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IN THE THIRD JUDICIAL DISTRICT COURT
IN AND FOR SALT LAKE COUNTY, STATE OF UTAH

LEAGUE OF WOMEN VOTERS OF UTAH, MORMON WOMEN FOR ETHICAL GOVERNMENT, STEFANIE CONDIE, MALCOLM REID, VICTORIA REID, WENDY MARTIN, ELEANOR SUNDWALL, and JACK MARKMAN,

Plaintiffs,

v.

UTAH STATE LEGISLATURE; UTAH LEGISLATIVE REDISTRICTING COMMITTEE; SENATOR SCOTT SANDALL, in his official capacity; REPRESENTATIVE MIKE SCHULTZ, in his official capacity; SENATOR J. STUART ADAMS, in his official capacity; and LIEUTENANT GOVERNOR DEIDRE HENDERSON, in her official capacity,

Defendants.

LEGISLATIVE DEFENDANTS' PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW

Case No.: 220901712

Honorable Dianna Gibson

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INTRODUCTION

The Legislature's 2025 Congressional Redistricting Plan complies with the provisions of Proposition 4 that this Court held apply to these remedial proceedings. To start, the Legislative Redistricting Committee far exceeded baseline compliance with each of Proposition 4's applicable requirements. It held two lengthy public hearings during which over fifty members of the public participated. The Committee then published five proposed plans for public comment for ten days; thousands of comments were received. And two experts hired by the Legislature transparently and independently applied credible, reliable, and industry-leading statistical methods to confirm that the maps neither purposefully nor unduly favor any political party.

Still dissatisfied, Plaintiffs propose two alternative congressional plans. They also want this Court to preliminarily enjoin S.B. 1011—the culmination of the Legislature's good-faith effort to define key (and vague) terms in Proposition 4, "determin[e] what judicial standards are applicable," and exercise its "discretion" to decide what constitutes "the 'best available data and scientific and statistical methods' to use in evaluating redistricting plans for compliance with state and federal law and the Proposition 4 redistricting standards." Doc. 470 (Op.) at 29.

Plaintiffs' plans do not satisfy the Legislature's chosen standards. At best, their plans are not as fair as the 2025 Plan and, at worst, their plans are themselves purposeful partisan gerrymanders. The two-day evidentiary hearing confirmed that the 2025 Plan is lawful and Plaintiffs' proposals are extreme partisan outliers.

PROPOSED FINDINGS OF FACT

I. The Court enjoins the 2021 Congressional Plan.

¶1 Following a remand from the Utah Supreme Court, *League of Women Voters of Utah v. Utah State Legislature*, 2024 UT 21, ¶¶48-50, Plaintiffs moved for summary judgment on Count V of their complaint. Count V challenged S.B. 200 as violating the people's right to alter or reform the government by impairing the citizen initiative known as Proposition 4. The Court entered an order in August 2025 granting summary judgment to Plaintiffs. Doc. 470 (Op.) at 62.

¶2 As a remedy, this Court enjoined the 2021 Congressional Map, H.B. 2004, calling it the "fruit" of S.B. 200's "unlawful repeal" of Proposition 4. *Id.* at 70. The problem with the 2021 Congressional Map, according to the Court, was not its substance—which was "irrelevant." *Id.* at 73. Instead, the problem was that the 2021 map was "drawn independent of the mandatory redistricting standards and procedures" and the "redistricting *process* established by the people under Proposition 4," so it was an "extension of the very constitutional violation that tainted the process from the start." *Id.* at 70-71. The Court emphasized the "need for" the "mandatory, neutral, prioritized redistricting standards and procedures enacted under Proposition 4." *Id.* at 29. Compliance with those standards, in the Court's view, provided the "obvious defense against challenges" that a map "unduly favor[s]" one party or another. *Id.* In short, because "Proposition 4's procedural requirements are so integral to the governmental reforms it put into place," any "map enacted in their absence is, itself, a violation of the people's right to alter and reform their government." *Id.* at 73.

¶3 Consistent with the Court's conclusion that Proposition 4 is the "law in Utah," *id.* at 68, the Court ordered the Legislature to "design and enact a remedial congressional redistricting map in conformity with Proposition 4's mandatory redistricting standards and requirements," *id.* at 76. Proposition 4 requires any redistricting plan adopted by the Legislature to be evaluated using "judicial standards and the best available data and scientific and statistical methods, including measures of partisan symmetry," to assess whether the plan complies with Proposition 4's standards. *See* Utah Code §20A-19-103(5). The Court confirmed that "the legislature retains discretion in determining what judicial standards are applicable" and "to determine the 'best available data and scientific and statistical methods' … given the general, non-specific nature of [Proposition 4's] language." Op. at 29-30. Plaintiffs never challenged that conclusion.

