

**IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ALABAMA
SOUTHERN DIVISION**

MARCUS CASTER, LAKEISHA
CHESTNUT, BOBBY LEE DUBOSE,
BENJAMIN JONES, RODNEY ALLEN
LOVE, MANASSEH POWELL,
RONALD SMITH, and WENDELL
THOMAS,

Plaintiffs,

v.

JOHN H. MERRILL, in his official
capacity as Alabama Secretary of State,

Defendant.

Case No. 2:21-CV-1536-AMM

SUPPLEMENTAL DECLARATION OF WILLIAM S. COOPER

WILLIAM S. COOPER, acting in accordance with 28 U.S.C. § 1746,
Federal Rule of Civil Procedure 26(a)(2)(B), and Federal Rules of Evidence 702.

1. My name is William S. Cooper. I serve as a demographic and
redistricting expert for the Plaintiffs. I filed a declaration in this lawsuit on May 17,
2024.

2. I file this supplemental declaration to respond to assertions made by Dr.
Sean Trende in his June 28, 2024 report (“Trende Report”) regarding (1) the supposed
lack of compactness of the illustrative plans I drew that contain two majority-Black
congressional districts and (2) the supposed over-reliance on race to define

boundaries of the districts in my illustrative plans. As I explain in this report, including by way of an additional illustrative plan, both of these assertions are without merit.

3. I also briefly respond to a few statistics in Dr. M.V. Hood’s June 28, 2024 report (“Hood Report”) regarding the disparities between Black and White voter registration rates and the number of Black representatives in the Alabama Legislature.

I. Map-drawing Principles

4. There are a series of traditional redistricting principles and considerations that go into creating a plan. These include at least population equality, compactness, contiguity, respect for political subdivision boundaries (including counties, municipalities, and VTDs), and respect for communities of interest. When drawing my illustrative plans, I strived to balance each of these considerations (as well as others, discussed further *infra* Section II); no one consideration was the only or most important consideration. Instead, it is a constant tradeoff and balancing act among the many different considerations. Balancing all of these considerations will necessarily result in no one factor performing at its maximum level.

5. Dr. Trende focuses on just one of the traditional redistricting principles in his report – compactness. Because compactness is only one among the many

considerations necessary in developing a plan, his singular focus on compactness is misguided. As a map drawer tasked with determining whether it is possible to draw a map with two majority-Black districts while adhering to traditional redistricting principles, I could not focus only on compactness. Rather, I considered and balanced the many different criteria – compactness being just one –to ensure that each of my illustrative plans complied with all traditional redistricting principles. Nonetheless, Illustrative Plans 1 through 8 are all reasonably compact on a plan-wide and district-by-district basis.

6. In addition to complying with the traditional redistricting criteria mentioned above, I drew each illustrative plan to achieve specific objectives in various illustrative plans, including, but not limited to: (1) avoiding pairing specific incumbents; (2) minimizing regional and specific municipal splits; (3) keeping the City of Mobile together¹; and (4) following the Legislature’s or Special Master’s boundaries for particular districts. All of these objectives are outlined in my May 17 report describing each of the 8 illustrative plans. Dr. Trende does not mention or consider any of these criteria, aside from compactness.

¹ Illustrative Plan 6 and Illustrative Plan 7, presented during the preliminary injunction phase, were designed to keep the City of Mobile together in one district. Since then, there has been an annexation, so it is possible that District 2 as drawn in those two illustrative plans no longer encompasses 100% of Mobile.

II. Compactness vs. Competing Trade-Offs for All Illustrative Plans

7. Aside from Illustrative Plan 7, where I also focused on compactness (*see* my report dated December 20, 2021, ¶5), the other illustrative plans I developed take into account a variety of specific considerations, including legislative determinations reflected in Alabama’s enacted plans, which sometimes come at the expense of maximal compactness. All of the plans balance traditional redistricting criteria.

8. I offer below – plan-by-plan – a few additional details beyond the previous descriptions in my May 17, 2024 Declaration at pp. 24-26. Dr. Trende does not consider or address how these unique considerations impact compactness. Had I not incorporated each of these considerations, the compactness scores of some plans and some of the districts within each plan would have been higher.

- Illustrative Plan 1 includes all or part of 17 counties within the historical Black Belt in one of the two majority Black districts. Montgomery County is split between District 2 and District 3 because it was split in all of the plans in place between 1992 and 2020.
- Illustrative Plan 2 includes 44% of the City of Dothan in District 2. Dothan is adjacent to (and partly contained in) Henry County, which is fully in District 2 and adjacent to the historical Black Belt. Including Dothan in the new majority-Black district is consistent with the Legislature’s decision to include Dothan in majority-Black Senate District 28 under the enacted state senate plan. Montgomery is split similarly to how it was split in Alabama’s 2011 congressional plan.

- Illustrative Plan 3 demonstrates that Montgomery County does not need to be split in a plan with two majority-Black districts.
- Illustrative Plan 4 demonstrates that Tuscaloosa County does not need to be split in a plan with two majority-Black districts.
- Illustrative Plan 5 places Coffee County in District 2, demonstrating that the current CD 2 incumbent would not have to be paired with the current CD 1 incumbent in a plan with two majority-Black districts.
- Illustrative Plan 6 places all of the City of Mobile in District 2, while also placing all of Montgomery County, including the City of Montgomery, in District 2. The “ungainly tail” that Dr. Trende complains about (Trende, p. 25) is necessary to ensure the CD 1 incumbent, who lives near the Mississippi state line, remains in CD 1.
- Illustrative Plan 7 prioritizes compactness, and also demonstrates that a plan with two majority-Black districts can be drawn with just five county splits rather than six county splits – as in the 2021 Plan and the 2023 Plan. (The enacted 2011 Plan split seven counties.) Illustrative Plan 7 also places all of the City of Mobile in District 2.
- Illustrative Plan 8 closely tracks the 2023 Special Master Plan. The core retention rate compared to the Special Master Plan is 90.48%. Like the Special Master’s plan, Illustrative Plan 8 replicated the Legislature’s apparent CD 4 and CD 5 preferred configuration from the 2023 Plan. This necessarily leads to lower compactness scores because CD 4 and CD 5 in the 2023 Plan each span nearly the width of the state. Illustrative Plan 8 also minimizes VTD splits (12 vs. 11 in the 2023 Plan).²

² Illustrative Plan 8 has a DRA composite compactness score of 29 – higher than 2024 plans in five states. The minimum Reock score is .1897 in District 1, which is higher than 21 congressional districts in 14 states, including a congressional district in Arizona and a congressional district in Virginia (the two states where Dr. Trende served as a consultant to redistricting commissions). Under Illustrative Plan 8, the minimum Polsby-Popper score is .1260 in District 2, which is higher than 37 congressional districts in 11 states.

