

Exhibit 4

**IN THE UNITED STATES DISTRICT COURT
FOR THE MIDDLE DISTRICT OF TENNESSEE**

AMBER SHERMAN, RACHAEL SPRIGGS,
KERMIT MOORE, BLACK CLERGY
COLLABORATIVE OF MEMPHIS, MEMPHIS
A. PHILIP RANDOLPH INSTITUTE, EQUITY
ALLIANCE,

Plaintiffs,

v.

26-cv-616

TRE HARGETT, in his official capacity as
Secretary of State of Tennessee, MARK GOINS,
in his official capacity as Coordinator of Elections
for Tennessee, STATE ELECTION
COMMISSION, and DONNA BARRETT, JUDY
BLACKBURN, JIMMY ELDRIDGE, MIKE
MCDONALD, SECONDRA MEADOWS,
VANECIA BELSER KIMBROW, and KENT
YOUNCE, in their official capacities as members
of the State Election Commission,

Defendants.

EXPERT REPORT OF DR. JONATHAN R. CERVAS

I. SUMMARY OF OPINIONS

1. I have been retained by counsel for the Plaintiffs in this case on behalf of their clients to evaluate the characteristics of congressional maps that would be generated by adhering to traditional race-neutral redistricting criteria.

2. My opinions on this matter are based on my education, training, and experience as a mapmaker and scholar of redistricting as well as review of the 2026 Plan, a comprehensive set of historical congressional redistricting plans for the state of Tennessee, a set of simulated race-blind congressional redistricting plans for the State of Tennessee generated by a peer-reviewed

and published algorithm, and publicly available geographic and demographic data from the United States Census Bureau.

3. Based upon this review, my opinion is that adherence to traditional race-neutral redistricting criteria would essentially guarantee the creation of at least one district in which Black voters constitute a majority of the voting age population had an opportunity to elect their candidates of choice.

4. Prior to the 2026 Plan, no congressional redistricting plan since the Memphis area became part of the State of Tennessee has divided Shelby County into more than two districts.

5. Splitting Shelby County and the City of Memphis into three districts is not necessary to comply with the federal constitutional ‘one person, one vote’ standard. The population of an ideal congressional district after the 2020 Census was 761,169 and the population of Shelby County at that time was 929,744. The result is that Shelby County is today populous enough to require splitting the county into two districts, but not three districts.

6. Adherence to race-blind traditional redistricting principles would have guaranteed the creation of at least one congressional district in which Black voters have an opportunity to elect their candidates of choice. I reviewed a set of 5,000 simulated congressional redistricting plans for the State of Tennessee generated with a peer-reviewed software package and archived by the Algorithm-Assisted Redistricting Methodology Project, an academic research group. Their simulations generate counterfactual district plans using neutral districting criteria and then compare enacted plans against those baselines. Out of those 5,000 simulated redistricting plans, 100% contain at least one district in which Black voters are able to elect their candidate of choice. And 98.9% of those simulated redistricting plans contain at least one district in which Black

residents constitute a majority of the population. These results make sense given the very large and geographically compact Black population in Shelby County and the City of Memphis.

7. The 2026 Redistricting Plan contains neither a Black majority district, nor a Black opportunity district. In fact, none of the three districts in the 2026 Plan exceeds 33% Black voting age population and two are under 30% Black voting age population. A plan that entirely eliminates such an opportunity district is certainly not an ordinary political outcome emerging from geography or chance. It is an extreme outlier.

II. QUALIFICATIONS

8. I am an Assistant Teaching Professor at Carnegie Mellon, a position I have held since 2024. I teach both graduate and undergraduate courses for the Carnegie Mellon Institute for Strategy and Technology (Political Science), including courses on American politics, research and statistical methods, representation and voting rights.

