**UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
RICHMOND DIVISION**

GLORIA PERSONHUBALLAH, *et al.*,	)	
	)	
Plaintiffs,	)	
	)	Civil Action No. 3:13-cv-678
v.	)	
	)	
JAMES B. ALCORN, *et al.*,	)	
	)	
Defendants.	)	

**MEMORANDUM OF *AMICI CURIAE* COMMON CAUSE AND NEW VIRGINIA
MAJORITY REGARDING PROPOSED REMEDIAL PLANS**

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INTERESTS OF *AMICI CURIAE*[1]

Amicus curiae Common Cause is a non-partisan, non-profit advocacy organization founded in 1970 as a vehicle for citizens to make their voices heard in the political process and to hold their elected leaders accountable to the public interest. With over 400,000 members and supporters, Common Cause advocates for honest and open government. Common Cause has long worked for reform of the redistricting process by supporting both state and federal legislative efforts, and state ballot initiatives, designed to make the redistricting process less susceptible to manipulation for purely partisan motives. Common Cause has participated in redistricting cases as an *amicus curiae*, most recently in the U.S. Supreme Court in *Evenwel v. Abbott*, No. 14-940 (U.S. probable jurisdiction noted May 26, 2015), *Shapiro v. McManus*, No. 140990, and *Ariz. State Legislature v. Ariz. Indep. Redistricting Comm'n*, 135 S. Ct. 2652, 2658 (2015).

Amicus curiae New Virginia Majority (NVM) is a Virginia non-profit organization. Since 2007 NVM has used mass organizing, leadership development, and strategic communications to champion the voices of communities of color, women, working people, LGBTs, and youth. New Virginia Majority has visited over 800,000 voters and developed into Virginia's leading progressive civic engagement organization. New Virginia Majority's voter participation program builds relationships with community residents and brings neighbors together to create change, whether or not there is an election on the horizon. The organization works with residents to organize their own neighborhoods in an effort to win policy victories and educate their friends and families about critical issues. It engages citizens on how to make Virginia's redistricting

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[1]   *Amici* affirm that no counsel for a party authored this brief in whole or in part and that no person other than *amici* and their counsel made a monetary contribution to its preparation or submission.

process more open and transparent. In 2011, NVM sought to prevent Prince William County

from opting out of 1965 Voting Rights Act review of their redistricting process.

INTRODUCTION

On June 5, 2015, this Court determined that Virginia Congressional District 3, as adopted

by the Virginia legislature in 2012, constituted an impermissible racial gerrymander in violation

of the Equal Protection Clause of the Fourteenth Amendment because race predominated in the

drawing of the third congressional district. In particular, this Court found that the Legislature

insisted upon a 55% Black Voting Age Population (BVAP) floor for District 3 as a

nonnegotiable precondition of any redistricting plan, without any evidence that such a floor was

necessary to maintain Black voters' ability to elect the representative of their choice. Based upon

this BVAP floor, the Legislature drew an oddly-shaped district that cut across political

subdivisions in order to sweep additional black voters into the district. The Special Master and

the Court, in the remedy stage of this litigation, now have the "unwelcome obligation" of

imposing a plan that fully remedies the constitutional violation in the unconstitutional 2012 Plan.

Wise v. Lipscomb, 437 U.S. 535, 540 (1978) (quoting *Connor v. Finch*, 431 U.S. 407, 415

(1977)).

Amici submit this Memorandum to assist this Court and the Special Master in fulfilling

that obligation by providing an analysis of various proposed plans. The analysis of proposed

plans has been undertaken by Professors Robin Best, Jonathan Krasno, Daniel B. Magleby, and

Michael D. McDonald, who are professors of political science at the State University of New

York at Binghamton.[2] They all have an academic interest in the implementation of fair and

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[2] Professors Best, Krasno, Magleby and McDonald were assisted in their analysis by
Shawn J. Donahue, a graduate student in the political science department of the State University
of New York at Binghamton.

effective congressional districts. These political scientists analyzed the level of partisan

gerrymandering in each of the proposed remedial plans submitted to the court.[3]

In determining the appropriate remedial plan, the Special Master and Court must, of

course, consider which plan most effectively remedies the unconstitutional racial gerrymander of

District 3. Each of the proposed plans use factors other than race, such as contiguity and

compactness, and reduce the BVAP of District 3 from 56.3% under the 2012 Plan to between

41.9% BVAP and 52.3% BVAP in the various proposed plans. In choosing among the proposed

plans, the Special Master and Court must also consider various other factors including, but not

limited to, compliance with the Voting Rights Act,[4] equal population, contiguity and

compactness pursuant to the Virginia Constitution, and compliance with the U.S. Constitution.

For over 50 years, the Supreme Court has recognized that the goal of redistricting is to

establish "fair and effective representation for all citizens." *Reynolds v. Sims*, 377 U.S. 533, 565-

68 (1964). In *Vieth v. Jubelier*, 541 U.S. 267 (2004), all nine Justices of the Supreme Court

agreed that excessive partisanship in redistricting offends the Constitution. *Id.* at 293 (opinion of

Scalia, J., joined by Roberts, C.J., O'Connor, & Thomas, J.J.) ("[A]n *excessive* injection of

politics is *un*lawful. So it is, and so does our opinion assume."); *id.* at 311-12 (Kennedy, J.

concurring in the judgment) ("Allegations of unconstitutional bias in apportionment are most

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[3]   *Amici* write in their individual capacity as interested and concerned citizens and academics. Binghamton University bears no responsibility for the analysis and conclusions drawn herein. The academic credentials of these political science professors are available at https://www.binghamton.edu/political-science/faculty/robin-best.html, https://www.binghamton.edu/political-science/faculty/jonathan-krasno.html, http://www.binghamton.edu/political-science/faculty/dan-magleby.html, and https://www.binghamton.edu/political-science/faculty/michael-mcdonald.html.

[4]   Several proposed remedial plans contend that it is possible to create two congressional districts in which Black voters would enjoy an effective and equal opportunity to elect their preferred candidates, while employing race-neutral traditional redistricting criteria such as compactness and contiguity.

serious claims, for we have long believed that "the right to vote" is one of "those political processes ordinarily to be relied upon to protect minorities."); *id.* at 326 (Stevens, J., dissenting) ("State action that discriminates against a political minority for the sole and unadorned purpose of maximizing the power of the majority plainly violates the decisionmaker's duty to remain impartial."); *id.* at 343 (Souter, J., joined by Ginsburg, J., dissenting) ("However equal districts may be in population as a formal matter, the consequence of a vote cast can be minimized or maximized, and if unfairness is sufficiently demonstrable, the guarantee of equal protection condemns it as a denial of substantial equality.") (internal citations omitted); *id.* at 355 (Breyer, J., dissenting) ("Sometimes purely political 'gerrymandering' will fail to advance any plausible democratic objective while simultaneously threatening serious democratic harm. And sometimes when that is so, courts can identify an equal protection violation and provide a remedy.").[5]

The Court has recently reiterated that partisan gerrymanders "[are incompatible] with democratic principles." *Ariz. Indep. Redistricting Comm'n*, 135 S. Ct. at 2658 (alteration in original) (quoting *Vieth*, 541 U.S. at 292). While the Court has yet to settle on a standard for striking down partisan gerrymanders as unconstitutional, it has consistently and repeatedly acknowledged that partisan gerrymanders offend the Constitution. In fact, "[t]he doctrine of 'one person, one vote' originally was regarded as a means to prevent discriminatory gerrymandering since 'opportunities for gerrymandering are greatest when there is freedom to construct unequally populated districts.'" *Davis v. Bandemer*, 478 U.S. 109, 168 n.5 (1986) (Powell, J., concurring) (quoting *Kirkpatrick v. Preisler*, 394 U.S. 526, 534 n.4 (1969)). Therefore, it is entirely appropriate for this Court to consider the level of partisan gerrymandering in the

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[5]   Mitchell N. Berman, *Managing Gerrymandering*, 83 TEX. L. REV. 781, 782 (2005) ("To be sure, *Vieth* did advance the ball in one critical respect: For the first time, all nine Justices agreed that excessive partisanship in redistricting is unconstitutional.").

proposed plans in selecting a remedial plan that accords with the principles of the U.S. Constitution, the Voting Rights Act, and the Virginia Constitution. This Court should adopt a remedial plan that avoids excessive partisan bias, which the Supreme Court has repeatedly held is unconstitutional and inconsistent with democratic principles.

The political scientists who have conducted their analysis for *amici* have developed a manageable standard for analyzing the level of partisan gerrymandering in the proposed plans by determining when redistricting lines upset the natural weight of a vote along partisan lines significantly more than a partisan-blind mapping process would.[6] Applying this standard to all the proposed remedial plans, *amici* determined that the plans submitted by Richmond First Club, Plaintiffs, Rapoport, and both plans submitted by Intervenors result in significant partisan gerrymanders, disadvantaging Democratic voters such that they cannot carry a majority of the districts even where they constitute the majority of voters. *Amici* determined that plans submitted by Senator Peterson and the Governor do not result in partisan gerrymanders. Three other plans also appear not to produce partisan gerrymanders: Bull Elephant Media Plan A, Bull Elephant Media Plan B, and the NAACP Plan. Therefore, *amici* respectfully submit that in imposing a remedial plan that remedies the unconstitutional racial gerrymander, the Court must ensure that its plan meets the requirements of Section 2 of the Voting Rights Act and that the level of partisan gerrymandering in each plan accords with constitutional principles that safeguard against partisan discrimination.