9. The traditional redistricting principles, legislative preferences, and other considerations reflected in Illustrative Plans 1 through 8 underscore that compactness was not my exclusive consideration in these plans. This naturally leads to slightly lower compactness scores than if compactness were the top or only priority, as Dr. Trende appears to prefer.

10. By the same token, the traditional redistricting principles and legislative preferences reflected in Illustrative Plans 1 through 8 demonstrate that race was not my predominant consideration in any of the Illustrative Plans, contrary to Dr. Trende's claim otherwise (Trende, p. 61-70). And had race been my overriding consideration, I could have drawn districts that consistently placed communities that have higher concentrations of Black Alabamians in majority-minority districts and communities with higher concentrations of White Alabamians in non-majority-minority districts, resulting in majority-minority districts with higher BVAPs. But at no point have I been asked or have I attempted to prioritize BVAP in District 2 or District 7 (or prioritize the racial composition of any district) over other traditional redistricting principles.

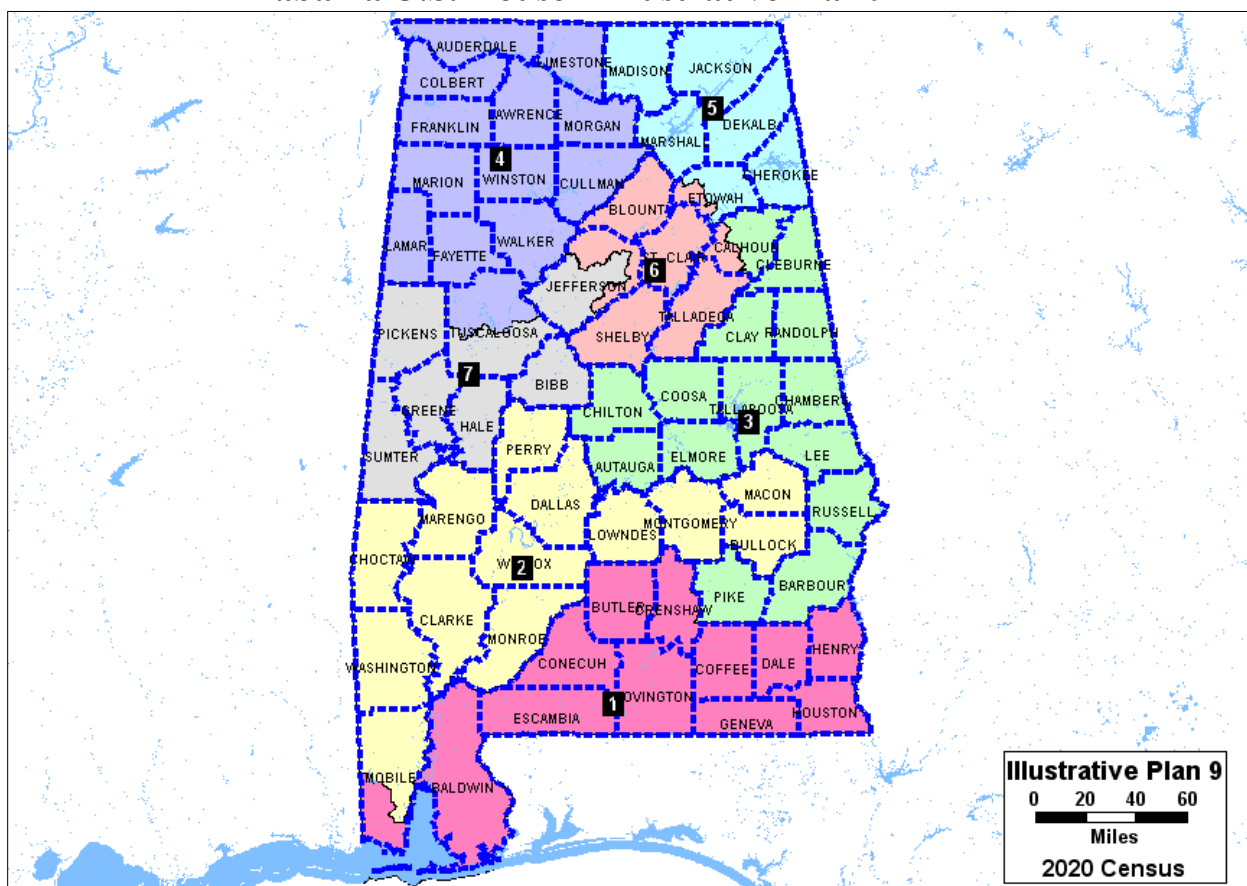
III. Illustrative Plan 9

11. My Illustrative Plans 1 through 8 demonstrate that the Black population in southern and central Alabama is sufficiently numerous and compact to form the

majority of a congressional district. Nonetheless, in response to Dr. Trende's suggestion that my prior illustrative plans are not sufficiently compact, I offer Illustrative Plan 9. In drawing Illustrative Plan 9, I placed greater emphasis on compactness, while still respecting other traditional redistricting criteria, including population equality, contiguity, preservation of political subdivision boundaries, and respect for communities of interest.

12. My focus on compactness in Illustrative Plan 9 is reflected in its superior compactness scores as compared to any plan Alabama has created since at least 1992. Illustrative Plan 9 demonstrates that it is possible to create a congressional plan with two majority-Black districts while respecting all traditional redistricting considerations and prioritizing compactness.

13. The map in **Figure 1** depicts Illustrative Plan 9. District 2 is 50.34% BVAP and District 7 is 50.02% BVAP.

Figure 1**Alabama U.S. House – Illustrative Plan 9**

14. **Exhibit A-1** contains detailed 2020 population statistics by district, along with 2023 registered voter percentages and 2018-2022 citizen voting age population percentage estimates from the 5-year American Community Survey.