9. I joined Carnegie Mellon University in 2020 as a post-doctoral fellow after receiving my M.A. and Ph.D. in Political Science from the University of California, Irvine. I received my undergraduate degree at the University of Nevada Las Vegas. As my curriculum vitae, attached as Appendix A, shows, I have published eleven peer-reviewed scholarly articles on topics related to political institutions, elections, redistricting, and voting rules. My work has been published in journals which specialize in political science, geography, economics, and law. These include the *Proceedings of the National Academy of Arts and Sciences*, *Social Science Quarterly*, *Political Geography*, *Public Choice*, *Election Law Journal*, *Stanford Journal of Civil Rights & Civil Liberties*, *Presidential Studies Quarterly*, *Statistics and Public Policy*, *New Hampshire Law Review*, *Albany Law Review*, and *PS: Political Science and Politics*. I have been invited to give talks or participate in convenings at Princeton University, University of Houston, Albany Law School, New York Law School, Harvard Law School, Stanford University, and the National

Conference of State Legislatures, as well as dozens of invited virtual lectures and talks. As part of my service commitment to the discipline of political science, I have served as referee for *American Journal of Political Science*, *Political Geography*, *Election Law Journal*, *Political Analysis*, *Public Choice*, and *Political Research Quarterly*.

10. I have served as a special master or consultant to several courts in redistricting cases, as well as to jurisdictions engaged in the redistricting process, including the following matters:

11. *Clarke v. Wisconsin Elections Commission* (2024): The Wisconsin Supreme Court appointed me and Dr. Bernard Grofman as co-consultants to the Court to assist in evaluating remedial plans proposed after the redistricting plans for the Wisconsin State Senate and Assembly were judicially invalidated. In that role, Dr. Grofman and I analyzed proposed remedial redistricting plans for both chambers of the State Legislature submitted by the parties to the case. Dr. Grofman and I produced a report evaluating the submissions and providing recommendations to the court. The legislature later adopted one of the plans that we evaluated, and the governor signed into law the new plan, which was used in the 2024 election.

12. *Harkenrider v. Hochul* (2022): The Supreme Court in the State of New York retained me as “special master to prepare and draw a new neutral, non-partisan Congressional map” after Justice McAllister ruled that the plans enacted by the State Legislature violated the New York State Constitution. In affirming Justice McAllister’s ruling, the Court of Appeals expanded my scope of work to include drawing a new, neutral redistricting plan for the New York State Senate as well. I prepared proposed redistricting maps for both the New York State Congressional delegation and the State Senate. The court approved my proposed plans, which were then implemented for the 2022 election cycle.

13. *Pennsylvania Legislative Reapportionment Commission*: In July of 2021, I entered into a contract with the 2021 Pennsylvania Legislative Reapportionment Commission to provide consulting work relating to the creation of the Pennsylvania State House of Representatives and Pennsylvania Senate districts to be used during elections held between 2022 and 2030. This work involved numerous aspects of the reapportionment process, not limited to map drawing. This bipartisan commission, led by Chancellor Emeritus Mark Nordenberg of the University of Pittsburgh, was composed of the Senate Majority and Minority leaders, and the House of Representatives Majority and Minority leaders. The maps drafted by the commission were passed with a bipartisan vote on February 4, 2022. The Pennsylvania Supreme Court unanimously affirmed the final reapportionment plan in March 2022.

14. *Wright v. Sumter County, GA* (2020): I served as an assistant to Dr. Grofman, the federal court appointed special master in this case concerning whether the method of electing members of the Sumter County Board of Education diluted the voting power of Black voters in violation of Section 2 of the Voting Rights Act. *Wright v. Sumter County Board of Elections and Registration*, 1:14-CV-42 (WLS) (M.D. Ga.). The district court struck down the plan and ordered it to be replaced; the court retained Prof. Grofman in his capacity as Special Master. I assisted Dr. Grofman in crafting illustrative plans. The court selected one of the plans I assisted in preparing. The Eleventh Circuit affirmed the district court and noted that the Special Master “expressly found an easily achievable remedy available.” *Wright v. Sumter County Board of Elections and Registration*, No. 15-13628 at 45 (11th Cir. 2020).