¶4 A few days later, on August 28, Legislative Defendants asked the Court to clarify its order. *See* Doc. 476. They asked: (1) whether a new commission must be convened under Proposition 4; (2) whether the Legislature needs to take an up-or-down vote on the maps proposed by the commission in 2021 under S.B. 200; (3) whether the Legislature needs to comply with Proposition 4's requirement to issue a written report explaining why its alternative remedial map better satisfies Proposition 4 than the 2021 commission's recommendations under S.B. 200; (4) whether the Legislature must make its proposed remedial map available online for at least 10 calendar days before enacting it; (5) whether the Legislature must make the remedial map's data available; and (6) whether the Legislature may also submit objections to any maps proposed by Plaintiffs or any other third parties. The next morning, Plaintiffs stated their positions on each of Legislative Defendants' questions. *See* Doc. 486.

¶5 On August 29, the Court held a status conference, where it orally adopted each of Plaintiffs' proposed answers to Legislative Defendants' questions. It ordered that the Legislature did not need to convene a new commission, take an up-or-down vote on the 2021 commission's recommendations or a new commission's recommendations, or issue a report with reasons for rejecting a commission's recommendation. *See* Doc. 514 at 27:7-17. The Court adopted Plaintiffs' reading that the Legislature does need to make its map available online for at least 10 calendar days and make the underlying data available. Docs. 486, 506. The Court also confirmed that the Legislature could submit objections to any maps proposed by Plaintiffs. *Id.*

¶6 Before the status conference, Legislative Defendants moved the Court to stay the permanent injunction of H.B. 2004 pending remedial proceedings and appeals. *See* Doc. 482. On September 2, the Lieutenant Governor explained that a congressional map must be in place by November 10 to ensure that her office and the county clerks can conduct the 2026 election in an orderly fashion. *See* Doc. 494.

¶7 Also on September 2, the Court denied the motion for stay. The Court acknowledged "the importance of legal issues and the consequential nature" of the permanent injunction. Doc. 496 at 2. The Court also recognized that the "timelines here are short," but said that redistricting has been accomplished in other states "under tighter timelines." *Id.* As examples, the Court referred to Texas and California. *Id.* Those and others, according to the Court, "suggest[]" that "there is time to redistrict and comply with Proposition 4." *Id.* And as the Court saw it, because the 2026 election was "more than a year away" and because election deadlines "can be moved without impacting the 2026 elections," it was "not impossible for

the parties to have a final decision from the Utah Supreme Court in time for and without impacting the 2026 midterm elections." *Id.* at 3. The Court also stated that the 2026 election should proceed "with a lawful congressional plan designed in compliance with Proposition 4's traditional redistricting standards and its prohibition on partisan gerrymandering." *Id.*

¶8 Remedial proceedings progressed according to the parties' stipulated schedule, adopted by this Court. *See* Docs. 500, 506. On September 25, the Legislature published five proposed alternative maps. Between September 26 and October 5, the Legislature made those proposed alternative maps available for public comment. On October 6, the Legislature enacted one of those proposed alternatives—Map C—and submitted it to the Court. Plaintiffs too submitted their own proposed maps on October 6. The parties filed supporting briefs, objections, and expert reports on October 17, and this Court held an evidentiary hearing on the Enacted Plan and Plaintiffs' alternative maps on October 23/24. By October 29, the parties would submit proposed findings of fact and conclusions of law.[1]

II. The Legislature redistricts under the Proposition 4 standards held applicable by the Court.

¶9 Following the Court's order and clarification, the Legislative Redistricting Committee began the redistricting process.

A. The Legislative Redistricting Committee holds a public hearing on September 22.

¶10 The Legislative Redistricting Committee held its first public hearing on Monday, September 22, at 9:00 AM. The meeting was open to the public and livestreamed on the

[1] The original due date for proposed findings of fact and conclusions of law was October 28. At the end of the evidentiary hearing, the Court extended that deadline by one day. Tr.2 406:12-15.

Legislature's website. *See* Utah State Legislature, Legis. Redistricting Comm. Meeting (Sept. 22, 2025), https://bit.ly/3KS56yx.

¶11 At the meeting, Committee Chair Senator Scott Sandall noted that the committee met "in compliance with the court's orders and under protest." *Id.* at 1:04. But the Legislature "maintain[ed] [its] constitutional duty to produce a map." *Id.*

¶12 Chair Sandall also clarified that unlike prior redistricting efforts, Proposition 4 prohibited the consideration of "any partisan data" when crafting a congressional map. *Id.* at 3:30-4:15. Chair Sandall asked staff to sort and remove any partisan comments in the public comment and forward to the committee only those that met the requirement of nonpartisan discussion.

¶13 Legislative staff then provided an update on the status of the ongoing litigation and an overview of the redistricting process. *Id.* at 7:47. They confirmed that districts would be drawn using the 2020 U.S. Census data. *Id.* at 12:24.