Figure 2**Illustrative Plan 9 – 2020 Census**

District	Population	18+ Pop	% 18+ AP Black	% 18+ NH White
1	717753	558203	17.22%	74.09%
2	717752	558144	50.34%	43.24%
3	717756	562388	25.39%	66.63%
4	717754	559419	9.26%	81.89%
5	717755	558589	16.34%	71.69%
6	717755	555414	12.39%	78.85%
7	717754	565009	50.02%	42.19%

15. The map in **Exhibit A-2** is a higher resolution version of the **Figure 1** map. **Exhibit A-3** contains maps focusing on District 2 and District 7, the two majority-Black districts, and adjacent areas. As shown in **Exhibit A-4**, Illustrative Plan 9 splits five counties and 25 populated VTDs. **Exhibit A-5** identifies the 29 municipalities where populations are divided into two or three districts. **Exhibit A-6** reports compactness scores by district. **Exhibit A-7** reports splits of U.S. Census Bureau / Office of Management and Budget-defined Core Based Statistical Areas (“CBSAs”). **Exhibit A-8** reports core retention based on the Special Master Plan. **Exhibit A-9** reports core retention of the 2023 Plan.

16. An address searchable online map of Illustrative Plan 9 (overlying county lines and boundaries for incorporated and unincorporated places, with a bold blue line demarcating the 2023 Plan) is available at the link in footnote below.³

17. Compared to the 2023 Plan, Illustrative Plan 9 is more compact (*see infra* Section V.A). It splits fewer counties (5 vs. 6) and splits fewer populated areas of municipalities (29 vs. 32). Illustrative Plan 9 splits 25 populated VTDs as compared to 11 such splits in the 2023 Plan. Many of these additional VTD splits are made to increase compactness, illustrating the tradeoffs between traditional redistricting principles that arise when one factor is prioritized over another.⁴

18. Together, Illustrative Plans 1 through 9 demonstrate that there are several ways to draw two majority-Black districts in Alabama while adhering to all traditional redistricting criteria, each emphasizing different non-racial criteria.

³ Layers and labels in the online map can be clicked on and off via the legend in the upper left corner. Topography can be viewed by clicking off the color-coded Illustrative Plan 9 layer. <https://online.caliper.com/mas-874-drp-290-ujr/maps/lz77ctfl00757ota9tpn>.

⁴ The 25 VTD splits in Illustrative Plan 9 also includes six straight-line VTD splits in Mobile County along the Dauphin Island Parkway, ensuring a clear vehicle route for District 1 to directly link up with the I-10 Causeway and Baldwin County. Had I extended District 2 to the water line of Mobile Bay, boundaries for a modified Illustrative Plan 9 would have the same compactness scores, a higher BVAP in District 2, and 19 VTD splits for the plan as a whole.

IV. Plan-wide Metrics – Illustrative Plan 9, Special Master Plan & 2023 Plan

19. For ease of reference, this section compares Illustrative Plan 9, the 2023 Plan, and the Special Master Plan on various traditional redistricting criteria. The format follows a similar review of Illustrative Plans 1 through 8 in my May 17, 2024 Declaration (pp. 45-57).

A. Political Subdivision and Regional Splits

20. **Figure 3** compares plans in terms of political subdivision splits—VTDs, counties, and municipalities.

21. Illustrative Plan 9 has fewer municipal splits (29) than the 2023 Plan (32) and the Special Master Plan (31). As noted, the 2023 Plan and Special Master Plan split six counties, as compared to five in Illustrative Plan 9.

Figure 3**Political Subdivision Splits⁵**

	Populated VTD Splits	Split Counties	Split Municipalities (excluding unpopulated blocks)
2023 Plan	11	6	32
Special Master Plan	14	6	31
Illustrative Plan 9	29	5	29

B. Communities of Interest

22. Illustrative Plan 9 preserves regions identified in my May 17, 2024 declaration (pp. 50-54) better or on par with the 2023 Plan and the Special Master Plan.

23. **Figure 4** shows splits for MSAs and MPSAs (including single-county core-based statistical areas in both categories). Illustrative Plan 9 splits fewer of these regions, as compared to the 2023 Plan and the Special Master Plan.

⁵ According to the 2020 Census, there are 462 municipalities in Alabama, 67 counties, and 1,988 populated VTDs. Where a number is bolded, this indicates that the plan outperforms or matches either the 2023 Plan or the Special Master Plan on the respective metric.

Some municipal splits occur naturally when a municipality spills over into two or more counties (e.g., Small populated parts of Birmingham and Hoover are in Shelby County). Municipal annexations and changes to precinct or VTD boundaries are common in Alabama.

Figure 4**Core-Based Statistical Area Splits**

	All CBSAs (MSAs and MPSAs)*	Multi-County MSAs (9 areas)
2023 Plan	36	17
Special Master Plan	37	18
Illustrative 9	35	15

* Unique CBSA/district combinations

24. The 2023 Legislative Findings identified three regions as communities of interest: (1) the Black Belt (18 counties), (2) Wiregrass region (nine counties), and (3) the Gulf Coast (two counties).⁶ **Figure 5** shows how many districts each of these regions are placed into in each of the plans. Illustrative Plan 9 maintains the Legislature's three community of interest regions in a similar number of districts as compared to the Special Master and 2023 Plans.

⁶ Source: SB5 Enrolled, previously submitted at ECF No. 220-11 and available at: <https://alison.legislature.state.al.us/files/pdfdocs/SearchableInstruments/2023SS2/SB5-enr.pdf>. The 18 Black Belt counties are: Barbour, Bullock, Butler, Choctaw, Lowndes, Crenshaw, Dallas, Macon, Marengo, Montgomery, Perry, Greene, Hale, Pickens, Pike, Russell, Sumter, and Wilcox.

The Gulf Coast region includes Mobile and Baldwin Counties.

The nine Wiregrass counties are: Barbour, Coffee, Covington, Crenshaw, Dale, Geneva, Henry, Houston, and Pike.