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[6]   In 2014-15, *amicus* Common Cause convened a trans-partisan group of academic and legal scholars to judge written submissions from scholars and experts around the country, proposing methods for measuring the partisan fairness of district lines. Through a double blind selection process, the winning methodology, or "gerrymander standard" was by the team from SUNY Binghamton, led by political science professors Michael D. McDonald and Robin Best.

DISCUSSION

I.   TOWARD AN *EQUAL VOTE WEIGHT* STANDARD

An easily manageable *equal vote weight* standard can be used to identify when a districting plan has had or is likely to have the effect of creating unequal vote weights for voters along partisan lines.

The *equal vote weight* standard relies on four principles:

1.   A districting plan that packs one set of partisan votes more than the other can be identified by a simple comparison of the median district vote percentage to the mean district vote percentage. A difference between the median and mean indicates an asymmetrical packing.

2.   Not any and all indications of packing are a definite sign of unequal vote weights. However, when there is a persistent asymmetry with the mean *and* system-wide two-party vote percentage on one side of the 50 percent mark and the median district two-party percentage on the other side of the 50 percent mark, it is certain that all votes do not carry the same weight.

3.   The vote weight inequality is clear because when one set of partisan voters cast a majority of the votes but nonetheless consistently carries less than a majority of the districts, the voting majority's votes are undervalued.

4.   The *equal vote weight* analysis demonstrates that the line placements are the cause of the unequal vote weights. When votes are counted system-wide, all votes contribute equally to the count. When votes are counted after division into districts, nothing changes except the

manner in which the votes are being counted. To the extent the two forms of counting do not produce the same result, the difference must be caused by the placement of district lines.[7]

a. A Hypothetical Illustration of the *Equal Vote Weight* Analysis.

Imagine a three-district plan where Republicans cast 60% of all votes, but the districts are arranged so that Republicans are 35% of voters in District One, 45% of voters in District Two, and 100% of voters in District Three. The median district voter percentage, the district voter percentage that resides at the middle position when all district percentages are arranged in order from low to high, is 45%. Meanwhile, the district mean percentage is 60% [(35 + 45 + 100)/3 = 60]. The -15% difference between the median and mean indicates that this three-district plan packs Republican voters more than Democrats. Such packing creates an imbalance that potentially can, and in this example demonstrably does, operate to undervalue Republican votes relative to Democratic votes.

In this hypothetical, the -15% differential translates into a meaningful, and harmful, vote-weight imbalance because, as a result, a minority of voters system-wide, 40% Democrat, carries a majority (2/3) of the districts. A jurisdiction-wide voter majority can be turned into a system-wide outcome minority if, and only if, all votes do not count equally. Thus, the vote weights given to Republicans are undervalued because, as stated in the third principle above, violations of majority rule subvert a claim of equal vote weights. Indeed, one value justification of majority

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[7] To be sure, some asymmetrical packing may occur naturally due to geography, residential patterns and respect for political subdivisions. To control for this natural asymmetry, the foregoing analysis includes 1,000 computer-generated, neutral plans and the average mean-median differential among those plans. The analysis only concludes that a proposed plan constitutes a partisan gerrymander where the mean-median differential and consequent partisan effects outstrip any natural asymmetry that would be expected in a partisan-blind plan.

rule, among others, is its strict insistence on voter equality when relying on it as a decision rule.[8]

Moreover, as stated in the fourth principle above, we know that the district line placements are the cause of the unequal vote weights. At the system-wide level, the votes are counted equally and all votes contribute equally to the outcome. But after division into districts, the outcome changes dramatically. That difference must be attributed to the placement of district lines.

We hasten to note that not all median-mean asymmetries equal vote dilution. For example, imagine that the same community as described above is divided into three-districts with 45, 55, and 90 percent Republican voters, respectively. In that case, the median percentage is 55% while the mean percentage is 60%. The 55/60 differential demonstrates the potential for dilution. The potential for harm exists because the median and mean are not the same. However, in this example, Republicans carry two of three districts, just as they would without packing. In other words, the mean-median differential signals a potential harm, but the outcomes indicate that no tangible harm will result from the asymmetry.

Therefore, the *equal vote weight* analysis requires two steps. First, it compares the median district percentage to the mean percentage; any differential signals packing. The second step identifies whether the packing, as indicated by the median-mean comparison, actually produces harm by subverting majority rule. The harm is the under- and overvaluation of vote weight in violation of the widely embraced concept that all votes are to count equally. It is the conjunction of packing (median/mean differential) and the violation of majority rule that signals a partisan gerrymander effect that produces tangible vote weight harm. Where the vote dilution is

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[8]   Kenneth O. May, *A Set of Independent Necessary and Sufficient Conditions for Simple Majority Decision*, 20 ECONOMETRICA 680, 680-84 (1952); ROBERT A. DAHL, DEMOCRACY AND ITS CRITICS 139 (Yale University Press 1989).

not the natural result of geography, residential patterns, or other neutral factors, the result is intentional partisan vote dilution that offends core democratic principles.

b. The 2012 Plan Was a Racial Gerrymander Which Had Unfair Partisan Impact.

The two most recent presidential elections in Virginia serve as a useful fact-based example of when packing does and does not result in individual vote weight harm directly attributable to gerrymandering. In addition to unconstitutionally packing voters on the basis of race, the 2012 Congressional Plan also diluted the vote weight of Democratic voters in favor of Republican voters.

In the 2012 presidential election, Barack Obama received 52% of Virginia's major two-party votes (with Mitt Romney receiving 48%).[9] Table 1, below, demonstrates Obama's vote percentages in each of Virginia's 11 congressional districts.[10]

Table 1

District	2012 Obama Two-Party %
1	46.2
2	50.8
3	79.8
4	49.3
5	46.6
6	40.1
7	42.3

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[9]   The Office of the Clerk of the U.S. House of Representatives reports that Barack Obama won 1,971,820 votes in Virginia to Mitt Romney's 1,822,522. Dividing Obama's votes by the total of the major two-party votes (1,971,820 / 3,794,342), and multiplying by 100 to calculate a percentage, reveals Obama won 52.0 percent of the two-party vote. This is the same as the mean two-party vote percentage. The system-wide and mean percentages will not always equal one another. They could differ because voter turnouts in the various districts differ. However, for the moment, taking turnout differentials into account is not necessary because here, and below in Table 2, the system-wide and mean percentages are equal.

[10]   The district-by-district two-party vote percentages are taken from Obama and Romney votes reported in MICHAEL BARONE & CHUCK MCCUTCHEON, THE ALMANAC OF AMERICAN POLITICS 2014 (University of Chicago Press 2013).

8	68.6
9	35.6
10	49.4
11	63.2
Mean	*52.0*

Arranging the district percentages from low to high, demonstrates the median:

35.6, 40.1, 42.3, 46.2, 46.6, *49.3*, 49.4, 50.8, 63.2, 68.6, 79.8

Median District Percentage

Thus, the median-mean difference (49.3 – 52.0) is -2.7 points. Moreover, as a result of the

differential, Obama only carried 4 of 11 districts despite winning a state-wide and mean two-

party vote majority percentage of 52%. The combination of the median-mean difference and the

subversion of majority-rule demonstrates that Democratic voters were packed to such an extent

that their votes would by systematically undervalued by the districting plan.

As discussed above, this apparent dilution of Democratic vote weights could be the

natural consequence of residential patterns of Republicans and Democrats in Virginia. However,

analyses of the 2008 presidential election in Virginia suggest this is not likely. Table 2, below,

reports the district by district vote percentages in the Obama versus McCain 2008 election.[11] One

column of percentages is for the districts as they existed at the time of the 2008 election, and the

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[11]   The Office of the Clerk of the U.S. House of Representatives reports that Barack Obama won 1,959,532 votes in Virginia to John McCain's 1,725,005. Dividing Obama's votes by the total of the major two-party votes (1,959,532 / 3,684,537), and multiplying by 100 to calculate a percentage, reveals Obama won 53.2 percent of the two-party vote. This is the same as the mean two-party vote percentage. The 2008 district-by-district two-party vote percentages under the 2008 lines are derived from Obama and McCain vote totals by district as reported in MICHAEL BARONE & CHUCK MCCUTCHEON, THE ALMANAC OF AMERICAN POLITICS 2012 (University of Chicago Press 2011). The 2008 district-by-district two-party vote percentages under the 2012 lines are derived from Obama and McCain votes as reported in MICHAEL BARONE & CHUCK MCCUTCHEON, THE ALMANAC OF AMERICAN POLITICS 2014 (University of Chicago Press 2013).

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rightmost column is for the vote percentages after being re-aggregated under the lines in place

for Virginia's 2012 Enacted Plan.