¶14 Staff then presented the Proposition 4 standards, noting that the Legislature was required to follow these criteria to the "greatest extent practicable" in the following order of priority: (a) adhering to federal law, including achieving equal population between districts; (b) minimizing the division of municipalities and counties in the formation of districts; (c) creating geographically compact districts; (d) making districts contiguous and allow for efficient transportation throughout the district; (e) preserving traditional neighborhoods and communities of interest; (f) following natural and geographic features; and (g) maximizing boundary agreement among different types of electoral and government districts. *See* Utah Code §20A-19-103(3)(a)-(g).

¶15 Regarding those redistricting standards, the Court's opinion recognized that the "statute itself provides some discretion in balancing competing interests and in making policy considerations." Op. at 28.

¶16 Staff also clarified that Proposition 4 prohibited the dividing of districts "in a manner that purposefully or unduly favors or disfavors any incumbent, elected official, candidate or prospective candidate for elective office, or any political party." Utah Code §20A-19-103(4); Legis. Redistricting Comm. Meeting (Sept. 22, 2025), https://bit.ly/3KS56yx, at 28:41. This provision's plain text applies to both a map drawer's intent ("purposefully") and a map's result ("unduly").

¶17 Partisan political data could be taken into account only during the back-end analysis of the map, not while drawing lines. *Id.* at 32:55.

¶18 An attorney from the Office of Legal Research and General Counsel then explained that Proposition 4 requires evaluating a plan's compliance with redistricting criteria by using "judicial standards and the best available data and scientific and statistical methods, including measures of partisan symmetry … to assess whether a proposed redistricting plan abides by and conforms to" Proposition 4's redistricting standards. Utah Code §20A-19-103(5); Legis. Redistricting Comm. Meeting (Sept. 22, 2025), https://bit.ly/3KS56yx, at 31:57.

¶19 Quoting U.S. Supreme Court Justice Stevens, OLRGC defined the concept of "partisan symmetry" as requiring "that the electoral system treat similarly-situated parties equally, so that each receives the same fraction of legislative seats for a particular vote percentage as the other party would receive if it had received the same percentage." *LULAC v. Perry*, 548 U.S. 399, 466 (2006) (Stevens, J., concurring).

¶20 Put differently, "[u]nder symmetry, the question isn't whether the seat share is … proportional … to the vote share, it's whether if Party A gets [a certain] percent and has a certain outcome, if we flip the vote and Party B gets that same vote, do they also get that same outcome." Legis. Redistricting Comm. Meeting (Sept. 22, 2025), https://bit.ly/3KS56yx, at 34:50.

¶21 Dr. Sean Trende then spoke to the committee. He was retained as an expert for the ongoing litigation and retained separately by the Legislature to assess maps. *Id.* at 1:33:00.

¶22 Dr. Trende began with Proposition 4's substantive map drawing criteria, the first of which is complying with federal law. The U.S. Constitution requires equalized populations for congressional districts. *Id.* at 1:36:33.

¶23 This equalized population requirement means Salt Lake County needs to be split because its population exceeds the maximum number of people who can make up a congressional district in Utah. *Id.* at 1:37:38.

¶24 Dr. Trende explained that "geographic compactness" was another criterion, and that there are several industry-standard methods for measuring a district's compactness.

¶25 One way is the Reock metric, which effectively draws a circle around a district and asks what percentage of the circle the district would fill. *Id.* at 1:40:52. The lower the number, the less compact; the higher the number (approaching 1), the more compact.

¶26 Another is Polsby-Popper, which measures the severity of a district's "arms" and "inlets." *Id.* at 1:41:32, 1:42:26. One downside of the Polsby-Popper score, noted Dr. Trende, is that it does not account for natural boundaries, which is one of Proposition 4's requirements for drawing district lines. *Id.* at 1:42:56. That means even if a district is drawn in

accordance with a natural boundary—like a river—it may have a low Polsby-Popper score, even though nothing inappropriate occurred when shaping the district.

¶27 Proposition 4 also includes as a factor keeping "communities of interest" together. Utah Code §20A-19-103(3)(e). Dr. Trende noted that he identified "high-level, well-established communities of interest" to account for when creating and evaluating maps. *Id.* at 1:48:35. These included keeping interstate corridors intact; keeping Native American reservations and college campuses together; and separating military bases into separate districts to ensure each of Utah's members of Congress was incentivized to support military personnel and installations in Utah.

¶28 He also recognized that the political science literature considers cities and counties de facto communities of interest, so by keeping cities and counties together, that "communities of interest concept" is "hardwired" into Proposition 4. *Id.* at 1:48:54.

¶29 Dr. Trende then explained the partisan symmetry requirement and the partisan bias test. Proposition 4, he explained, asked two questions: whether a map "purposefully" favors a partisan outcome, and whether it "unduly" does so. The "purpose" test asks "if you were drawing without any political data," would this map "look like what you would expect to produce?" Is this map "trying to help Republicans or trying to help Democrats?" *Id.* at 1:52:38.