Figure 5**Legislature's Defined Communities of Interest**

	Black Belt (18 counties)	Wiregrass (9 counties)	Gulf Coast (2 counties)
2023 Plan	2	2	1
Special Master Plan	2	2	2
Illustrative 9	4	2	2

25. All of my illustrative plans place significantly more of the Black Belt counties into a majority-Black district than the 2023 Plan. As shown in **Figure 6**, only half (nine) of the Legislature's 18 identified Black Belt counties are in a majority-Black district in the 2023 Plan. Conversely, each of my illustrative plans place over 70% of the Black Belt counties in a majority-Black district, and four of my illustrative plans place all but one of the Black Belt counties in a majority-Black district.

Figure 6

PLAN	Number of Black Belt Counties in Majority- Black District
Illustrative 1	17
Illustrative 2	17
Illustrative 3	15
Illustrative 4	17
Illustrative 5	15
Illustrative 6	14
Illustrative 7	15
Illustrative 8	17
Illustrative 9	13
2023 Plan	9

C. Core Retention

26. The second and third columns in **Figure 7** show the percentage of the population kept in the same district in Illustrative Plan 9 as compared to the 2023 Plan and the Special Master Plan, which is also detailed in **Exhibit A-8** and **Exhibit A-9**.⁷

Figure 7

Core Constituencies

Core Constituencies by Plan	% Core Population Kept Together from 2023 Plan	% Core Population Kept Together from Special Master Plan	% City of Mobile Kept Together	% City of Birmingham Kept Together
2023 Plan	NA	NA	100%	74.69%
Special Master Plan	73.61%	NA	90.4%	93.26%
Illustrative 9	58.66%	68.78%	96.55%	87.85%

27. The fourth and fifth columns of **Figure 7** show the percentage of the population of the cities of Mobile and Birmingham that are kept together in one district under each plan. Compared to the 2023 Plan, Illustrative Plan 9 keeps more

⁷ I define “core population” as the largest district-level subset of a population that is kept together in the shift from one plan to another (without considering changes in district numbers or changes in incumbent representation). The core population is identified with shading in the referenced exhibits.

of the population in Birmingham together in District 7 (87.85%). Under Illustrative Plan 9, almost all of the City of Mobile (96.55%) is in District 2.

D. Number of Counties per District per Plan

28. **Figure 8** shows the number of counties in each district for the 2023 Plan, the Special Master Plan, and Illustrative Plan 9. In the 2023 Plan, each district contains between four and 16 counties. In the Special Master Plan, each district contains between six and 13 counties. In Illustrative Plan 9, each district contains between six and 14 counties.

Figure 8

Counties Per District

2023 Plan		Special Master Plan		Illustrative Plan 9	
DISTRICT	COUNTIES	DISTRICT	COUNTIES	DISTRICT	COUNTIES
1	4	1	9	1	12
2	16	2	13	2	13
3	11	3	11	3	14
4	13	4	13	4	13
5	6	5	6	5	6
6	8	6	8	6	7
7	15	7	13	7	7
total (inc. splits)	73	total (inc. splits)	73	total (inc. splits)	72

29. In Illustrative Plan 9, five out of seven districts have the same number or fewer counties than the corresponding districts in the 2023 Plan. Both of the majority-Black districts in Illustrative Plan 9 (Districts 2 and 7) contain fewer

counties than their corresponding districts in the 2023 Plan.

V. Plan-wide Composite Compactness Scores

30. Dr. Trende’s singular focus on compactness to determine whether a plan sufficiently meets traditional redistricting criteria ignores the multitude of other factors that must be considered in drawing a district. Nonetheless, Illustrative Plan 9 is well within the normal range of compactness – in Alabama and nationwide. Illustrative Plans 1 through 8 are also reasonably compact, but I focus on Illustrative Plan 9 here.

A. Illustrative Plan 9 compared to 2023 Plan and the Special Master Plan

31. **Figure 9** summarizes Reock and Polsby-Popper scores – the two most widely-referenced measures of compactness – for Illustrative Plan 9, the 2023 Plan, and the Special Master Plan.

Figure 9**Compactness Scores – Illustrative Plan 9, 2023 Plan and Special Master Plan**

	Reock				Polsby-Popper		
	Mean avg.	Low	High		Mean avg.	Low	High
2023 Plan							
All Districts	.41	.31	.61		.28	.18	.40
CD 2	.61				.37		
CD 7	.40				.23		
Special Master Plan							
All Districts	.35	.21	.46		.24	.14	.40
CD 2	.22				.34		
CD 7	.46				.21		
Illustrative Plan 9							
All Districts	.43	.26	.59		.27	.17	.48
CD 2	.33				.21		
CD 7	.32				.20		

32. As shown in **Figure 9**, from the standpoint of overall compactness (mean average), Illustrative Plan 9 is on par or superior to the 2023 Plan and the Special Master Plan.

B. Nationwide Enacted Congressional Plans 2024

33. As shown in **Figure 10**, Illustrative Plan 9 scores 59 (out of a possible 100) in a composite plan-wide compactness measure, as reported by the Dave’s Redistricting Application (“DRA”) website.⁸ When compared against all 2024

⁸ <https://davesredistricting.org/maps#ratings::ccc802f8-eff7-427e-9f7b-a6b99264fd81>.

congressional plans with at least three districts (36 states), Illustrative Plan 9 ranks tenth most compact (in a 4-way tie with Arkansas, Oregon, and Pennsylvania).⁹

Figure 10

DRA Composite Compactness Scores (36 states with 3 or more districts)

State	Score	State	Score	State	Score
Indiana	93	Connecticut	58	New Mexico	47
Nevada	77	Georgia	58	South Carolina	37
Florida	70	Washington	58	New Jersey	36
Utah	70	Kansas	56	Alabama (2024)**	36
Mississippi	65	Ohio	56	Kentucky	35
New York	63	Alabama (2023)*	55	Maryland	35
Michigan	62	Virginia	54	California	33
North Carolina	61	Iowa	53	Massachusetts	31
Missouri	60	Minnesota	53	Texas	26
Arkansas	59	Arizona	51	Tennessee	21
Oregon	59	Oklahoma	50	Louisiana	11
Pennsylvania	59	Colorado	50	Illinois	10
Illustrative Plan 9	59	Wisconsin			

*The 2023 Plan **Special Master Plan

34. Illustrative Plan 9 scores higher than both the 2023 Enacted Plan (55) and the Special Master Plan (36).

⁹ My choice of the 36 states with at least 3 congressional districts is consistent with Dr. Trende's selection set (Trende Report. p.36), with the exception of Louisiana's 2024 Congressional Plan, which I include because it is the official map for the 2024 election cycle.