Table 2

District	2008 Obama Two-Party % 2008 District Lines	2008 Obama Two-Party % 2012 District Lines
1	48.1	47.3
2	51.0	50.9
3	76.1	79.0
4	50.8	49.2
5	48.8	48.4
6	42.4	42.4
7	46.3	44.0
8	70.0	69.1
9	40.3	40.8
10	53.5	51.4
11	57.5	62.7
Mean	*53.2*	*53.2*

Arranging the district percentages under the 2008 district lines from low to high demonstrates the

median:

40.3, 42.4, 46.3, 48.1, 48.8, *50.8*, 51.0, 53.5, 57.5, 70.0, 76.1

Median District Percentage

Therefore, under the 2008 district lines, the median-mean difference tilted against Democratic

voters by -2.4 points (53.2 – 50.8). But since the two-party median district percentage was above

50, Obama (representing Democrats) carried a majority of the districts (6 of 11) with a majority

of the votes. This is a real world example where a potential harm is signaled by the median

versus mean comparison, but no harm is realized because the Democratic vote majority carried a

majority of the districts.

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The new 2012 Plan, however, negatively impacted the weight of Democratic votes. Under the lines drawn for the 2012 Enacted Plan, the rightmost column in Table 2 shows that enough packing of Democratic votes occurred so that the median-mean difference increased to -4 points (49.2 – 53.2):

40.8, 42.4, 44.0, 47.3, 48.4, **49.2**, 50.9, 51.4, 62.7, 69.1, 79.0

↑

Median District Percentage

With that shift, the median district would have been won by Republican John McCain. Thus, the redrawing of racially gerrymandered district lines for the 2012 election reassigned voters so that Democrats constituted a vote majority but would carry only a minority of the districts, 5 of 11.

Therefore, the 2012 Enacted Plan clearly tilts the electoral playing field against Democratic voters. The tilted field is observable in the Obama-Romney 2012 votes, as discussed above and demonstrated by Table 1. Moreover, the re-aggregation of the Obama-McCain 2008 votes—which under the 2008 lines result in an outcome consistent with majority rule but which under the Enacted Plan's line contradict an equal vote weight principle—demonstrates that the imbalance is not merely a result of geography and residential patterns of voters.

The results of the actual 2012 and 2014 House elections show similar asymmetries harmful to Democratic voters, as shown by Table 3, below. In both elections the median Democratic two-party percentage was lower than the mean vote percentage. These are additional telltale signs of a districting plan that undervalues the votes of Democrats relative to Republicans.

Table 3

District	2012 U.S. House Two-Party Democrat % 2012 District Lines	2014 U.S. House Two-Party Democrat % 2012 District Lines
1	42.3	35.3

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2	46.2	41.2
3	81.5	100.0
4	**43.0**	**38.4**
5	43.6	37.1
6	34.6	0.0
7	41.5	37.8
8	67.9	66.8
9	38.6	0.0
10	39.9	41.7
11	63.2	58.5
Mean	*49.3*	*41.5*
Median	*43.0*	*38.4*

In the House elections, however, the contra-majority result present in the presidential elections

does not follow because Democrats did not garner a mean vote percentage, or state-wide vote

percentage, over 50%. However, even those results should be viewed with a skeptical eye. The

nature of two-party competition of two candidates within a district is conditioned from the outset

by where the lines are placed. High-quality candidates and campaign resources are deterred when

the district lines are clearly stacked against a party.

II.   PROPOSED REMEDIAL PLANS' PARTISAN GERRYMANDER IMPACT

As discussed above, the Special Master and the Court should, among other factors,

consider each of the proposed remedial plans in light of their potential for diluting votes on the

basis of partisanship. To provide guidance in this regard, this section explains the results of

partisan gerrymandering analyses, according to the *equal vote weight* standard, for ten districting

proposals submitted to the Court.[12]

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[12]   We do not report on Donald Garrett's proposed at-large plan. While at-large plans are not *per se* unconstitutional, they have a well-known tendency to produce super-majoritarian election outcomes. The party winning the largest number of votes statewide holds good prospects for winning a super-majority of seats, perhaps all of them. Such a result would nearly or totally silence minority voices. To avoid such super majoritarian results, Congress has shown a preference for single-member districts by requiring that U.S. House elections be conducted in single-member districts. *See* 2 U.S.C. § 2(c) (1967). Moreover, the Supreme Court has shown "a

Our analysis uses data from nine statewide elections to determine the partisan gerrymandering effects of the proposed remedial plans. Five of the proposed plans (Richmond First, Petersen, Intervenors #1, Intervenors #2, and Governor) report data on a common set of six statewide elections as applied to the proposed plans: Governor 2009, Lieutenant Governor 2009, Attorney General 2009, U.S. Senate 2012, President 2008, and President 2012. For the other five proposed plans, the analysis is based on compiled data from the 2008 and 2012 presidential elections as well as three additional statewide elections: Governor 2013, Lieutenant Governor 2013, and Attorney General 2013. The statewide two-party vote totals and percentages for each of these nine elections are reported in Table 4.[13]

Table 4

Office	Dem. Candidate Total Vote	Rep. Candidate Total Vote	Dem % of Two-Party Vote
Pres. 2008	1,959,532	1,725,005	53.2
Gov. 2009	818,950	1,163,651	41.3
Lt. Gov. 2009	850,111	1,106793	43.4
Att'y Gen. 2009	828,687	1,124137	42.4

preference for a level of parity between votes and representation sufficient to ensure that significant minority voices are heard and that majorities are not consigned to minority status." *Davis v. Bandemer*, 478 U.S. at 125 n.9.

In addition, there are practical considerations that make performing a useful analysis of the at-large Garret proposal impossible until it is more clearly explained. This is because estimating effects under an at-large arrangement would vary considerably depending on whether the decision rule for identifying the eleven winners calls for (1) the top eleven vote-getters winning seats in a free-for-all among all candidates, (2) the eleven seats being contested separately in each of eleven different designated posts, A through K, or (3) deciding the allocation of seats using a proportional election rule. They would also vary depending on whether the voting rules (1) allow voters to cumulate their voters, (2) require voters to cast all eleven votes, or (3) require voters to cast one ballot for a single party under proportional representation rules.

[13]   The steps undertaken to construct, by district, the vote tallies and percentages for the three 2013 elections are describe in Appendix L.

U.S. Sen. 2012	2,010,067	1,785,542	53.0
Pres. 2012	1,971,820	1,822,522	52.0
Gov. 2013	1,069,789	1,013,354	51.4
Lt. Gov. 2013	1,213,155	980,257	55.3
Att'y Gen 2013	1,103,777	1,103,612	50.0

Source: Commonwealth of Virginia, Department of Legislative Services—Redistricting 2010 website.

As a prelude to our first step, reliance on the median-mean comparison as a leading indicator of the potential for a plan to produce a gerrymandering effect, the political scientists simulated the expected median-mean difference from 1,000 computer-generated, neutrally drawn plans.[14] Using block-level data, they were able to calculate expected mean-median differences for four elections. The average values of bias (median minus mean, using the two-party Democratic vote percentages), the minimum and maximum bias values, along with bias values for the 25th and 75th percentiles, are presented in Table 5.

Table 5

Election	Average Median% - Mean %	Minimum	Maximum	25th percentile	75th percentile
Pres. 2008	+0.9	-4.3	+4.7	-0.6	+2.5
Gov. 2013	+1.3	-4.5	+6.6	-0.1	+3.0
Lt. Gov. 2013	+1.2	-3.0	+5.2	-0.2	+2.4
Att'y Gen. 2013	+1.1	-4.8	+5.5	-0.4	+2.7

Note: Positive values indicate asymmetry bias in Democrats' favor; negative values indicate asymmetry bias in Republicans' favor.

As Table 5 demonstrates, the average values indicate that Democrats actually hold about a one percentage point advantage associated with packing that is attributable to natural

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[14]   The specifics of that computer program's model are described in Appendix K.

residential patterns of Democratic and Republican voters. In each of the four elections, the 25th percentile range was greater than -1%. Therefore, submissions that show values outside a range of -2 to +3 points are at least suspect.

<u>**An Analysis of the Plans That Are Partisan Gerrymanders**</u>:

a. *Richmond First Plan*

The Richmond First proposed plan included compilations of two-party vote percentages in each proposed district for six statewide elections.[15] The six covered elections are Governor 2009, Lieutenant Governor 2009, Attorney General 2009, U.S. Senate 2012, President 2008, and President 2012. Therefore, the gerrymandering analysis relies on the proposal's provided election data. *See* Appendix A. All six elections show that the district lines are biased against Democratic voters by packing them relatively more than Republican voters. The median-to-mean comparisons run substantially against Democratic voters in all six elections (between -3.6 and -5.3 points) in significant excess of even the 25th percentile for the computer-generated plans. The potential for harm signaled by the Democratic voters' disadvantage would lead to real harm inasmuch as Democratic votes do not carry a majority of the districts in any of the three elections when they cast a vote majority. Democratic vote majorities are consigned to minority status even in elections when they cast a substantial 53 percent majority, as in the 2008 presidential election.

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[15] *See* Commonwealth of Va., Dep't of Legislative Servs., *Redistricting Plans*, *Congressional Plan: 4 - SB 5003 – J. Miller (William and Mary Plan), PDF – Report – Population, Demographics, Election Data, Voting Population*, at http://redistricting.dls.virginia.gov/2010/Data/congressional%20plans/SB5003_W&M/sb5003_W&M.pdf.