¶30 The "standard-issue" way to determine whether a map "purposefully" favors a partisan outcome is by using computer simulations. Dr. Trende compared the maps he produced to simulation "ensembles"—thousands of computer-generated maps constituting a representative sample of possible district configurations. *Id.* at 1:53:00.

¶31 One of the ensemble sets he compared his maps to was originally created by Dr. Christopher Kenny. *See* Algorithm-Assisted Redistricting Methodology (ALARM) Project, https://alarm-redist.org/. The ALARM project is directed by political scientists and researchers at Harvard and elsewhere, including Kosuke Imai, Christopher Kenny, Cory McCartan, and Tyler Simko (the "Harvard maps"). The group created a set of publicly available "50-State Redistricting Simulations." Each state has its own "ensemble of alternative redistricting plans" which are "tailored to its redistricting rules." *Id.* This allows the simulations to "directly account for the state's political geography and redistricting criteria." *Id.* The ALARM project generated over 5,000 simulated plans for each state.

¶32 Dr. Trende compared the vote share in the least Republican district in each map he drew to the Harvard Utah ensemble to check whether it conformed to the expected range of partisan outcomes in the Harvard maps' districts. *See* ALARM Project, Utah Congressional Districts, https://alarm-redist.org/fifty-states/UT_cd_2020/. The Harvard ensemble was "drawn by a computer," leaving "no question" that no partisan intent was involved. Legis. Redistricting Comm. Meeting (Sept. 22, 2025), https://bit.ly/3KS56yx, at 1:53:43.

¶33 If a proposed map yielded a partisan index for the least Republican district similar to the Harvard set (*i.e.*, within the middle 95%), then he concluded the map was not a partisan outlier. *Id.* at 1:53:49.

¶34 Dr. Trende also compared the Least Republican Vote Share (LRVS) in his proposed maps to the LRVS in two additional 100,000-map ensembles, both of which he generated using the publicly available Redist algorithm. *Id.* at 1:53:50.

¶35 One set—the "base" set—incorporated the first three Proposition 4 standards: compliance with federal law, respect for city and county integrity, and geographic compactness. *See* Utah Code §20A-19-103(3)(a)-(c).

¶36 He programed the second set—the "restricted" set—to minimize county and city splits, deviate no more than +/-1% from the ideal district population, contain contiguous districts, avoid splitting Tribal lands and reservations, respect Utah's unique landforms and geography, and ensure ease of transportation within districts *Id.* §20A-19-103(3)(a)-(g); Legis. Redistricting Comm. Meeting (Sept. 22, 2025), https://bit.ly/3KS56yx, at 1:54:21.

¶37 When compared to the LRVS of these 100,000-map ensembles, the partisan distribution of the least Republican district in each of Dr. Trende's proposed maps fell within the acceptable middle-95% range. Legis. Redistricting Comm. Meeting (Sept. 22, 2025), https://bit.ly/3KS56yx, at 2:03:41.

¶38 Dr. Trende then compared the least Republican district in each of his proposed maps to the least Republican district in a refined set of the three simulation ensembles. He said that it was an "open question" whether simulation sets should include asymmetric maps that would fail the partisan bias test since those maps would be illegal under Utah law. *Id.* at 1:55:08. To account for this open question, he "culled" the simulations ensembles to include only those maps that complied with Proposition 4's partisan symmetry requirement.

¶39 Dr. Trende described "partisan symmetry" as the "gold standard" for determining whether the outcome of a map unduly favors one party over the other. *Id.* at 1:55:58. He described it as the "do unto others as you would have them do unto you" standard. *Id.* at 1:56:18. Based on his experience, expertise, and the social science literature, he concluded that

the "only test" that measures partisan symmetry is the "partisan bias test." *Id.* at 1:57:05; *see also* DX10 (Jonathan Katz, Gary King, and Elizabeth Rosenblatt, *Theoretical Foundations and Empirical Evaluations of Partisan Fairness in District-Based Democracies*, 114 Am. Pol. Sci. Rev. 164, 164 (2020)). And because Proposition 4's plain text requires "partisan symmetry," there is no "option to *not* include a partisan bias test." Legis. Redistricting Comm. Meeting (Sept. 22, 2025), https://bit.ly/3KS56yx, at 1:56:30.

¶40 Chair Sandall asked whether Dr. Trende had compared the Independent Redistricting Committee maps to the Proposition 4 standards. *Id.* at 2:00:44. Dr. Trende answered that all of them fail the partisan bias test. Thus, none of them were "live options" under Proposition 4. *Id.*

¶41 Dr. Trende then presented to the Committee his five proposed maps. He clarified that he evaluated all of them using the same LRVS and culling techniques he had just described. *Id.* at 2:01:57. All of them fell within the acceptable range of partisan outcomes in the LRVS simulation ensemble analysis and passed the partisan bias test.