15. *Bethune-Hill v. Virginia State Board of Elections* (2019): I served as assistant to the Special Master, Dr. Grofman, in crafting a remedial plan in this case where the district court found that the redistricting plan for Virginia’s House of Delegates was an unconstitutional racial

gerrymander. *Bethune-Hill v. Virginia State Bd. of Elections*, 326 F. Supp. 3d 128 (E.D. Va. 2018). The district court retained Dr. Grofman as Special Master and I worked with Prof. Grofman to assist the district court in developing the remedial districts that were used in the 2019 and 2021 elections.

16. *Navajo Nation v. San Juan County* (2018): I served as assistant to the court-appointed Special Master, Dr. Grofman, in this case where the district court ruled that the election districts for school board and county commission violated the Fourteenth Amendment to the United States Constitution. *Navajo Nation v. San Juan County, UT*, D.C. No. 2:12-CV-00039-RJS (D. Utah 2018). The court selected remedial plans that I assisted in preparing for immediate use in the next election. They were upheld by the Tenth Circuit in *Navajo Nation v. San Juan County*, No.18-4005 (10th Cir. 2019).

17. I have prior familiarity with the geography and demographics of the State of Tennessee from my experience as an expert witness in *Wygant v. Lee*, which addressed the validity of redistricting plans for both houses of the Tennessee General Assembly under the Tennessee Constitution. I prepared several alternative plans for both chambers. I was an admitted expert in the case.

18. My attached curriculum vitae lists each such engagement as well as all of my engagements as an expert witness.

III. SCOPE OF WORK

19. Counsel for the Plaintiffs in this case asked me to analyze whether the 2026 Redistricting Plan could be drawn as the product of adherence to traditional race-neutral redistricting criteria.

20. My opinions on this matter are based on my education, training, and experience as a mapmaker and scholar of redistricting.

21. To form the opinions expressed in this report, I have reviewed the following materials:

- a. The 2026 congressional redistricting plan for the State of Tennessee;
- b. *The Historical Atlas of United States Congressional Districts: 1789-1983*, which is authored by Kenneth C. Martis, Professor of Geography (now emeritus) at West Virginia University. This volume contains maps of all United States Congressional Districts from the effective date of the United States Constitution in 1789 through the 1980 Census.
- c. Digitized versions of the congressional districts found in *The Historical Atlas* along with district lines for the subsequent years are downloaded from *Digital Boundary Definitions of United States Congressional Districts, 1789-2012*, created by Jeffrey B. Lewis, Brandon DeVine, Lincoln Pitcher, and Kenneth C. Martis. (2013). Retrieved from <https://cdmaps.polisci.ucla.edu>.
- d. A set of 5,000 simulated race-blind congressional redistricting plans for the State of Tennessee archived by the Algorithm-Assisted Redistricting Methodology Project, a research group directed by co-principal investigators Prof. Kosuke Imai, Prof. Christopher T. Kenny, Prof. Cory McCartan, and Prof. Tyler Simko. (<https://alarm-redist.org/>) The software package that the Project uses is peer-reviewed and open-source (McCartan, Cory, Christopher T. Kenny, Tyler Simko, George Garcia, Kevin Wang, Melissa Wu, Shiro Kuriwaki, and Kosuke Imai. 2022.

“Simulated Redistricting Plans for the Analysis and Evaluation of Redistricting in the United States.” *Scientific Data* 9(1): 689. doi:[10.1038/s41597-022-01808-2](https://doi.org/10.1038/s41597-022-01808-2)).

- e. Publicly available geographic and demographic data from the United States Census Bureau.

