estimates statewide. All Disparity Indices and analyses based on population estimates in the 2023 report use these incarceration-adjusted counts.

While this adjustment does not subtract enough individuals from the state estimates as a whole to impact the statewide findings, jurisdictions with a large proportion of their Census count drawn from incarceration facilities *and* racial disparities in their incarceration rates compared to the general adult population experience shifts in disparity indices when incarcerated individuals are removed. For example, a county with a large proportion of incarcerated black individuals and a small overall population will have a relatively lower black driver count estimate—and corresponding higher black driver DIs—when you subtract incarcerated individuals from the estimates.

Disparity Index Calculations for Virginia State Police Maps with Stops, Searches, and Driver Arrests by Driver Race

VSP stop DIs were calculated using the formula described in section Statewide Disparity Index (DI):

$$\frac{\text{Group's percentage of all stops reported by VSP statewide}}{\text{Group's percentage of population age 15+ statewide}}$$

The group's percentage of all stops reported is the percentage of driver stops for individuals age 15 and older by race or ethnicity as reported statewide by VSP.

The group's percentage of population age 15+ is the total population age 15 and older statewide by race or ethnicity statewide.

A second set of VSP stop DIs were calculated for state resident drivers using a similar formula:

$$\frac{\text{Group's percentage of all state resident stops reported by VSP statewide}}{\text{Group's percentage of population age 15+ statewide}}$$

The group's percentage of all state resident stops reported is the percentage of driver stops for individuals age 15 and older by race or ethnicity as reported statewide by VSP, where the Residency value for the driver was marked as "R" or "V".

It should be noted that the VSP statewide traffic stop DIs may be subject to more variability than traffic stop DIs calculated for local LEAs. This is because VSP often patrols interstate highways, which are more likely to be traveled by transient, out-of-state drivers, who are not included in the Virginia population age 15+ used in the calculation.

Disparity Index Calculations for Local Area Maps with Stops, Searches, and Driver Arrests by Driver Race for Local Law Enforcement Agencies

Local area DIs were calculated using the *sum* of stops (or the sum of stop details like searches or driver arrests) submitted by all city, county, or town agencies that reported traffic stops within the geographic boundary of the city or county.

For example, if both a PD and SO reported stops within City X, the total number of stops (or searches or driver arrests) from both agencies along with the City X bridged-race population age 15+ were used to compute the local area DI for City X. Due to the blend of City/County and Town agencies involved in these local area calculations, all driver stops are used in stop DI calculations instead of local resident filters.

Similarly, if a SO and two town PDs reported stops (or searches or driver arrests) within the geographic boundary of County Y, the total reported by all three agencies along with the County Y bridged race population age 15+ (which includes the population for the towns) were used to compute the local area DI for County Y.

Once the total number of stops is determined for a local area, the DI is calculated using the formula described in section *Statewide Disparity Index (DI):*

$$\frac{\text{Group's percentage of all stops reported for the local area}}{\text{Group's percentage of population age 15+ for the local area}}$$

Similarly, once the total number of searches or driver arrests is determined for a local area, the DI is calculated using the formula described in section *Statewide Disparity Index (DI):*

$$\frac{\text{Percent of drivers in each group for searches or driver arrests for the local area}}{\text{Group's percentage of all stops reported for the local area}}$$