¶42 After Dr. Trende's presentation, a committee staff member explained that the public could view and comment on the proposed maps at redistricting.utah.gov. This allowed the public to "view" and "comment" on maps and to create their own. Legis. Redistricting Comm. Meeting, Recording 2 (Sept. 22, 2025), https://bit.ly/3KS56yx, at 1:46.

¶43 Chair Sandall then opened the meeting for public comment. Thirty-eight members of the public commented on the proposed maps, both in person and over Zoom. The meeting was then adjourned.

B. The Legislative Redistricting Committee holds a second public hearing on September 24.

¶44 Two days later, on Wednesday, September 24, at 11:00 AM, the Legislative Redistricting Committee held another public meeting to review the proposed maps and allow for further public comment.

¶45 Representative Candice Pierucci, a Committee co-chair, noted that public comment would be taken into account when the committee determined which map to recommend to the full Legislature. Legis. Redistricting Comm. Meeting (Sept. 24, 2025), https://bit.ly/4n2xDyB, at 4:02.

¶46 Chair Pierucci then presented the Legislature's proposed maps for a second time and formally introduced them as complying with Proposition 4's standards, drawn with no partisan intent, and passing the partisan bias test. *Id.* at 6:10.

¶47 Chair Pierucci then explained that the Legislature identified various communities of interest that it deemed important to keep together in any potential map, including the Uintah Basin, Tribal lands and reservations, and institutions of higher education. *Id.* at 11:27. Chair Pierucci also explained that military installations should be kept together, in part because of their "nexus to the federal government," meaning that they mattered for occasions of work in partnership with the federal government. *Id.* at 11:49.

¶48 Senate Minority Leader Luz Escamilla and Representative Doug Owens presented their own proposed map with the aid of Dr. Daniel Magleby, whom they hired as their consulting expert. *Id.* at 56:17.

¶49 The Escamilla-Owens proposal was based on a former Independent Redistricting Commission Map and adjusted in an effort to comply with Proposition 4. *Id.* at 59:40. The

map did not have equal population among the four proposed districts. Dr. Magleby said that could be fixed later. *Id.* The map also had 13 municipal splits and 4 county splits. *Id.* at 1:02:54; 1:39:57 (discussing the original amount of splits in the IRC map). The Committee asked questions about the map and discussed Dr. Magleby's background. *Id.* at 1:13:20.

¶50 Multiple members asked about the number of city splits. *Id.* at 1:12:27; 1:39:57; 1:42:07; 1:47:56. Dr. Magleby confirmed that the original IRC map had 13 city splits and 5 county splits, so the proposed map did not, in fact, reduce the number of city splits. *Id.* at 1:50:24.

¶51 Afterward, the committee heard more public comment. In total 27 people spoke in person and over Zoom. *Id.* at 1:52:04. The Committee again made clear that the maps, data, and information would be available on the redistricting website and that members of the public could propose their own maps and comment on the ones posted there. *Id.* at 3:00:14. Altogether, more than 10,000 comments were submitted on 64 proposed maps. There were nearly 3,000 comments on the Legislature's Map C—later enacted as the 2025 Plan.

C. Senator Brammer introduces S.B. 1011.

¶52 Over the course of these hearings, Senator Brady Brammer introduced S.B. 1011. That bill further defined Proposition 4's "partisan symmetry" test and articulated standards for evaluating whether a map "purposefully or unduly favored" either party. Legis. Redistricting Comm. Meeting (Sept. 22, 2025), https://bit.ly/3KS56yx, at 40:15. It also clarified that any "judicial review" of congressional redistricting plans should be based on the tests named in the bill.

¶53 The goal of the bill was to "facilitate" Proposition 4's reforms, given that the Court had "invited" the Legislature to define the standards of partisan symmetry. *Id.* at 45:37; *see* Op. at 29-30 (recognizing the Legislature's discretion to "determin[e] what judicial standards are applicable").

¶54 Given that Proposition 4 specifically says "partisan symmetry"—the first time any state statute had done so—Senator Brammer's bill proposed a method for measuring partisan symmetry. Legis. Redistricting Comm. Meeting (Sept. 22, 2025), https://bit.ly/3KS56yx, at 44:20.

¶55 Senator Brammer explained that the key principle behind partisan symmetry is that "the outcome of an election should be determined by the voters and not the map." *Id.* at 47:06. He emphasized this Court's statement that the Legislature has the authority to determine which methods to use. Defining this statutory term would provide "clarity for the courts." *Id.* at 43:12.

¶56 Senator Brammer proposed assessing partisan symmetry using a method known as the "partisan bias test." He said the partisan bias test was used to "measure partisan symmetry by measuring lines of a district map and determining whether each party has a symmetrical opportunity to win a seat." *Id.* at 45:54. The test would help avoid "packing" and "cracking" of districts. *Id.* at 47:00.