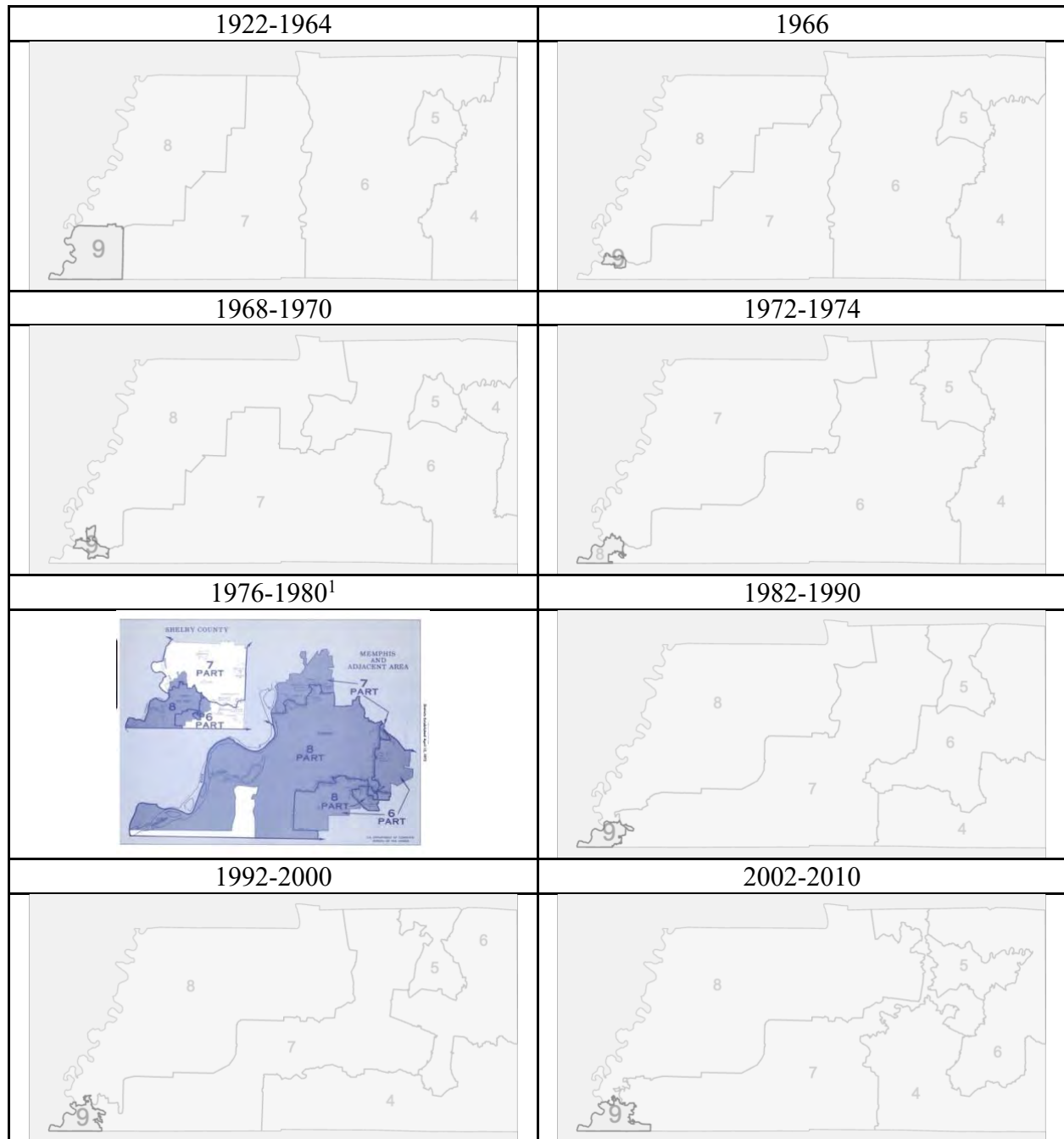
IV. OPINIONS

22. In drawing congressional redistricting plans, mapmakers look to a set of criteria that are widely known by both courts and scholars as traditional districting criteria. Those criteria include ensuring that districts are nearly equal in population as practicable, that they are compact and contiguous, and avoid unnecessary splits of counties and other political subdivisions.