Therefore, the **Richmond First** plan violates the *equal vote weight* standard and

constitutes a partisan gerrymander because:

- The plan persistently packs Democratic voters and the packing disadvantages
  Democratic voters in all six elections.
- The magnitude of the packing, ranging from 3.6 to 5.3 points, is sizable enough
  that Democratic voters suffer vote weight harm because even when they
  constitute a sizeable vote majority, they do not carry a majority of the districts.

b. Plaintiffs' Plan

The Plaintiffs' proposed plan did not supply the same data as the Richmond First plan.

Therefore, the foregoing analysis is based on the block-level shapefile submitted to the Court,

which was used to recompile the statewide votes by proposed district for the 2013 statewide

elections for Governor, Lieutenant Governor, and Attorney General.[16] *See* Appendix B. In each

of the three 2013 elections, Democratic voters were disadvantaged.[17] The median-to-mean

comparisons in the three elections were -2, -3.3, and -.3 respectively. The -2 and -3.3 values are

far below even the 25th percentile for the computer-generated plans. In two of the three elections,

the value bias against Democratic voters results in statewide Democratic vote majorities that fail

to carry a majority of the districts.

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[16]   Since this analysis is based on fewer statewide elections, the analysis would benefit from additional data similar to the data available for the Richmond First plan.

[17]   The compilations in the appendices do not cover absentee or provisional ballots as the political scientists were unable to assign them to specific precincts (VTDs). This results in the following vote totals: Governor, D = 1,004,145 and R = 964,454; Lt. Governor, D = 1,142,196 and R = 931,943; Attorney General, D = 1,037,753; R = 1,049,529. The excluded ballots do not much hamper the analysis of the Governor and Lieutenant Governor elections, but in the closely contested Attorney General election, officially won by the Democrat, Herring, by 165 votes out of over two million, the leading candidate by the vote count available is Obenshain, the Republican. The analysis relies on this reconstructed vote total.

Therefore, the **Plaintiffs'** plan appears to violate the *equal vote weight* standard and

constitutes a partisan gerrymander because:

- Based on three 2013 elections, the plan shows bias against Democratic voters based on the median-to-mean differential.
- Two of the three 2013 elections lead to Democratic voter majorities carrying only a minority of districts.[18] Therefore, more often than not, the Plaintiffs' plan operates as a partisan gerrymander.

c. *Rapoport Plan*

The analysis of the Rapoport proposed plan is based both on the 2008 presidential

election results that Rapoport constructed and submitted to the Court and three 2013 elections

based on Rapoport's block-level shapefile submission.[19] *See* Appendix C. All four elections

show a bias running against Democratic voters. All median-mean differences are negative,

ranging from -2.6 points to -3.9 points, all of which are far below the 25th percentile for the

computer-generated plans.

The Attorney General election results, reported here on the basis of vote counts

constructed from census blocks associated with VTDs and not counting absentee and validated

provisional ballots, has the Republican (Obenshain) edging out the Democrat (Herring) in vote

totals and average vote percentage—50.1 for Republican Obenshain to 49.9 for Democrat

Herring (see Appendix C, third column). By this constructed count, Democrats did not cast a

majority of the constructed countable votes. Therefore, the countable vote majority belongs to

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[18] While the mean two-party Democratic vote percentage in the Attorney General election for this plan is 50.1, that majority indicator is in some part a consequence of a slight turnout bias in favor of Democrats. The summed votes using block-level data are just under 50 percent. This creates a degree of ambiguity about whether this particular election actually indicates that there is a gerrymander effect.

[19] Therefore, for the same reasons discussed *supra* at note 16, this analysis would benefit from additional data.

Republican voters. Since Republicans were not the disadvantaged voters, the Attorney General

election cannot tell us about harm to the disadvantaged Democratic voters. However, in two of

the three remaining elections, the value bias against Democratic voters results in statewide

Democratic vote majorities that fail to carry a majority of the districts.

Therefore, the **Rapoport** plan appears to violate the *equal vote weight* standard and

constitutes a partisan gerrymander because:

- The plan persistently packs Democratic voters; the packing disadvantages
  Democratic voters in all four elections for which there is data.
- The magnitude of the packing, ranging from 2.6 to 3.9 points, is sizable enough
  that in two of the three elections, more often than not, Democrats cast a majority
  of the votes but fail to carry a majority of the districts.

d. Intervenors' Plan #2

Intervenors' proposed "Plan #2" included compilations of two-party vote percentages in

each proposed district for the same six statewide elections as the Richmond First proposed

plan.[20] The analysis relies on the Intervenors' submitted election calculations in these elections.

See Appendix D. All six elections demonstrate a bias running against Democratic voters with

negative median-mean differences ranging from -2.5 to -5.0. All of these are far below the 25th

percentile for the computer-generated plans. When Republicans voters cast vote majorities, as in

the 2009 elections, we cannot say whether the bias results in knowable harm to Democratic

voters.

Nonetheless, in two of the three elections where Democrats cast a majority of votes, the

value bias against Democratic voters results in statewide Democratic vote majorities that fail to

carry a majority of the districts. The third election, the 2012 U.S. Senate, is more ambiguous.

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[20]   *See* ECF No. 232, Exhibit S of Intervenors' Sept. 18, 2015 filing, *Intervenor-Defendants' Plan 2: Election Data.*

The median district percentage (district #4) is 50 percent, meaning that the median district is a toss-up with five secure districts for each side.

In sum, the **Intervenors' Plan #2** violates the *equal vote weight* standard and **constitutes a partisan gerrymander** because:

- The plan packs Democratic voters; it disadvantages Democratic voters in all six elections.
- The magnitude of the packing, ranging from 2.5 to 5.0 points, is sizable enough that Democratic voters suffer known vote weight harm because when they cast a vote majority they, more often than not, do not carry a majority of the districts. The gerrymander effect in the 2012 U.S. Senate election is equivocal. The Intervenors report a 50:50 vote percentage split in District 4, and thus we cannot say whether the Democratic vote majority would have, on the basis of a precise vote count, carried a majority of the districts. Nonetheless, the other two relevant elections show clear gerrymandering effects.

e. **Intervenors' Plan #1**

Intervenors' proposed "Plan #1" included compilations of two-party vote percentages in each proposed district for the same six statewide elections as the Richmond First and Intervenors' #2 proposed plans.[21] The analysis relies on the Intervenors' submitted election calculations in these elections. *See* Appendix E. All six elections demonstrate a bias running against Democratic voters with negative median-mean differences ranging from -2.6 to -5.1. All of these are far below the 25th percentile for the computer-generated plans. When Republicans voters cast vote majorities, as in the 2009 elections, we cannot say whether the bias results in knowable harm to Democratic voters. Still, in all three remaining elections where Democrats cast a majority of votes, Democrats did not carry a majority of the districts due to value bias against

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[21]   *See* ECF No. 232, Exhibit I of Intervenors' Sept. 18, 2015 filing, *Intervenor-Defendants' Plan 1: Election Data.*

Democratic votes. Thus, the line placements in this proposal clearly undervalue Democratic votes relative to Republican votes.

Therefore, the **Intervenors' Plan #2** unequivocally violates the *equal vote weight* standard and **constitutes a partisan gerrymander** because:

- The plan packs Democratic voters; it disadvantages Democratic voters in all six elections.
- The magnitude of the packing, ranging from 2.6 to 5.1 points, is sizable enough that Democratic voters suffer known vote weight harm because, in each election where they cast a vote majority, they do not carry a majority of the districts.

An Analysis of the Plans That Are Not Partisan Gerrymanders:

f. NAACP Plan

Like the analysis of the Plaintiffs' proposed plan, the analysis of the NAACP proposed plan is limited to the three 2013 statewide elections for Governor, Lieutenant Governor, and Attorney General.[22] As reported in Appendix F, this plan shows substantial bias against Democratic Party voters. The median-to-mean comparisons each significantly disfavor Democrats: -5.4 points (Governor), -3.7 points (Lieutenant Governor), and -5.3 points (Attorney General). All of these values are far below the 25th percentile for the computer-generated plans. However, in only one of the two elections where the disadvantaged Democratic Party voters win a statewide majority of the vote, the 2013 Governor election, did the vote weight bias deprive them of carrying a majority of the districts. In the Lieutenant Governor race, where the Democratic vote percentage was 55.1 percent, Democratic votes carry a majority of the districts.

Finally, just as with the Rapoport plan, the Attorney General vote totals and mean district percentage, from the knowable counts and derivative computations, show the Republican

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[22]   Therefore, for the same reasons discussed *supra* at note 16, an analysis of this plan would benefit from additional data.

candidate winning. Thus, under the NAACP's plan, that election cannot speak to whether the Democratic voter disadvantage produced knowable vote weight harm.

Therefore, the **NAACP** plan does not definitively violate the *equal vote weight* standard and **does not, so far as the limited data shows, definitively constitute a partisan gerrymander** because:

- All three elections show Democratic voters are disadvantaged.
- Based on the limited data available, one election operates as a partisan gerrymander, one other does not, and the third has the advantaged Republican voters casting a majority of the votes and thus carrying a majority of the districts.
- Therefore, an observable gerrymander effect does not result more often than not.

g. *Petersen Plan*

The Petersen proposed plan also included compilations of two-party vote percentages in each proposed district for the same six statewide elections as the Richmond First and both Intervenors' proposed plans.[23] Therefore, the gerrymandering analysis relies on the proposal's provided election data. *See* Appendix G.