To access DRA's maps, stats, and compactness scores for current and recent congressional plans by state, click the My Maps tab (top left-hand corner) and then check "Official Maps" or follow the link: <https://davesredistricting.org/maps#list::Official-Maps>.

If you don't have an account, click SIGN UP at the link to create a free account: <https://davesredistricting.org/maps#home>.

35. Illustrative Plan 9 also scores higher than the enacted congressional plans in two states – Arizona (51) and Virginia (54) – where Dr. Trende served as a consultant to independent redistricting commissions in the post-2020 redistricting cycle.

36. While Dr. Trende criticizes the use of plan-wide compactness scores, he rightfully admits that they are not “inherently untrustworthy” and he has used such measures in his work. (Trende Report, p. 23).

37. In fact, in a December 27, 2021 memo to the Supreme Court of Virginia, Dr. Trende (along with fellow Special Master Dr. Bernard Grofman) endorsed the DRA plan-wide composite compactness score, adding that the “most important compactness score is for the state as a whole”. Specifically, they wrote:

“[S]ince we are drawing a whole map for the state, the most important compactness comparison is for the state as whole. Dave’s Redistricting App provides a composite compactness score for a whole map. The Special Masters’ (SMs) congressional map is more compact than the current congressional map, a value of 46 for the SMs map as compared to a value of only 25 for the current map”¹⁰

38. Considering what Dr. Trende deems the “most important compactness score,” there is little doubt that Illustrative Plan 9 is reasonably compact.

¹⁰ *Memo to the Chief Justices and Justices of the Supreme Court of Virginia*, Dec. 27, 2021, p.18.

C. Alabama Historical Plans – 1992 to 2022

39. As shown in **Figure 11**, based on the plan-wide composite compactness measure reported by the DRA website, Illustrative Plan 9 is also superior to all congressional plans in place in Alabama since 1992, including the 2023 Enacted Plan and the 2023 Special Master Plan.¹¹

¹¹ DRA maps and stats for Alabama’s congressional plans from 1992 to 2024:

1992 to 2000

<https://davesredistricting.org/maps#ratings::ed20be30-3a37-49ed-ad4e-9330690027f0>

2002-2010

<https://davesredistricting.org/maps#ratings::070797a6-3ca6-4de7-af5e-402e202a0f53>

2012-2020

<https://davesredistricting.org/maps#ratings::a3df66fd-3cb8-4c76-ba40-04a804c80a20>

2022

<https://davesredistricting.org/maps#ratings::b1cfc3f6-27df-498d-a147-0664d75fea88>

2024

<https://davesredistricting.org/maps#ratings::e164e6f9-b758-4c9e-b6bb-332a1386c0cd>

Figure 11**DRA Compactness Scores (Alabama Plans – 1992-2024)**

Plan	Composite Score
1992 to 2000	36
2002 to 2010	32
2012 to 2020	38
2021 Enacted (2022)	38
2023 Enacted	55
2024 Special Master	36
Illustrative Plan 9	59

VI. District-by-District Compactness Comparisons**A. Illustrative Plan 9 vs. the 2023 Plan**

40. **Figure 12** compares the Reock and Polsby-Popper scores for Illustrative Plan 9¹² and the 2023 Plan,¹³ as reported by DRA. Bolded scores are higher relative to the same district in the other plan.

¹² <https://davesredistricting.org/maps#analytics::ccc802f8-eff7-427e-9f7b-a6b99264fd81>

The district-by-district compactness scores are available for all of the referenced plans under the rightmost tab “Advanced” on DRA.

¹³ <https://davesredistricting.org/maps#ratings::02f339fa-f8b4-4bc4-bce9-f8b08cdaf2f1>

Figure 12**Illustrative Plan 9 vs. 2023 Enacted Plan**

Illustrative Plan 9	Reock	Polsby- Popper	2023 Enacted Plan	Reock	Polsby- Popper
1	0.2366	0.1904	1	0.2854	0.2325
2	0.3079	0.2069	2	0.5832	0.3677
3	0.4680	0.1678	3	0.4653	0.3639
4	0.6434	0.4369	4	0.3169	0.1983
5	0.4730	0.4796	5	0.3167	0.3708
6	0.6163	0.1962	6	0.4760	0.1842
7	0.3103	0.1962	7	0.4335	0.2418
Mean Avg.	0.4365	0.2678	Mean Avg.	0.4110	0.2799

41. Illustrative Plan 9 and the 2023 Enacted Plan are almost exactly equal on compactness at the district level. Illustrative Plan 9 scores higher than the 2023 Enacted Plan on the Reock measure in four districts, while the 2023 Plan scores higher than Illustrative Plan 9 on the Polsby-Popper measure in four districts.

B. Nationwide – Illustrative Plan 9 vs. 2024 Plans Nationwide

42. **Figure 13** shows the 25 least compact congressional districts in the country, based on Reock scores. No district in Illustrative Plan 9 ranks among them.

43. In fact, neither District 2 nor District 7 in any of my Illustrative Plans rank among the 25 least compact congressional districts in the country based on Reock scores.

44. As shown in **Exhibit B-1**, nationwide there are 45 congressional districts (in 18 states) with Reock scores lower than the least compact district in

Illustrative Plan 9 (District 1 with a Reock score of .2366). In fact, both Arizona and Virginia, where Dr. Trende served as a post-Census 2020 redistricting cycle consultant, have districts that are among the 25 least compact, according to the Reock measure.

45. **Figure 13** also shows the 25 least compact congressional districts in the country, based on the Polsby-Popper measure. Again, no district in Illustrative Plan 9 ranks among them.

46. With one exception, neither District 2 nor District 7 in any of my Illustrative Plans rank among the 25 least compact congressional districts in the country based on Polsby-Popper scores. Only District 7 in Illustrative Plan 6 would appear on this list—ranked number 25 by .0002.