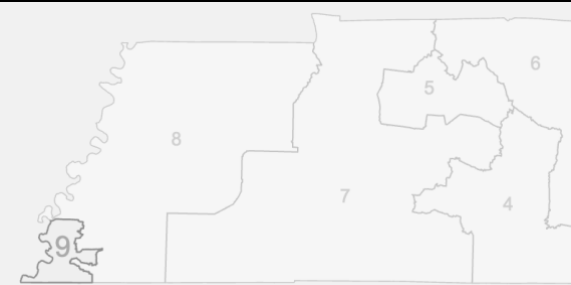
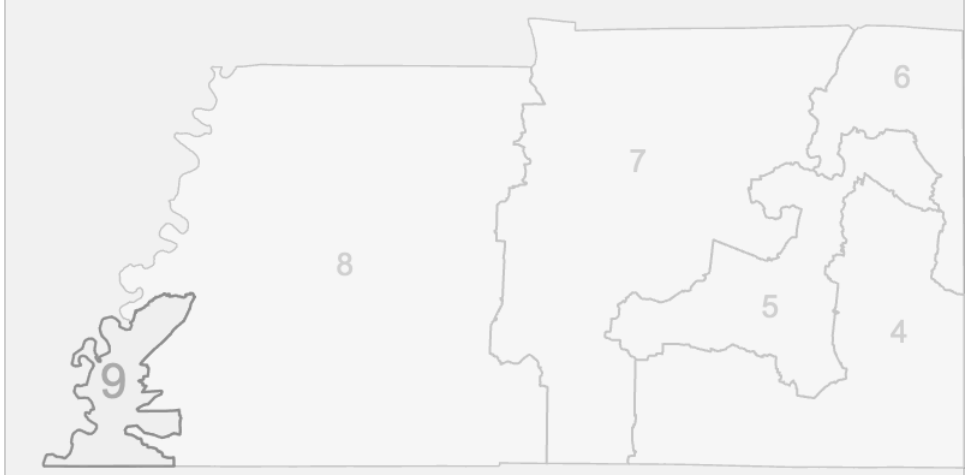
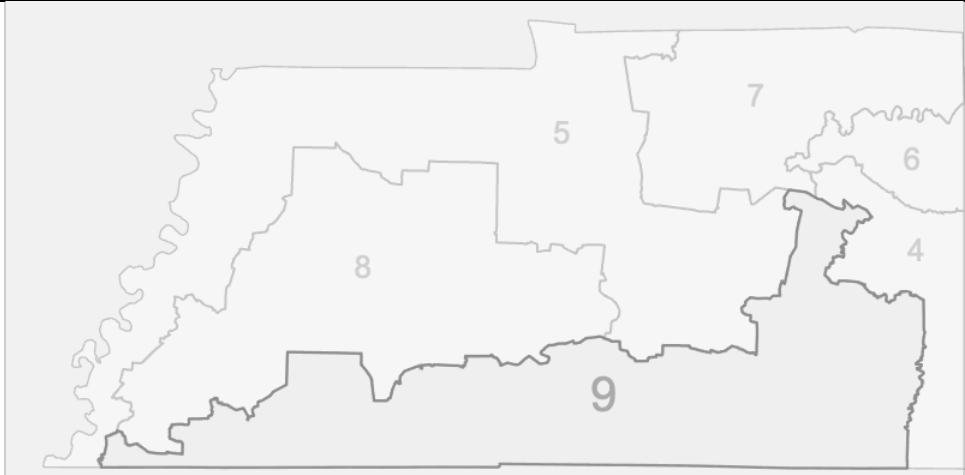
23. The history of Tennessee’s congressional districts show a particularly strong adherence to keeping counties whole. From the time when the greater Memphis area first became part of the State of Tennessee in the early 19th century through the mid-1960s when the Supreme Court set out the ‘one person, one vote’ requirement, every congressional district was made up of whole counties. And even since then, no redistricting plan has ever split Shelby County or the City of Memphis into more than two districts.