Four elections show bias against Democratic voters by packing them relatively more than Republican voters; two elections show bias against Republican voters by packing them relatively more than Democratic voters. The median-to-mean comparisons run in both directions, from -2.3 points to +0.4 points, which is a strong indication that neither set of partisan voters is likely to suffer from a structural gerrymander. Further, in five of six elections, the disadvantaged partisan voters could not have suffered from a gerrymander because they did not win a statewide vote

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[23]   *See* Commonwealth of Va., Dep't of Legislative Servs, *Redistricting Plans, Congressional Plan: 8 - SB 5001 (2015) – Petersen, PDF – Report – Population, Demographics, Election Data, Voting Population*, at http://redistricting.dls.virginia.gov/2010/data/congressional%20plans/SB5001_petersen/SB5001_petersen.pdf

majority. In the one election (President 2008) when the Democrats were disadvantaged and cast a majority of votes, they still carried a majority of the districts (6 out of 11).

Therefore, the **Petersen** plan does not violate the *equal vote weight* standard and **does not constitute a partisan gerrymander** because:

- Packing of partisan voters show mixed results, twice disadvantaging Republican voters and four times disadvantaging Democratic voters.
- There is no indication of harm in any of the six elections. All six elections abide by majority rule, regardless of which partisan voters are disadvantaged.

h. Governor's Plan

The Governor's proposed plan included compilations of two-party vote percentages in each proposed district for the same six statewide elections as the Petersen, Richmond First, and Intervenors' #1 and # 2 proposed plans.[24] The analysis relies on the Governor's submitted election calculations in these elections. *See* Appendix H.

This plan shows no particular tendency for partisan bias in either direction. Three elections show bias against Democratic voters by packing them relatively more than Republican voters, and three other elections show bias against Republican voters by packing them relatively more than Democratic voters. The fact that the median-to-mean comparisons run in both directions is a strong indication that neither set of partisan voters is likely to suffer from a structural gerrymander. Further, in four of six elections the disadvantaged party could not have suffered from a gerrymander because they did not cast a vote majority. In the other two elections, the disadvantaged voters (Republicans in the 2009 Gubernatorial election and Democrats in the

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[24] *See* ECF No. 231, Exhibit E of the Governor's Sept. 18, 2015 filing, *SB 5002 – Sen Locke: Election Data,* at 4.

2012 Senate election) still carried a majority of the districts. Therefore, any packing did not

result in anti-majoritarian results in any of the six elections.

Therefore, the **Governor** plan does not violate the *equal vote weight* standard and **does**

not constitute a partisan gerrymander because:

- Packing of partisan voters show small magnitudes, indicating small degrees of
  packing, and no tendency to favor one set of partisan voters over the other. The
  packing disfavors Democrats three times and disfavors Republicans three times.
- There is no indication of harm in any of the six elections. When either set of
  partisan voters is disadvantaged and casts a vote majority, the vote majority
  carries a majority of the districts.

i. *Bull Elephant Plan B*

The data available to analyze the Bull Elephant Plans, both A and B, is more limited than

all other proposed plans. The Bull Elephant plans report vote totals within precincts and

associated proposed congressional districts for the 2008 presidential election only. The group

appears to have built its plan through reliance on data at the census VTD (precinct) level, and

there was no shapefile submitted that would allow reconstruction of this plan to apply its

boundaries to other elections. Further, through a decision rule unknown to the political scientists,

Bull Elephant appears to have assigned absentee and validated provisional ballots to specific

precincts, given that their summation of reported vote totals equals the total number of votes cast

in the 2008 presidential election. The analysis of these plans is quite limited and would benefit

from additional data and review. Therefore, it is not possible to perform a complete analysis of

Bull Elephant Plan B.

Based on the data available, however, Bull Elephant Plan B demonstrates a median-to-

mean comparison, -2.4, that disfavors Democrats. However, despite the potential for

gerrymandering harm, in the one election for which we have information, the potentially

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disadvantaged Democratic voters are projected to suffer no harm. The Democratic voters'

majority carries a majority of the districts, 6 of 11.

Therefore, the **Bull Elephant Plan B**, based on one presidential election only, appears

not to violate the *equal vote weight* standard and **does not constitutes a partisan gerrymander**

because:

- The one election data point shows that Democratic voters are disadvantaged.
- Despite the disadvantage, the Democratic vote majority in the 2008 presidential election carries a majority of the plan's districts.

j. *Bull Elephant Plan A*

The limited available data for this plan is identical to Plan B, discussed above. The only

data available for the proposed districts of this proposed plan is the voter data for the 2008

presidential election. Therefore, any analysis of this plan's gerrymandering effects is also

necessarily quite limited and complete analysis of this plan is not possible.

Similar to the results for Bull Elephant Plan B, Bull Elephant Plan A demonstrates a

median-to-mean comparison, -2.4, that disfavors Democrats. Also, as with Plan B, despite the

potential for gerrymandering harm, in the one election for which we have information, the

potentially disadvantaged Democratic voters are projected to suffer no harm. Democratic voters

carry a majority of the districts, 6 of 11.

Therefore, the **Bull Elephant Plan A**, based on one presidential election only, appears

not to violate the *equal vote weight* standard and **does not constitutes a partisan gerrymander**

because:

- The one election data point shows that Democratic voters are disadvantaged.
- Despite the disadvantage, the Democratic vote majority in the 2008 presidential election carries a majority of the plan's districts.

CONCLUSION

In selecting an appropriate remedial plan to replace the unconstitutional racial

gerrymandering 2012 Plan, this Court must consider several factors, including the plan's

effective remedy for the racial gerrymandering violation, compliance with the U.S. Constitution

and Section 2 of the Voting Rights Act, and compliance with the Virginia Constitution

(contiguity and compactness). Partisan gerrymandering dilutes the votes of individual voters on

the basis of their political beliefs. Like racial gerrymandering, the Supreme Court has repeatedly

recognized that partisan gerrymanders are simply "[incompatible] with democratic principles."

Ariz. Indep. Redistricting Comm'n, 135 S. Ct. at 2658 (alteration in original) (quoting *Vieth*, 541

U.S. at 292). Therefore, the level of partisan gerrymandering in any remedial plan is another

factor this Court should consider in assessing the adequacy of the proposed remedial plans.

Amici have determined, based on the analyses contained herein by the political science

professors, that the plans submitted by Senator Peterson and the Governor do not result in

partisan gerrymanders. Three other plans also appear not to produce partisan gerrymanders but

have incomplete data: Bull Elephant Media Plan A, Bull Elephant Media Plan B, and the

NAACP Plan. However, to be conclusive, these three additional plans would need to be

subjected to additional analysis in order to assess fully whether such plans constitute partisan

gerrymanders. Equally important, *amici* determined that the plans submitted by Richmond First

Club, Plaintiffs, Rapoport, and both plans submitted by Intervenors result in significant partisan

gerrymanders, disadvantaging Democratic voters such that they cannot carry a majority of the

districts even where they constitute a majority of the voters. We respectfully urge this Court to

carefully weigh these data, along with other factors, in order to select a remedial plan that avoids

the twin evils of racial and partisan unconstitutional gerrymandering and fully remedies the

constitutional violation.

Respectfully submitted,

/s/ J. Gerald Hebert
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CERTIFICATE OF SERVICE

I hereby certify that on this 12th day of November, 2015, I served the foregoing

MEMORANDUM OF *AMICI CURIAE* COMMON CAUSE AND NEW VIRGINIA

MAJORITY REGARDING PROPOSED REMEDIAL PLANS on all counsel in this case by

filing a true copy of the same with the Clerk of Court using the ECF system, which will

send notification to all parties and ECF participants.

I also placed a true copy of the same in the U.S. mail, postage prepaid, to the following:

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APPENDIX A: Richmond First Plan

District	Dem Gov '09	Dem Lt Gov '09	Dem Atty Gen '09	Dem Pres '12	Dem U.S. Sen '12	Dem Pres '08
1	60.2	62.4	62.8	67.7	68.5	72.7
2	36.1	39.1	37.6	**47.2**	**48.4**	**47.3**
3	56.9	59.3	57.3	69.5	69.0	68.1
4	35.5	**40.3**	37.2	46.0	47.6	45.9
5	47.0	49.0	46.8	59.0	60.5	58.7
6	31.8	33.9	34.0	42.2	43.2	44.2
7	**36.8**	38.4	**36.7**	45.6	46.6	46.5
8	34.0	34.1	32.9	40.0	40.8	41.6
9	32.8	33.5	33.5	35.3	37.9	40.0
10	46.9	49.5	50.2	58.0	58.9	57.4
11	40.7	43.3	42.8	56.4	56.4	55.6
███████	███	███	███	███	███	███
Median District %[1]	36.8	40.3	37.6	47.2	48.4	47.3
Mean District %[2]	41.7	43.9	42.9	51.5	52.5	52.0
Median – Mean Difference[3]	-4.9	-3.6	-5.3	-4.3	-4.1	-4.7
Disadvantaged Party[4]	Dem	Dem	Dem	Dem	Dem	Dem
Contra-Majority Result for						

1

Disad-vantaged Party[5]	~ ~ ~	~ ~ ~	~ ~ ~	Yes	Yes	Yes
Gerrymander Effect[6]	*NA*	*NA*	*NA*	*Yes*	*Yes*	*Yes*

[1] **Median District %** is the numerical value among the 11 that, when the Democrat's two-party percentages are ordered from lowest to highest, stands in the middle, i.e., sixth in order with five lower and five higher percentages. It is a simple indicator of which party carried a majority of the districts.