¶57 Votes would be "equalized to evaluate if lines of a district map are fair." *Id.* The election used to determine bias would be a hypothetical one, separate from the actual outcome of the election. And the result would demonstrate if the map is skewed to one party or another.

¶58 Senator Brammer said the "partisan bias test" is more accurate than other proposed standards of symmetry, such as the efficiency gap. *Id.* at 54:51. He noted that the efficiency gap, another purported measure of fairness, was "ruled out as statistically not viable" in a state with fewer than six districts. Senator Escamilla said she "a hundred percent" agreed that the efficiency gap test was not applicable. *Id.* at 57:45. Senator Escamilla then said that there are additional measures of partisan symmetry, such as the mean-median difference and an ensemble analysis, which she included in her proposed amendment to Senator Brammer's bill. *Id.*; *see* Escamilla Proposed Amendment (Sept. 22, 2025), https://perma.cc/36KH-EH8X. Representative Owens similarly expressed concern about only having one test of partisan symmetry in the bill. *Id.* at 1:16:21.

¶59 Senator Brammer amended his initial proposal to add two additional tests to "ensure the analysis of maps is more robust to identify undue favoring or disfavoring of any party." *Proposed Redistricting Standards Bill Now Include Three Tests*, Utah State Senate (Oct. 3, 2025) https://perma.cc/CT2K-W83Q.

¶60 In total, the proposed S.B. 1011 defined and required three statistical methods for analyzing maps: the partisan bias test, the mean-median difference test, and an ensemble analysis using the Ranked Marginal Deviation test.

¶61 Ranked Marginal Deviation tests for partisan purpose in a different way than the Least Republican Vote Share test. *See* DX13 at 38 (Trende Report); DX14 at 25-31 (Barber Initial Report); Tr.2 128:1-20 (Trende). Essentially, RMD requires first ranking a proposed plan's districts from least Republican to most Republican based upon their partisan index and second, for each ranked position, "computing the average vote share across the ensemble."

DX14 at 25-26. The test then applies a mathematical equation to compare each district's partisan index to the ensemble's average at that rank. Essentially, RMD "is a descriptive measure of how typical the map's ranked pattern is compared to the average simulated map." DX14 at 26. LRVS, in contrast, looks only at the least Republican district and "asks where does the lowest-ranked district sit relative to the distribution from the neutral simulations." *Id.* at 30.

¶62 Dr. Trende performed the LRVS test on each of the proposed maps (A, B, C, D, E) when presenting them to the Redistricting Committee. PX12 (Trende Summary Sheets). He did not evaluate them at that time using RMD. Tr.2 128:1-20 (Trende). Only after he learned that S.B. 1011 would require RMD, and not LRVS, did he perform the RMD ensemble analysis on the proposed maps and found that each passed. Tr.2 128:19-20.

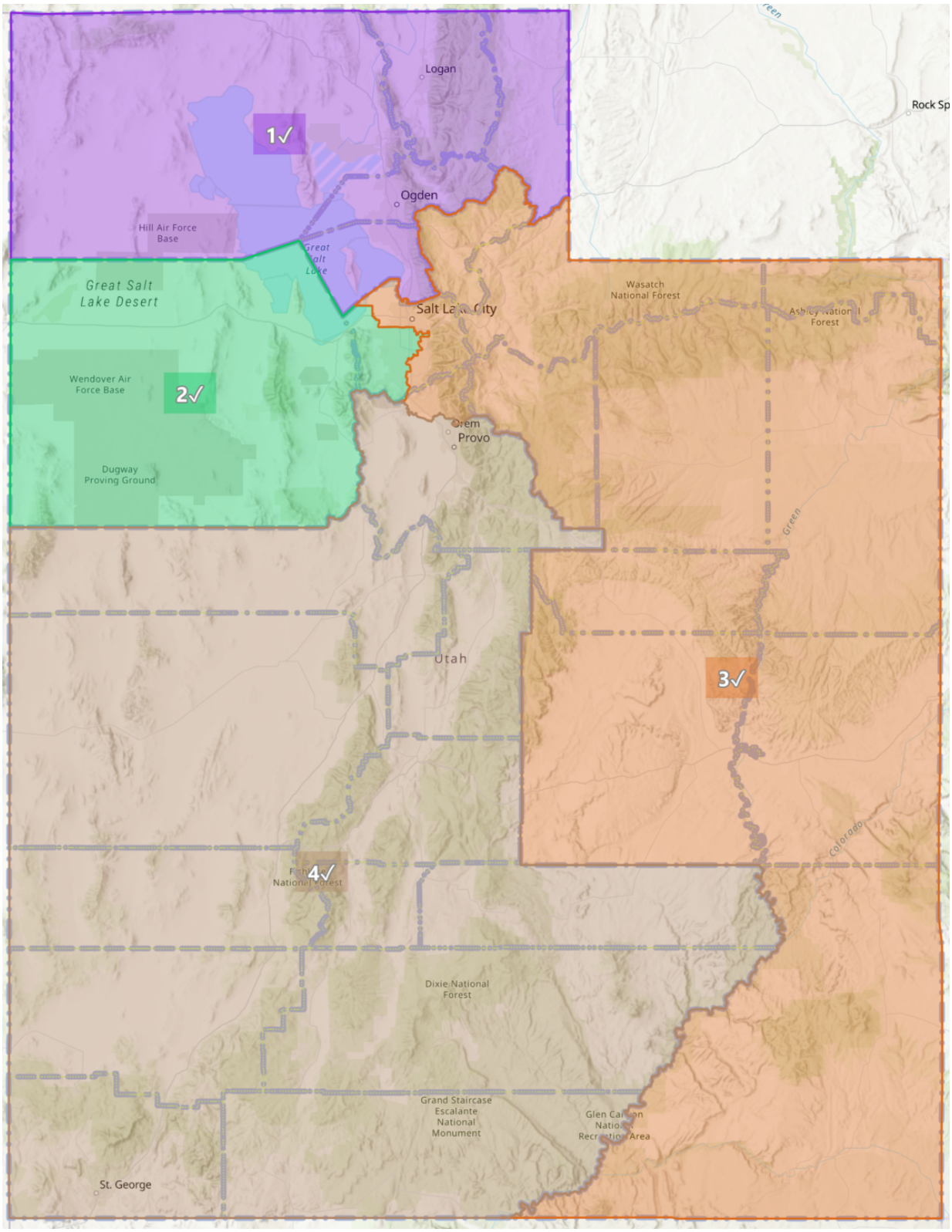
III. The Legislature enacts the 2025 Plan.