24. A review of the shapes of congressional districts between 1922 and today shows the radical departure of the 2026 Plan from the compact southwestern Tennessee district that has been a fixture of maps for over a century.

Figure 1: Western Tennessee Congressional Districts, 1922-2026



¹ The digital shapefile is incomplete for this congress. This image was provided to me by Kenneth Martis through personal communication.

2012-2020	
	
2022-2024	
	
2026	
	

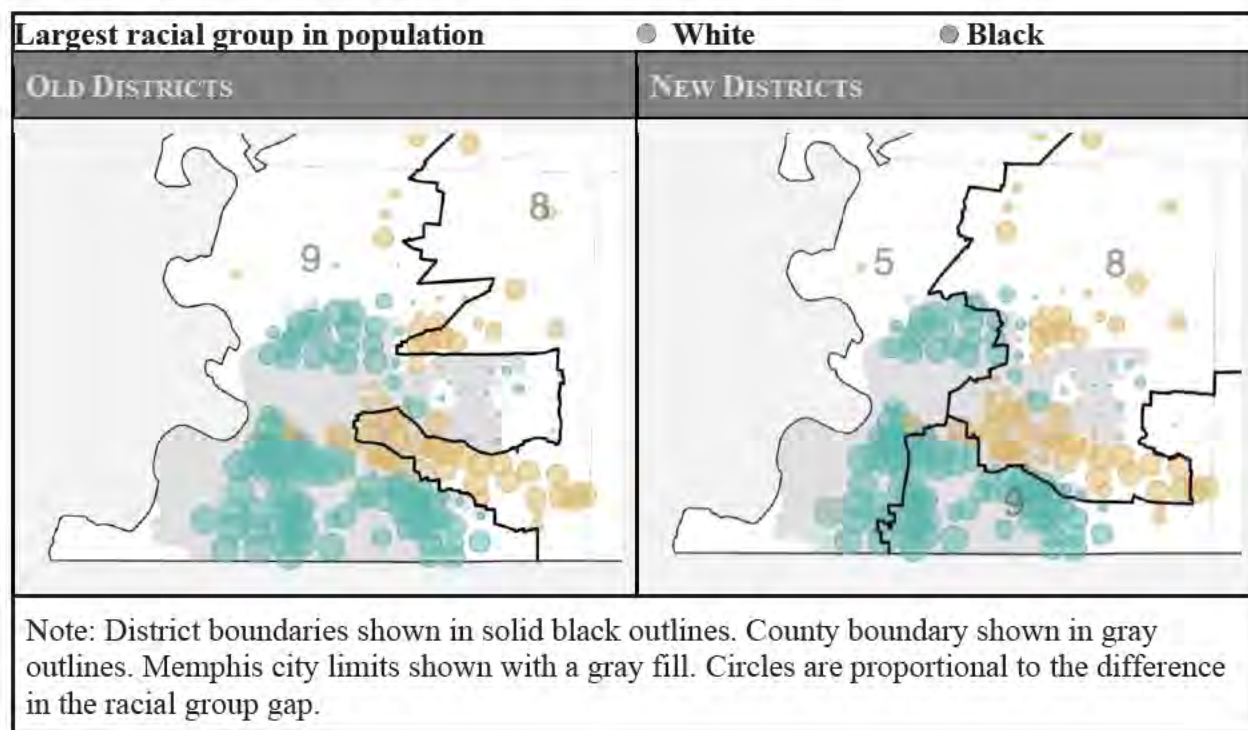
25. Splitting Shelby County and the City of Memphis into three districts is not necessary to comply with the federal constitutional ‘one person, one vote’ standard. The population of an ideal congressional district after the 2020 Census was 761,169 and the population of Shelby

County at that time was 929,744. The result is that Shelby County is populous enough to require splitting the county into two districts, but not three districts.