[2] **Mean District %** is the average two-party percentage among the eleven districts.

[3] **Median - Mean Difference** subtracts the mean districts percentage from the median district percentage. A positive value indicates Republican voters have been packed more than Democratic voters; a negative value indicates Democratic voters have been packed more than Republicans. The magnitude loosely indicates the size of the disadvantage suffered by one party's voters.

[4] **Disadvantaged Party** reports which party's voters are relatively more packed.

[5] **Contra-Majority Result for Disadvantaged Party** reports whether harm to the disadvantaged party voters is evident because they failed to carry a majority of districts with a majority of votes. An ~ ~ ~ entry indicates the disadvantaged party voters could not have been harmed because they did not cast a majority of votes.

[6] **Gerrymander Effect** reports whether the outcome of the election indicates the voters of the disadvantaged party suffered harm due to packing because their vote majority carried less than a majority of districts. *Yes* = gerrymandering harm in the election; *No* = no gerrymandering harm in the election; *NA* = not applicable because the disadvantaged party could not suffer harm as it cast only a minority of the votes.

APPENDIX B: Plaintiffs' Plan

District	Dem Gov '13	Dem Lt Gov '13	Dem Atty Gen '13
1	43.0	48.4	42.7
2	55.5	61.2	52.5
3	71.8	72.6	69.3
4	54.1	58.8	52.2
5	36.4	43.6	35.6
6	44.9	48.3	42.4
7	41.2	47.7	41.1
8	71.2	72.9	70.1
9	34.0	38.8	32.7
10	*49.3*	*52.1*	*49.8*
11	63.0	65.1	62.5
■■■■■			
Median District %[1]	49.3	52.1	49.8
Mean District %[2]	51.3	55.4	50.1
Median – Mean Difference[3]	-2.0	-3.3	-0.3
Disadvantaged Party[4]	Dem	Dem	Dem
Contra-Majority Result for			

3

Disad-vantaged Party[5]	Yes	~ ~ ~	Yes
Gerrymander Effect[6]	*Yes*	*No*	*Yes*

[1] **Median District %** is the numerical value among the 11 that, when the Democrat's two-party percentages are ordered from lowest to highest, stands in the middle, i.e., sixth in order with five lower and five higher percentages. It is a simple indicator of which party carried a majority of the districts.

[2] **Mean District %** is the average two-party percentage among the eleven districts.

[3] **Median - Mean Difference** subtracts the mean districts percentage from the median district percentage. A positive value indicates Republican voters have been packed more than Democratic voters; a negative value indicates Democratic voters have been packed more than Republicans. The magnitude loosely indicates the size of the disadvantage suffered by one party's voters.

[4] **Disadvantaged Party** reports which party's voters are relatively more packed.

[5] **Contra-Majority Result for Disadvantaged Party** reports whether harm to the disadvantaged party voters is evident because they failed to carry a majority of districts with a majority of votes. An ~ ~ ~ entry indicates the disadvantaged party voters could not have been harmed because they did not cast a majority of votes.

[6] **Gerrymander Effect** reports whether the outcome of the election indicates the voters of the disadvantaged party suffered harm due to packing because their vote majority carried less than a majority of districts. *Yes* = gerrymandering harm in the election; *No* = no gerrymandering harm in the election; *NA* = not applicable because the disadvantaged party could not suffer harm as it cast only a minority of the votes.

APPENDIX C: Rapoport Plan

District	Dem Gov '13	Dem Lt Gov '13	Dem Atty Gen '13	Dem Pres '08
1	44.8	49.8	44.2	47.5
2	*48.6*	*55.2*	*46.0*	*49.3*
3	67.8	68.8	65.1	67.5
4	62.3	66.1	60.6	61.8
5	44.2	48.6	42.8	48.4
6	37.4	41.8	35.3	42.4
7	39.9	48.0	40.0	43.0
8	71.3	72.9	70.2	68.7
9	34.2	39.1	32.8	40.8
10	49.3	52.1	49.8	51.9
11	63.0	65.1	62.5	62.3
Median District %[1]	48.6	52.1	46.0	49.3
Mean District %[2]	51.2	55.2	49.9	53.1
Median – Mean Difference[3]	-2.6	-3.1	-3.9	-3.8
Disadvantaged Party[4]	Dem	Dem	Dem	Dem
Contra-Majority Result for Disad-	Yes	No	~ ~ ~	Yes

vantaged Party[5]				
Gerrymander Effect[6]	*Yes*	*No*	*NA*	*Yes*

[1] **Median District %** is the numerical value among the 11 that, when the Democrat's two-party percentages are ordered from lowest to highest, stands in the middle, i.e., sixth in order with five lower and five higher percentages. It is a simple indicator of which party carried a majority of the districts.

[2] **Mean District %** is the average two-party percentage among the eleven districts.

[3] **Median - Mean Difference** subtracts the mean districts percentage from the median district percentage. A positive value indicates Republican voters have been packed more than Democratic voters; a negative value indicates Democratic voters have been packed more than Republicans. The magnitude loosely indicates the size of the disadvantage suffered by one party's voters.

[4] **Disadvantaged Party** reports which party's voters are relatively more packed.

[5] **Contra-Majority Result for Disadvantaged Party** reports whether harm to the disadvantaged party voters is evident because they failed to carry a majority of districts with a majority of votes. An ~ ~ ~ entry indicates the disadvantaged party voters could not have been harmed because they did not cast a majority of votes.

[6] **Gerrymander Effect** reports whether the outcome of the election indicates the voters of the disadvantaged party suffered harm due to packing because their vote majority carried less than a majority of districts. *Yes* = gerrymandering harm in the election; *No* = no gerrymandering harm in the election; *NA* = not applicable because the disadvantaged party could not suffer harm as it cast only a minority of the votes.

6

APPENDIX D: Intervenors' Plan #2

District	Dem Gov '09	Dem Lt Gov '09	Dem Atty Gen '09	Dem Pres '12	Dem U.S. Sen '12	Dem Pres '08
1	34.4	37.1	36.5	46.1	47.1	46.2
2	38.9	44.0	40.9	51.5	52.7	50.7
3	64.3	66.2	64.3	75.1	75.0	74.1
4	*37.8*	40.5	*38.3*	*49.2*	*50.0*	*48.7*
5	38.0	39.4	38.0	46.2	46.6	47.3
6	32.8	33.2	32.4	39.9	40.7	41.7
7	34.9	37.4	35.6	45.3	47.7	46.3
8	60.1	62.2	62.5	67.7	68.5	66.9
9	33.9	34.3	34.2	35.7	38.3	40.3
10	37.5	*39.7*	40.0	*49.2*	50.1	50.0
11	50.2	53.0	53.5	62.7	63.2	61.2
Median District %[1]	37.8	39.7	38.3	49.2	50.0	48.7
Mean District %[2]	42.1	44.3	43.3	51.7	52.7	52.1
Median – Mean Difference[3]	-4.3	-4.6	-5.0	-2.5	-2.7	-3.4
Disadvantaged Party[4]	Dem	Dem	Dem	Dem	Dem	Dem

Contra-Majority Result for Disad-vantaged Party[5]	~ ~ ~	~ ~ ~	~ ~ ~	Yes	Maybe	Yes
Gerrymander Effect[6]	*NA*	*NA*	*NA*	*Yes*	*Maybe*	*Yes*

[1] **Median District %** is the numerical value among the 11 that, when the Democrat's two-party percentages are ordered from lowest to highest, stands in the middle, i.e., sixth in order with five lower and five higher percentages. It is a simple indicator of which party carried a majority of the districts.

[2] **Mean District %** is the average two-party percentage among the eleven districts.

[3] **Median - Mean Difference** subtracts the mean districts percentage from the median district percentage. A positive value indicates Republican voters have been packed more than Democratic voters; a negative value indicates Democratic voters have been packed more than Republicans. The magnitude loosely indicates the size of the disadvantage suffered by one party's voters.

[4] **Disadvantaged Party** reports which party's voters are relatively more packed.

[5] **Contra-Majority Result for Disadvantaged Party** reports whether harm to the disadvantaged party voters is evident because they failed to carry a majority of districts with a majority of votes. An ~ ~ ~ entry indicates the disadvantaged party voters could not have been harmed because they did not cast a majority of votes.

[6] **Gerrymander Effect** reports whether the outcome of the election indicates the voters of the disadvantaged party suffered harm due to packing because their vote majority carried less than a majority of districts. *Yes* = gerrymandering harm in the election; *No* = no gerrymandering harm in the election; *NA* = not applicable because the disadvantaged party could not suffer harm as it cast only a minority of the votes.