¶63 On the morning of October 6—before the special session started—the Legislative Redistricting Committee met to discuss whether to recommend S.B. 1012, which selected proposed Map C as the congressional plan, to the full Legislature.

¶64 Senator Ipson moved to recommend Map C for consideration in the 2025 special session. The Committee voted 8-2 to recommend Map C to the full Legislature for consideration and then adjourned.

¶65 On October 6, the House and Senate convened in special session, and each body voted to adopt S.B. 1012 as the 2025 Congressional Plan. Governor Cox signed it into law later that night.[2] Map C as enacted by S.B. 1012 appears on the page below.

[2] An interactive version of the 2025 Plan can be accessed at https://davesredistricting.org/maps#viewmap::91c33cec-aaab-4c0a-93aa-5c1fc7f18b83


1✓
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Logan
Ogden
Hill Air Force Base
Great Salt Lake
Great Salt Lake Desert
Wendover Air Force Base
Dugway Proving Ground
Salt Lake City
Wasatch National Forest
Provo
Utah
Green
Colorado
Dixie National Forest
Grand Staircase Escalante National Monument
St. George

A. The Legislature made its proposed maps available for ten days and solicited public comment.

¶66 The Legislative Redistricting Committee made Maps A through E, including Map C—later enacted as the 2025 Plan—available to the public for more than 10 days, from September 21 to October 6 on the Legislative Redistricting Committee's public website: redistricting.utah.gov. This fact is undisputed.

¶67 The public left over 3,000 comments on the 2025 Plan itself and thousands more comments on other maps, providing the Committee with feedback and commentary. Beyond making the five proposed plans publicly available in a highly interactive format, the Committee allowed the public to draw, submit, and comment on their own proposed plans. Sixty-four proposals were submitted.

¶68 The Committee also hosted two public hearings, described *supra* ¶¶10-51, during which dozens of members of the public spoke to the Committee in person and via Zoom.

B. The Legislature made its redistricting software and data available to the public.

¶69 The Legislature published its data and software on the redistricting website beginning on September 21. This fact is undisputed.

¶70 Dr. Sean Trende, the Legislature's expert, spoke during the first public hearing about the methodology, software, and data sets he used to create and evaluate the proposed maps. These too were made available for public inspection and use. No data, code, or software relied upon by the Legislature was hidden from the public.

C. The Legislature did not consider any partisan data or information when redistricting.

¶71 The Legislative Redistricting Committee took great care to shield itself and other members of the Legislature from any partisan information when creating and reviewing potential maps. Staff screened public comments for partisan content and the co-chairs and presiding officers prohibited discussion about partisan political data. Dr. Trende presented the five proposed plans to the Committee, listed the number of county splits, counties split, and municipalities split, provided the Polsby-Popper and Reock compactness scores, and communicated that the plans had passed the partisan bias test and the Least Republican Vote Share test when compared against the ALARM simulation set, the "base" simulation set, and the "restricted" simulation set. PX12 (Trende Summary Sheets). He gave the Committee no other partisan information, such as anticipated partisan vote share of the proposed districts. When the Committee and later the Legislature voted on the proposed plans, they did so blind to partisan outcomes.