26. Shelby County's substantial Black population has been divided among three congressional districts under the proposed map. And none of these three districts exceeds 33% Black voting age population, which represents a stark contrast with the racial demographics of Shelby County, which has a majority-Black population (53%), and the City of Memphis, which has an even higher Black population share (63%). Memphis has approximately 400,000 Black residents and is about 63% Black by population share. The city's total population is just below the ideal size of a congressional district, but its Black population alone is more than sufficient to elect a candidate of choice, even if the remainder of the district were entirely white.

27. The same is true countywide. Shelby County's Black population approaches 500,000 residents—again, more than enough to elect candidates preferred by Black voters in any reasonably configured district centered on the county. Indeed, fracturing Shelby County between two districts, as is required under the 'one person, one vote' doctrine, would still provide Black voters an opportunity to elect their candidates in at least one district. The Black population is geographically compact, as shown in Figure 2.

Figure 2: Black and White Populations in Shelby County



28. The portions of Shelby County assigned to Districts 5, 8, and 9 contain the following populations: TN-05: 221,035; TN-08: 440,132; and TN-09: 268,577. By comparison, under the districts used in 2024, Shelby County populations were distributed as follows: TN-08: 192,467 and TN-09: 737,277. In other words, the Ninth District was previously composed of approximately 96% Shelby County residents. Under the new configuration, however, the district containing the largest share of Shelby County voters is the Eighth District, where only about 57% of the district's population resides in Shelby County. Notably, the reconfigured Eighth District also has the lowest Black population percentage of the three Shelby County-based districts.

29. The City of Memphis itself has likewise been divided almost evenly among three districts. The Fifth District contains 212,105 Memphis residents, the Eighth District 222,303, and the Ninth District 198,696. Significantly, the Eighth District, the largest of the three Memphis segments, also has the smallest Black population share. This division systematically fragments

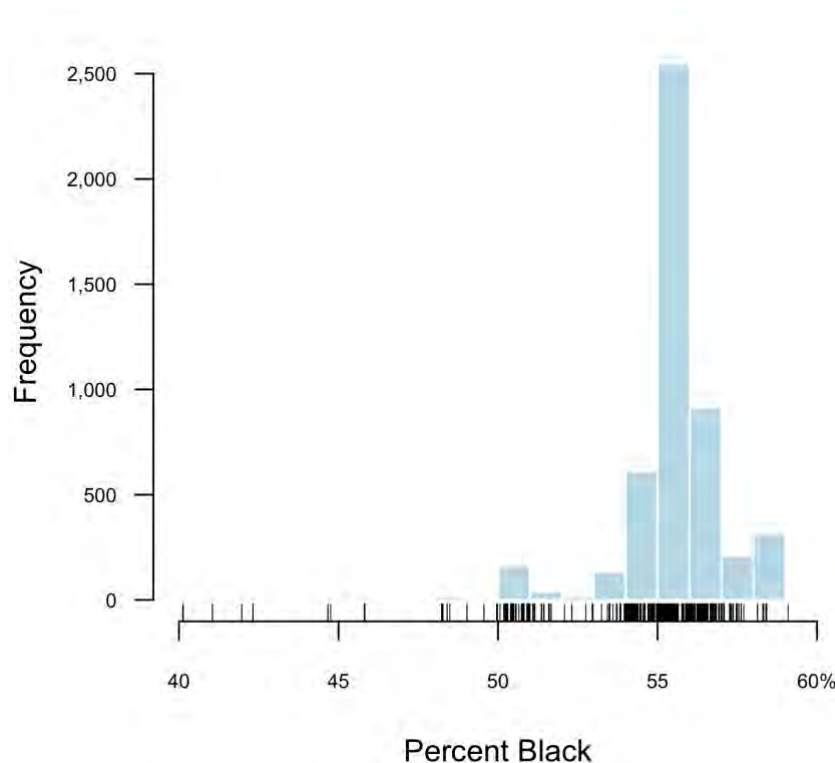
Black voters in Memphis across multiple districts, thereby diluting their collective voting strength and reducing their ability to elect candidates of choice.