APPENDIX E: Intervenors' Plan #1

District	Dem Gov '09	Dem Lt Gov '09	Dem Atty Gen '09	Dem Pres '12	Dem U.S. Sen '12	Dem Pres '08
1	34.4	37.1	36.5	46.1	47.1	46.2
2	38.9	44.0	40.9	51.5	52.7	50.7
3	64.6	66.4	64.5	75.6	75.6	74.6
4	**37.7**	40.4	**38.2**	**49.1**	**49.9**	**48.7**
5	38.0	39.4	38.0	46.2	46.6	47.3
6	32.8	33.2	32.4	39.9	40.7	41.7
7	34.6	37.1	35.3	45.0	47.3	45.8
8	60.1	62.2	62.5	67.7	68.5	66.9
9	33.9	34.3	34.2	35.7	38.3	40.3
10	37.5	**39.7**	40.0	49.2	50.1	50.0
11	50.2	53.0	53.5	62.7	63.2	61.2
████████						
Median District %[1]	37.7	39.7	38.2	49.1	49.9	48.7
Mean District %[2]	42.1	44.3	43.3	51.7	52.7	52.1
Median – Mean Difference[3]	-4.4	-4.6	-5.1	-2.6	-2.8	-3.4
Disadvantaged Party[4]	Dem	Dem	Dem	Dem	Dem	Dem
Contra-Majority Result for Disad-	~ ~ ~	~ ~ ~	~ ~ ~	Yes	Yes	Yes

vantaged Party[5]						
Gerrymander Effect[6]	*NA*	*NA*	*NA*	*Yes*	*Yes*	*Yes*

[1] **Median District %** is the numerical value among the 11 that, when the Democrat's two-party percentages are ordered from lowest to highest, stands in the middle, i.e., sixth in order with five lower and five higher percentages. It is a simple indicator of which party carried a majority of the districts.

[2] **Mean District %** is the average two-party percentage among the eleven districts.

[3] **Median - Mean Difference** subtracts the mean districts percentage from the median district percentage. A positive value indicates Republican voters have been packed more than Democratic voters; a negative value indicates Democratic voters have been packed more than Republicans. The magnitude loosely indicates the size of the disadvantage suffered by one party's voters.

[4] **Disadvantaged Party** reports which party's voters are relatively more packed.

[5] **Contra-Majority Result for Disadvantaged Party** reports whether harm to the disadvantaged party voters is evident because they failed to carry a majority of districts with a majority of votes. An ~ ~ ~ entry indicates the disadvantaged party voters could not have been harmed because they did not cast a majority of votes.

[6] **Gerrymander Effect** reports whether the outcome of the election indicates the voters of the disadvantaged party suffered harm due to packing because their vote majority carried less than a majority of districts. *Yes* = gerrymandering harm in the election; *No* = no gerrymandering harm in the election; *NA* = not applicable because the disadvantaged party could not suffer harm as it cast only a minority of the votes.

APPENDIX F: NAACP Plan

District	Dem Gov '13	Dem Lt Gov '13	Dem Atty Gen '13
1	43.0	47.5	43.2
2	45.3	*51.4*	43.2
3	67.2	69.3	64.2
4	69.6	71.1	67.4
5	*45.6*	49.9	*44.4*
6	33.5	38.8	31.7
7	41.1	50.4	40.9
8	71.2	72.9	70.1
9	36.8	41.2	35.2
10	49.3	52.1	49.8
11	63.0	65.1	62.5
Median District %[1]	45.6	51.4	44.4
Mean District %[2]	51.0	55.1	49.7
Median – Mean Difference[3]	-5.4	-3.7	-5.3
Disadvantaged Party[4]	Dem	Dem	Dem
Contra-Majority Result for Disad-	Yes	~ ~ ~	~ ~ ~

vantaged Party[5]			
Gerrymander Effect[6]	*Yes*	*No*	*NA*

[1] **Median District %** is the numerical value among the 11 that, when the Democrat's two-party percentages are ordered from lowest to highest, stands in the middle, i.e., sixth in order with five lower and five higher percentages. It is a simple indicator of which party carried a majority of the districts.

[2] **Mean District %** is the average two-party percentage among the eleven districts.

[3] **Median - Mean Difference** subtracts the mean districts percentage from the median district percentage. A positive value indicates Republican voters have been packed more than Democratic voters; a negative value indicates Democratic voters have been packed more than Republicans. The magnitude loosely indicates the size of the disadvantage suffered by one party's voters.

[4] **Disadvantaged Party** reports which party's voters are relatively more packed.

[5] **Contra-Majority Result for Disadvantaged Party** reports whether harm to the disadvantaged party voters is evident because they failed to carry a majority of districts with a majority of votes. An ~ ~ ~ entry indicates the disadvantaged party voters could not have been harmed because they did not cast a majority of votes.

[6] **Gerrymander Effect** reports whether the outcome of the election indicates the voters of the disadvantaged party suffered harm due to packing because their vote majority carried less than a majority of districts. *Yes* = gerrymandering harm in the election; *No* = no gerrymandering harm in the election; *NA* = not applicable because the disadvantaged party could not suffer harm as it cast only a minority of the votes.

APPENDIX G: Petersen Plan

District	Dem Gov '09	Dem Lt Gov '09	Dem Atty Gen '09	Dem Pres '12	Dem U.S. Sen '12	Dem Pres '08
1	**39.5**	**43.9**	**41.5**	**51.9**	**52.9**	**51.4**
2	43.9	47.8	45.1	55.3	56.1	54.2
3	60.9	62.3	60.5	72.6	72.6	71.6
4	32.6	34.9	33.9	43.3	44.8	44.1
5	36.3	38.8	36.7	45.9	48.2	46.7
6	37.4	37.6	36.2	43.7	44.3	45.2
7	30.0	31.2	30.9	39.4	39.9	41.1
8	58.8	61.0	61.2	67.0	67.8	66.1
9	31.0	31.8	31.7	33.4	36.0	38.0
10	43.8	46.5	46.0	58.0	58.1	57.6
11	45.9	48.4	49.3	56.5	57.6	56.0
███████	███████	███████	███████	███████	███████	███████
Median District %[1]	39.5	43.9	41.5	51.9	52.9	51.4
Mean District %[2]	41.8	44.0	43.0	51.5	52.6	52.0
Median – Mean Difference[3]	-2.3	-0.1	-1.5	+0.4	+0.3	-0.6
Disadvantaged Party[4]	Dem	Dem	Dem	Rep	Rep	Dem

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Contra-Majority Result for Disad-vantaged Party[5]	~ ~ ~	~ ~ ~	~ ~ ~	~ ~ ~	~ ~ ~	No
Gerrymander Effect[6]	*NA*	*NA*	*NA*	*NA*	*NA*	*No*

[1] **Median District %** is the numerical value among the 11 that, when the Democrat's two-party percentages are ordered from lowest to highest, stands in the middle, i.e., sixth in order with five lower and five higher percentages. It is a simple indicator of which party carried a majority of the districts.

[2] **Mean District %** is the average two-party percentage among the eleven districts.

[3] **Median - Mean Difference** subtracts the mean districts percentage from the median district percentage. A positive value indicates Republican voters have been packed more than Democratic voters; a negative value indicates Democratic voters have been packed more than Republicans. The magnitude loosely indicates the size of the disadvantage suffered by one party's voters.

[4] **Disadvantaged Party** reports which party's voters are relatively more packed.

[5] **Contra-Majority Result for Disadvantaged Party** reports whether harm to the disadvantaged party voters is evident because they failed to carry a majority of districts with a majority of votes. An ~ ~ ~ entry indicates the disadvantaged party voters could not have been harmed because they did not cast a majority of votes.

[6] **Gerrymander Effect** reports whether the outcome of the election indicates the voters of the disadvantaged party suffered harm due to packing because their vote majority carried less than a majority of districts. *Yes* = gerrymandering harm in the election; *No* = no gerrymandering harm in the election; *NA* = not applicable because the disadvantaged party could not suffer harm as it cast only a minority of the votes.

APPENDIX H: Governor's Plan

District	Dem Gov '09	Dem Lt Gov '09	Dem Atty Gen '09	Dem Pres '12	Dem U.S. Sen '12	Dem Pres '08
1	33.5	35.6	35.2	44.2	45.1	45.2
2	34.3	39.1	36.2	45.3	46.8	44.8
3	54.0	57.2	55.3	67.0	66.9	64.3
4	56.7	58.4	54.6	68.1	68.3	66.7
5	*43.3*	*44.4*	*42.9*	*52.3*	*52.6*	*52.3*
6	28.1	29.0	28.4	35.3	36.2	36.8
7	31.0	33.7	31.5	40.6	43.2	41.2
8	54.3	56.8	56.6	66.9	66.9	64.8
9	33.4	33.6	33.5	34.4	37.0	38.5
10	45.7	47.9	48.2	54.6	55.7	54.8
11	50.7	53.3	54.0	61.3	62.0	59.5
███████	███	███	███	███	███	███
Median District %[1]	43.3	44.4	42.9	52.3	52.6	52.3
Mean District %[2]	42.3	44.5	43.3	51.8	52.8	51.7
Median – Mean Difference[3]	+1.0	-0.1	-0.4	+0.4	-0.2	+0.6
Disadvantaged Party[4]	Rep	Dem	Dem	Rep	Dem	Rep
Contra-Majority Result for Disad-	No	~ ~ ~	~ ~ ~	~ ~ ~	No	~ ~ ~

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vantaged Party[5]						
Gerrymander Effect[6]	*No*	*NA*	*NA*	*NA*	*No*	*NA*

[1] **Median District %** is the numerical value among the 11 that, when the Democrat's two-party percentages are ordered from lowest to highest, stands in the middle, i.e., sixth in order with five lower and five higher percentages. It is a simple indicator of which party carried a majority of the districts.