Figure 13**25 Least Compact Congressional Districts (2024) – Reock and Polsby-Popper**

State	District	Reock		State	District	Polsby-Popper
AZ	7	0.1618		CA	19	0.10
CA	3	0.1337		CA	20	0.0953
CA	11	0.0954		CA	31	0.1062
CA	19	0.148		CA	41	0.0599
CA	41	0.2026		CA	45	0.0785
CA	42	0.1254		CO	1	0.0864
CO	1	0.1612		CO	6	0.0919
FL	28	0.2004		IL	3	0.0787
IL	3	0.1534		IL	5	0.0677
IL	5	0.1248		IL	8	0.1075
IL	9	0.1029		IL	9	0.0961
IL	13	0.1101		IL	13	0.1043
KY	1	0.1503		IL	16	0.0925
KY	4	0.1896		IL	17	0.0768
LA	6	0.1188		KY	1	0.0897
MD	6	0.1453		LA	4	0.0820
MI	5	0.1381		LA	5	0.0809
MI	13	0.1728		LA	6	0.0527
MN	1	0.1671		MA	7	0.0928
NY	23	0.1868		SC	6	0.0769
TX	15	0.1637		TX	2	0.0745
TX	33	0.1926		TX	18	0.0808
TX	34	0.2002		TX	29	0.0877
TX	35	0.0971		TX	33	0.0450
VA	9	0.1696		TX	35	0.0547

47. As detailed in **Exhibit B-2**, nationwide there are 80 congressional districts (in 20 states) with Polsby-Popper scores lower than the least compact district in Illustrative Plan 9 (District 3 with a Polsby-Popper score of .1678).

C. Illustrative Plans vs. Alabama Historical Plans

48. Dr. Trende claims that some of the districts in my other illustrative plans rank among the least compact districts that Alabama has enacted in recent years. (*See e.g.*, Trende Report, p. 43 & figs. 23, 25). Dr. Trende misses the point on a few marks. First, none of the districts he identifies in Figure 23 are Illustrative District 2, which is the new majority-Black district I have drawn. In other words, this chart does not provide any information about whether the Black population in southern and central Alabama is sufficiently compact to form a majority of the voting age population a new congressional district. In fact, it confirms that none of the Illustrative District 2s I drew rank among the least compact districts Alabama has drawn in the last 50 years.

49. In fact, District 2 and 7 in all of my illustrative plans fall well within the range of compactness scores for congressional districts Alabama has enacted since 1992. **Figures 14 and 15** show Reock and Polsby-Popper scores for CD 2 and CD 7 in each of my illustrative plans and every district in congressional plans Alabama has enacted dating back to 1992. CD 2's and CD 7's compactness scores,

on both the Reock and Polsby-Popper measures, in each of my illustrative plans have compactness scores similar to many congressional districts enacted by the Alabama Legislature in the past three decades.

Figure 14

Illustrative Plans vs. Alabama Historical Plans - Reock

Plan	District	Reock	Plan	District	Reock
2023 Plan	2	0.5832	Illustrative Plan 1	7	0.3657
2002 Plan	2	0.4877	Illustrative Plan 5	2	0.3646
2022 Plan	2	0.4837	Illustrative Plan 7	7	0.3594
1992 Plan	1	0.4795	2002 Plan	7	0.3564
2023 Plan	6	0.476	2022 Plan	6	0.3559
2022 Plan	7	0.4744	2002 Plan	3	0.3505
2012 Plan	2	0.4716	Illustrative Plan 4	2	0.3267
2024 Special Master Plan	7	0.4705	2012 Plan	4	0.3261
1992 Plan	2	0.4701	2022 Plan	4	0.3243
2023 Plan	3	0.4653	2023 Plan	4	0.3169
2024 Special Master Plan	3	0.4653	2024 Special Master Plan	4	0.3169
2024 Special Master Plan	6	0.46	2023 Plan	5	0.3167
2002 Plan	1	0.4495	2024 Special Master Plan	5	0.3167
2012 Plan	6	0.4476	Illustrative Plan 9	7	0.3103
2012 Plan	1	0.4345	Illustrative Plan 9	2	0.3079
2023 Plan	7	0.4335	Illustrative Plan 1	2	0.3026
2022 Plan	3	0.4203	Illustrative Plan 8	2	0.3001
Illustrative Plan 4	7	0.4189	Illustrative Plan 6	2	0.2944
2012 Plan	7	0.4163	1992 Plan	4	0.2901
2012 Plan	3	0.416	2002 Plan	4	0.2899
2022 Plan	1	0.4132	Illustrative Plan 3	7	0.2861
2002 Plan	6	0.4046	2023 Plan	1	0.2854
1992 Plan	7	0.4013	Illustrative Plan 2	2	0.2829
Illustrative Plan 8	7	0.3961	2022 Plan	5	0.2479
1992 Plan	3	0.3953	Illustrative Plan 5	7	0.2267
1992 Plan	6	0.3894	2002 Plan	5	0.2211
Illustrative Plan 2	7	0.3873	1992 Plan	5	0.2174
Illustrative Plan 6	7	0.3849	2024 Special Master Plan	2	0.2049
Illustrative Plan 7	2	0.3755	2024 Special Master Plan	1	0.1916
Illustrative Plan 3	2	0.3658	2012 Plan	5	0.1818