30. Adherence to a race-blind redistricting process would have guaranteed the creation of at least one congressional district in which Black voters have an opportunity to elect their candidates of choice because of the very large and compact Black population concentrated in Memphis and Shelby County. I reviewed a set of 5,000 simulated congressional redistricting plans for the State of Tennessee archived by the Algorithm-Assisted Redistricting Methodology (ALARM) Project, an academic research group led by co-principal investigators Prof. Kosuke Imai, Prof. Christopher T. Kenny, Prof. Cory McCartan, and Prof. Tyler Simko. Although there is complex math and computer science behind the process of generating sets of simulated maps, the methodology itself is fairly simple: To understand what motivated the choices undergirding a particular map, we can compare that map to thousands of other legally compliant maps that could have been drawn using traditional, race-neutral redistricting criteria. Those traditional race-neutral criteria include ensuring that districts have equal population, are contiguous, are compact, and avoid splitting counties and other political subdivisions more than necessary. The ALARM Project generated this set of simulated maps employing a peer-reviewed, published, and open-source software package for redistricting simulation and analysis. The software package and the archives of simulated maps are publicly available online.

31. I analyzed 5,000 simulated redistricting plans archived by this research group and the legislature's enacted 2021 plan. Out of those 5,001 maps, 4,945 (98.9%) contain at least one district in which Black residents comprise a majority of the population (4,773 of the plans contain a district in which Black residents constitute a majority of voting age persons [95.4%]). In other

words, only 1.1% (4.6% BVAP) of simulated plans fail to produce such a district. And every single one of those 5,001 maps has a district that is at least 40.1% Black (39% BVAP).

Figure 3: Highest Proportion-Black District, 5,000 Simulations



32. But Black voters need not constitute an absolute majority to elect candidates of choice. Differential turnout, coalition voting, and white crossover support often permit minority-preferred candidates to prevail in districts that are below 50% Black voting age population. The simulation data also includes electoral data for several statewide contests: the 2016 presidential election, the 2020 presidential election, and the 2020 U.S. Senate election. Across all 15,003 district-election combinations generated by the simulations, the white-preferred candidate defeats the Black-preferred candidate only four times. Moreover, no simulated district ever produces more than a single loss for the Black-preferred candidate across the three elections.

33. The result is that across all 5,000 simulated plans and the 2021 legislature-drawn plan, 100% of those maps contain at least one district in which Black voters have a very strong opportunity to elect their candidate of choice.

34. The City of Memphis and Shelby County are not merely areas with substantial Black populations. They are heavily Black jurisdictions in which minority voters naturally possess the numerical strength to elect their preferred candidates. Any effort to divide these populations across multiple districts necessarily diminishes that power, as Black voters in this region alone possess sufficient electoral strength to constitute an effective voting bloc in a compact area.

35. The implication of the 2026 Plan is unavoidable. Under virtually any congressional plan drawn with traditional race-neutral districting criteria, Tennessee naturally produces at least one district in which Black voters have an opportunity to elect their candidates of choice. A plan that entirely eliminates such a district is not an ordinary political outcome emerging from geography or chance. It is an extreme outlier.

* * *

I reserve the right to modify, update, or supplement my opinions in light of additional facts, testimony and/or materials that may become available.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on May 12, 2026
Morgantown, West Virginia

A handwritten signature in dark ink, appearing to read 'J. Cervas', is written over a horizontal line.

Dr. Jonathan Cervas