[2] **Mean District %** is the average two-party percentage among the eleven districts.

[3] **Median - Mean Difference** subtracts the mean districts percentage from the median district percentage. A positive value indicates Republican voters have been packed more than Democratic voters; a negative value indicates Democratic voters have been packed more than Republicans. The magnitude loosely indicates the size of the disadvantage suffered by one party's voters.

[4] **Disadvantaged Party** reports which party's voters are relatively more packed.

[5] **Contra-Majority Result for Disadvantaged Party** reports whether harm to the disadvantaged party voters is evident because they failed to carry a majority of districts with a majority of votes. An ~ ~ ~ entry indicates the disadvantaged party voters could not have been harmed because they did not cast a majority of votes.

[6] **Gerrymander Effect** reports whether the outcome of the election indicates the voters of the disadvantaged party suffered harm due to packing because their vote majority carried less than a majority of districts. *Yes* = gerrymandering harm in the election; *No* = no gerrymandering harm in the election; *NA* = not applicable because the disadvantaged party could not suffer harm as it cast only a minority of the votes.

APPENDIX I: Bull Elephant Plan B

District	Dem Pres '08
1	48.1
2	51.5
3	72.5
4	***50.7***
5	48.0
6	42.9
7	46.6
8	69.1
9	40.8
10	54.0
11	59.9
Median District %[1]	50.7
Mean District %[2]	53.1
Median – Mean Difference[3]	-2.4
Disadvantaged Party[4]	Dem
Contra-Majority Result for Disad-	No

vantaged Party[5]	
Gerrymander Effect[6]	*No*

[1] **Median District %** is the numerical value among the 11 that, when the Democrat's two-party percentages are ordered from lowest to highest, stands in the middle, i.e., sixth in order with five lower and five higher percentages. It is a simple indicator of which party carried a majority of the districts.

[2] **Mean District %** is the average two-party percentage among the eleven districts.

[3] **Median - Mean Difference** subtracts the mean districts percentage from the median district percentage. A positive value indicates Republican voters have been packed more than Democratic voters; a negative value indicates Democratic voters have been packed more than Republicans. The magnitude loosely indicates the size of the disadvantage suffered by one party's voters.

[4] **Disadvantaged Party** reports which party's voters are relatively more packed.

[5] **Contra-Majority Result for Disadvantaged Party** reports whether harm to the disadvantaged party voters is evident because they failed to carry a majority of districts with a majority of votes. An ~ ~ ~ entry indicates the disadvantaged party voters could not have been harmed because they did not cast a majority of votes.

[6] **Gerrymander Effect** reports whether the outcome of the election indicates the voters of the disadvantaged party suffered harm due to packing because their vote majority carried less than a majority of districts. *Yes* = gerrymandering harm in the election; *No* = no gerrymandering harm in the election; *NA =* not applicable because the disadvantaged party could not suffer harm as it cast only a minority of the votes.

APPENDIX J: Bull Elephant Plan A

District	Dem Pres '08
1	62.3
2	48.2
3	51.5
4	72.5
5	*50.7*
6	48.4
7	42.4
8	46.6
9	69.1
10	40.8
11	51.4
Median District %[1]	50.7
Mean District %[2]	53.1
Median – Mean Difference[3]	-2.4
Disadvantaged Party[4]	Dem
Contra-Majority Result for Disad-vantaged Party[5]	No

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Gerrymander Effect[6]	*No*

[1] **Median District %** is the numerical value among the 11 that, when the Democrat's two-party percentages are ordered from lowest to highest, stands in the middle, i.e., sixth in order with five lower and five higher percentages. It is a simple indicator of which party carried a majority of the districts.

[2] **Mean District %** is the average two-party percentage among the eleven districts.

[3] **Median - Mean Difference** subtracts the mean districts percentage from the median district percentage. A positive value indicates Republican voters have been packed more than Democratic voters; a negative value indicates Democratic voters have been packed more than Republicans. The magnitude loosely indicates the size of the disadvantage suffered by one party's voters.

[4] **Disadvantaged Party** reports which party's voters are relatively more packed.

[5] **Contra-Majority Result for Disadvantaged Party** reports whether harm to the disadvantaged party voters is evident because they failed to carry a majority of districts with a majority of votes. An ~ ~ ~ entry indicates the disadvantaged party voters could not have been harmed because they did not cast a majority of votes.

[6] **Gerrymander Effect** reports whether the outcome of the election indicates the voters of the disadvantaged party suffered harm due to packing because their vote majority carried less than a majority of districts. *Yes* = gerrymandering harm in the election; *No* = no gerrymandering harm in the election; *NA* = not applicable because the disadvantaged party could not suffer harm as it cast only a minority of the votes.

APPENDIX K:
Checking Symmetry with 1,000 Computer-Generated, Neutral
Districting Plans using the 2008 Presidential and
Three 2013 Statewide Elections

We generated estimates for the distribution of neutrally drawn maps using a multi-level weighted graph partitioning algorithm. Graph partitioning is a technique used by computer scientists to assign equal numbers of computational tasks to a computer's processors. We use our graph partitioning algorithm to divide geographic regions into districts containing equal numbers of people. The process begins by randomly combining sets of contiguous census blocks. The process randomly combines those sets of blocks until there are only eleven distinct and contiguous districts. We then use the Kernigan-Lin algorithm, a process developed by computer scientists, to adjust the boundaries of the legislative district in order to achieve population parity across all districts in the map.[1] We used the process to produce 1,000 distinct maps of eleven contiguous congressional districts in Virginia. Since the computer is only instructed to draw maps in which each district is contiguous and contains equal population (loosely defined as $\pm$ 1.5 percent of the ideal), there is no reason to believe that the process is prejudiced for or against a particular group.

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[1] Brian W. Kernighan & Shen Lin, *An efficient heuristic procedure for partitioning graphs*, 49.2 BELL SYSTEM TECH. J. 291, 291-307(1970); BRUCE HENDRICKSON & ROBERT LELAND, A MULTI-LEVEL ALGORITHM FOR PARTITIONING GRAPHS 28 (1995).

APPENDIX L:
Compiling Data for the 2013 Elections

Data for the analysis of the 2013 elections come from four main sources: a shapefile of Virginia's election districts in all counties, independently compiled by the Virginia Public Access Project, a shapefile of 2010 census blocks downloaded from the Census Department's website, the block-level demographic reports from the 2010 census reported by the "Census Fact Finder" application on the Census Department's website, and precinct-level election returns reported by the Virginia Department of Elections. We discuss each of these in turn and then describe how the data were merged and the results produced.

Precinct boundaries may change in between elections as counties and independent cities attempt to meet their citizens' needs (usually by dividing or combining precincts). Since local governments draw these districts and there is, in Virginia and many other states, no centralized repository of election maps, finding a usable statewide map is difficult. Recognizing this problem, the Virginia Public Access Project contacted every county and independent city in 2013 and 2014 for copies of their precinct maps, and have produced a statewide map for 2013 in the form of shapefile. We downloaded this map, https://github.com/vapublicaccessproject/va-precinct-maps/tree/master/shp, and compared it to election results reported by the Department of Elections. Virginia's precincts are both numbered and named (for the location in which the polling takes place), so we were able to confirm that the shapefile was an accurate representation of the precincts in which votes were cast in 2013.

Given the need to split precincts to keep district populations equal, we followed the lead of many of the parties here by disaggregating the precincts into their component blocks from the 2010 Census. Using GIS, we joined the precinct shapefile to a shapefile of 2010 census blocks downloaded for the Census Department in order to assign each of the 285,762 blocks to a single precinct. We added block-level demographic data, most importantly its population and voting-age population, from the Census website.

Finally, we added 2013 precinct-level returns to the dataset from results from the Department of Elections reports for the general elections for Governor, Lieutenant Governor, and Attorney General. One unusual feature of Virginia's election administration is its treatment of absentee and provisional ballots. Most states report these votes in the precinct where the voter resides. Virginia creates separate countywide precincts for absentee and provisional votes that are unlinked to specific geography. Given the uncertainty of how to allocate these votes within a county or city and the relatively small number of absentee and provisional ballots cast (usually less than 10% of votes in any election), we chose to set these aside and deal only with votes counted directly in a single, definable precinct. (We note, however, that in the extremely close 2013 race for Attorney General, the losing candidate—Obenshain—actually had a small majority among votes attributed to a specific precinct.)

To estimate the candidates' share of votes within a precinct, we calculated the block's share of the precinct's voting-age population and multiplied it by the number of votes cast within a precinct for a particular candidate. For instance, if a candidate received 1,000 votes in a precinct and a given block accounted for 3.34% of its voting-age population, we would estimate they received 33.4 votes on that block. This is a fairly standard method for allocating votes to blocks.

Several of the plans we analyze include a list of 2010 census blocks with their congressional district assignment. We merged these assignments with the larger dataset and summed the raw vote totals for the Democratic and Republican candidates for Governor, Lieutenant Governor, and Attorney General in 2013. We next calculated the two-party vote percentage in each district and calculated the median and mean across all districts. At least one plan, the proposal submitted by the plaintiffs, did not provide a list of district assignments by census blocks, so we used GIS to spatially locate blocks within districts, then repeated the process above.