Figure 15**Illustrative Plans vs. Alabama Historical Plans – Polsby-Popper**

Plan	District	Polsby-Popper	Plan	District	Polsby-Popper
2023 Plan	5	0.3708	2022 Plan	7	0.1948
2024 Special Master Plan	5	0.3708	Illustrative Plan 7	2	0.1946
2023 Plan	2	0.3677	2022 Plan	4	0.1937
2023 Plan	3	0.3639	2012 Plan	4	0.1871
2024 Special Master Plan	3	0.3639	1992 Plan	4	0.1866
2022 Plan	5	0.2975	2023 Plan	6	0.1842
2012 Plan	5	0.2634	Illustrative Plan 4	2	0.1806
2022 Plan	3	0.2573	2002 Plan	4	0.1678
2002 Plan	2	0.254	2012 Plan	1	0.1613
2022 Plan	2	0.2498	2022 Plan	6	0.1543
2023 Plan	7	0.2418	Illustrative Plan 3	7	0.1528
1992 Plan	5	0.2355	2024 Special Master Plan	1	0.1475
Illustrative Plan 4	7	0.2351	Illustrative Plan 1	2	0.1394
2023 Plan	1	0.2325	2024 Special Master Plan	2	0.139
2012 Plan	3	0.23	2012 Plan	6	0.1349
2002 Plan	5	0.2235	Illustrative Plan 1	7	0.1341
Illustrative Plan 3	2	0.2193	2002 Plan	1	0.1337
1992 Plan	1	0.2178	2012 Plan	7	0.1335
2012 Plan	2	0.2175	Illustrative Plan 7	7	0.1305
1992 Plan	3	0.2098	Illustrative Plan 8	7	0.1288
2024 Special Master Plan	7	0.209	Illustrative Plan 8	2	0.126
1992 Plan	2	0.2078	Illustrative Plan 2	7	0.1256
Illustrative Plan 9	2	0.2069	1992 Plan	6	0.1204
2024 Special Master Plan	6	0.1997	Illustrative Plan 2	2	0.1157
2002 Plan	3	0.1989	Illustrative Plan 6	2	0.1149
Illustrative Plan 5	2	0.1989	Illustrative Plan 5	7	0.1149
2023 Plan	4	0.1983	Illustrative Plan 6	7	0.1073
2024 Special Master Plan	4	0.1983	2002 Plan	6	0.1052
Illustrative Plan 9	7	0.1962	2002 Plan	7	0.1036
2022 Plan	1	0.195	1992 Plan	7	0.0994

50. Second, Dr. Trende's chart confirms that the differences in compactness among these districts can be incredibly small, and at times negligibly

small, so ranking them as Dr. Trende did does not necessarily provide any useful information. For example, as reported by Dr. Trende, the difference between District 1 in my Illustrative Plan 6 and District 5 in Alabama's map 103 is .0062, a negligibly small difference. (Trende Report, fig. 23). The same responses apply to Dr. Trende's Figure 25.

VII. Jefferson County Case Study

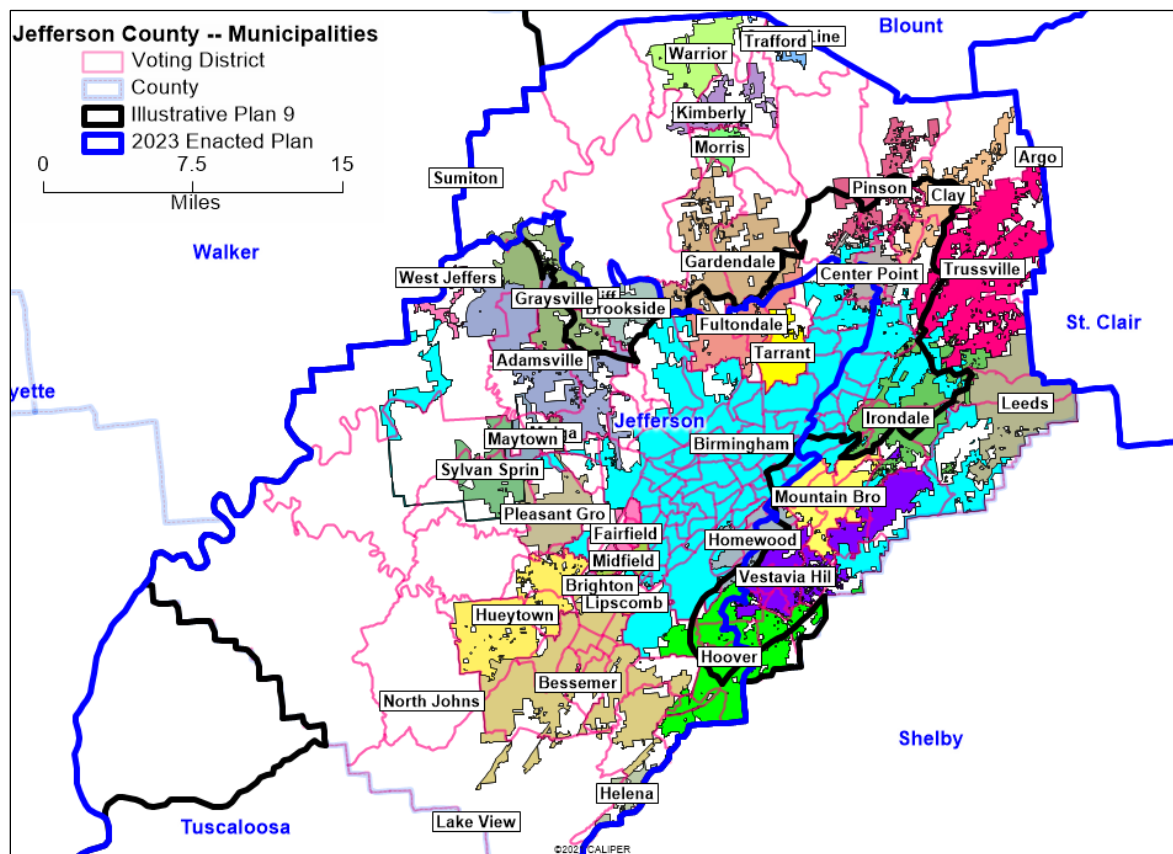
51. Dr. Trende suggests that I split Jefferson County along racial lines. (Trende Report, pp. 61-65). This is wrong. When drawing district boundaries in Jefferson County, I considered municipal lines, VTDs, block group boundaries, transportation corridors, topography, population distribution, county commission districts, county school board districts, 2022 State Senate Districts, the 2023 Enacted Plan, the Special Master Plan, and community socio-economic profiles.

52. My knowledge about Jefferson County has developed over the course of six Voting Rights Act lawsuits since 2012 in Alabama that involved Jefferson County. In the 2010s, I also served as a GIS/demographic expert in a desegregation lawsuit involving efforts of the majority-White city of Gardendale to de-annex from the racially diverse Jefferson County School District. During that lawsuit, I visited schools and areas around Jefferson County.

53. Jefferson County has a range of unique challenges that make drawing a compact or smooth split very difficult. As shown in the **Figure 16** map, Jefferson County is a crazy quilt of misshapen VTDs and highly irregular municipal boundaries. **Exhibit C-1** is a higher resolution version of the Figure 16 map.

Figure 16

Jefferson County Municipalities and VTDs



54. For example, the City of Birmingham (turquoise) spans the width of Jefferson County – sometimes reduced to nothing more than two highway lanes.

Birmingham wraps around Irondale and Mountain Brook on the Shelby County line and touches the Walker County line in western Jefferson County.

55. Plan drawing becomes even more complicated after factoring in the 219 VTDs in Jefferson County. As shown in **Exhibit C-2**, Jefferson County VTDs split populated areas of the 39 municipalities into 222 pieces.

56. **Figure 17** reports compactness scores for the 15 most populous municipalities in Jefferson County. Thirteen of the municipalities have Polsby-Popper scores below 0.1, meaning they have extremely irregular boundaries. The data in Figure 17 is restricted to Jefferson County. For example, populated areas of Birmingham and Hoover extend into Shelby County.¹⁴ Leeds encompasses three counties – Jefferson, Shelby, and St. Clair. **Exhibit D** reports Reock and Polsby-Popper scores for all 39 incorporated places in Jefferson County.¹⁵

¹⁴ Including Shelby County, the 2020 population of Birmingham is 200,733. Hoover's 2020 population is 92,606.

¹⁵ I used *Maptitude for Redistricting* to generate compactness scores for the municipalities.

Figure 17**Compactness – 15 Most Populous Jefferson County Municipalities**

Municipality	Pop.	% NH White	% AP Black	Reock	Polsby Popper
Birmingham	198829	22.56%	70.25%	0.18222	0.0103
Hoover	65961	63.67%	21.19%	0.08858	0.0280
Vestavia Hills	39062	83.31%	5.37%	0.17633	0.0188
Homewood	26414	68.82%	20.70%	0.32635	0.1249
Bessemer	26019	18.74%	71.23%	0.31588	0.0294
Trussville	24521	82.16%	10.86%	0.29823	0.0152
Mountain Brook	22461	94.57%	0.79%	0.37620	0.0904
Hueytown	16776	51.50%	40.15%	0.33573	0.0440
Center Point	16406	17.06%	76.09%	0.46965	0.0538
Gardendale	16044	76.38%	15.89%	0.42477	0.0216
Irondale	13497	53.22%	31.42%	0.27665	0.0192
Clay	10291	54.03%	38.33%	0.14343	0.0217
Leeds	10164	69.11%	18.89%	0.40581	0.1209
Fairfield	10000	2.17%	96.00%	0.33111	0.1806
Fultondale	9876	49.38%	33.15%	0.21131	0.0750

57. Finally, one must add complex topography to the list of challenges facing a map-drawer in Jefferson County. Jefferson County is not a two-dimensional flat plain. Jefferson County is very Appalachian. Some of the more rural parts of Jefferson County remind me of coal towns in Southwest Virginia and Eastern Kentucky, where you can't see the mountains for the hills – and, as we say in Appalachia with respect to travel routes, “you can't get there from here.”

58. All of these unique characteristics of Jefferson County mean that it is difficult to draw smooth lines in this county. In other words, the bizarre boundaries

and complex topography in Jefferson County naturally led to lower compactness scores for District 7. Even so, I was able to configure District 7 in all of the Illustrative Plans so that it is clearly within Alabama's contemporary and historical compactness norms, while also creating a second majority-Black district.

VIII. Distance Between Population Centers

59. Dr. Trende devotes the final 15 pages of his report to blue dot population distribution maps to argue that Mobile and Montgomery are too far apart to be in the same congressional district. (Trende Report, pp. 74-90).

60. There is no brightline rule for how long a congressional district can be, and there is no absolute way to determine whether a district is "too long." There is also no traditional redistricting requirement that forbids one urban center from being joined with another in a district.

61. Similarly, Dr. Trende's single-minded focus on compactness does not hold up elsewhere in the 2023 Enacted Plan. For example, Dr. Trende claims Illustrative District 2 in each of my plans is "sprawling." (Trende Report, p. 75). However, the distance encompassed by CD 4 in the 2023 Plan (and the 2021 Plan) is comparable to the distance between Montgomery and Mobile. According to Google Maps, the driving distance from Fort Payne in Dekalb County to downtown Tuscaloosa (both of which are in CD 4 in the 2023 Plan) via I-59 and Birmingham

is 152 miles. The driving distance from downtown Mobile to downtown Montgomery (both of which are in District 2 in the illustrative plans) is about the same – 169 miles. While District 2 in some of the illustrative districts may be wider in miles than CD 4 in the 2023 and 2021 Plans, CD 4 consistently spans the width of the entire state of Alabama, like District 1 and District 2 in some of my illustrative plans.¹⁶

IX. Racial Disparities

62. Dr. Hood reports statistics regarding the voter registration rates for Black Alabamians over time. (Hood Report, p. 22). While Black voter registration rates have improved since the passage of the Voting Rights Act in 1965, it is still the case that Black voter registration rates in Alabama lag White voter registration rates (85.7% vs. 92%), as shown in **Exhibit E**.¹⁷ Additionally, the White population continues to significantly outpace the Black population across almost every measure

¹⁶ Dr. Trende argues that because CD4 and CD5 have been drawn in roughly the same fashion for the past 150 years, it is necessary to continue that tradition even though there are more compact alternatives. (Trende Report, p. 32). I question that assessment, both because it seems inconsistent with Dr. Trende's singular focus on compactness in other parts of his report and because the population distribution in northeast Alabama has changed dramatically over the last 150 years. In 1870, Madison County had a population of 31,267. Today, it is the largest county in the state, with a 2020 population of 388,153.

¹⁷ Based on June 2024 active registered voters and 2020 Census VAP, available at: <https://www.sos.alabama.gov/alabama-votes/voter/election-data>.

of socio-economic well-being. A cursory review of the charts in **Exhibit F-2** from the statewide 1-year 2022 American Community Survey makes these disparities clear.

63. Dr. Hood also reports that there are more Black representatives in the Alabama state legislature today than there were in 1965. This is true. What Dr. Hood fails to mention is that all but one of the 33 elected Black representatives in the Alabama Legislature are elected from majority-Black districts, as shown in **Exhibit G**.

###

I reserve the right to continue to supplement my reports in light of additional facts, testimony and/or materials that may come to light.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: September 6, 2024 (as amended)



WILLIAM S. COOPER