IV. The Legislature enacts S.B. 1011.

¶72 The Brammer bill was introduced in the House and Senate during the Legislature's special session on October 6. When that session opened, Senator Brammer introduced a substitute bill that retained the three measures—partisan bias, mean-median, and the ensemble analysis using the Ranked Marginal Deviation test—and further clarified how to conduct the RMD test. Representative Abbott later introduced another substitute bill that would have removed the mean-median test from the bill. The Abbott bill failed on a voice vote. The Brammer bill passed out of both chambers and was signed by Governor Cox that same day.

A. The Legislature mandates a simulation ensemble analysis to test for partisan intent.

¶73 S.B. 1011 institutes a simulation ensemble analysis to test for partisan purpose. *See* Utah Code §20A-19-103(1)(a).

¶74 S.B. 1011's ensemble analysis mandates generating a "representative ensemble of districting plans"—thousands or more—using a "Sequential Monte Carlo simulation" (SMC) and then comparing a proposed map's partisan distribution to the partisan distribution of the simulation ensemble. Utah Code §20A-19-103(1)(a), (f). An SMC simulation is "a probabilistic algorithm that simultaneously generates a representative ensemble of districting plans for comparison in an ensemble analysis by building redistricting plans through a step-by-step random sampling method, weighting and resampling the plans to reflect legal and geometric criteria." *Id.* §20A-19-103(1)(f).

¶75 If the proposed map's partisan distribution falls below 95% of the ensemble's average partisan distribution, it passes and is deemed to be drawn without partisan intent. *Id.* §20A-19-103(1)(a)(iii), (4).

¶76 The "point" is to answer "what … a variety of neutral, legally valid Utah plans look like," and "where does a proposed map sit relative to that neutral baseline." DX14 at 23 (Barber Initial Report). This sort of analysis allows a map drawer, legislature, or court to "sample a large number of maps from the universe of maps drawn without respect to politics"—to essentially "conduct a poll of maps drawn without respect to politics." DX13 at 21 (Trende Report). The focus is on intent, not effect. *Id.* at 22. Even if a map has the effect of favoring one party or another by "chance," or because "the political geography of a jurisdiction

naturally favors one party or the other," using the ensemble analysis helps ensure that the act of map-drawing itself was unbiased. *Id.*

¶77 The use of simulation ensemble analyses is widespread in political science and is the industry-standard way to demonstrate that maps are drawn without illicit partisan purpose. Comparisons against computer-simulated ensembles began in the 1960s following the Supreme Court's decision in *Baker v. Carr*, 369 U.S. 186 (1962). DX13 at 20 (Trende Report).

¶78 S.B. 1011 requires use of the "ranked marginal deviation" test to compare the enacted map to the simulations. This is a standard method of evaluating how a particular map stacks up to the computer-simulated ensemble.

¶79 A map "fail[s] the ensemble analysis" in either of two ways: first, if it falls above 95% of the simulated maps' average RMD score; and second, if it falls above 95% of the ensemble districts average RMD score *after* "culling the ensemble to include only redistricting plans that pass the partisan bias test." Utah Code §20A-19-103(1)(a)(iii)(A)-(B); *see* DX14 at 23 (Barber Initial Report) (noting that the 95% number is a "standard statistical significance threshold").

¶80 In plain language, a map is first compared to the entire set of ensemble districts. Then, all maps that fail the partisan bias test—in other words, all illegal maps—are removed from the ensemble, and the proposed map is compared to that "culled" set. This ensures that a map is not an outlier when compared either to all representative maps or only to representative maps exhibiting no undue partisan *effect* (because they've passed the partisan bias test).

B. The Legislature mandates the partisan bias test to probe for undue partisan favoritism.

¶81 Proposition 4 requires the Legislature to use "measures of partisan symmetry" to assess whether a proposed redistricting plan "unduly favors" one political party or the other. Utah Code §20A-19-103(4)(c).

¶82 Partisan symmetry is an "'outcome-based measure' that describes the effects of the plan." DX13 at 29 (Trende Report). In theory and design, partisan symmetry measures fairness: whether "both parties are treated even-handedly" in how votes translate into seats. DX14 at 15 (Barber Initial Report). In other words, "whether comparable swings would yield comparable seat changes." *Id.* "A plan can be fair even if the winner's seat share exceeds its vote share, so long as the rules of conversion are even for both sides across the range of elections the state actually experiences." *Id.* On the other hand, a plan "can look 'proportional' in one election yet be unfair if its structure systematically blunts one party's ability to convert additional votes into seats." *Id.*

¶83 The idea is that "parties with the same level of voter support be treated equally by the electoral system." DX12 at 2 (Katz Report). If "each party can translate votes into seats" with equal ease a plan is symmetrical. DX14 at 16 (Barber Initial Report).

¶84 The partisan bias test measures deviations from symmetry by using electoral data in a "seats-votes curve." DX12 at 3 (Katz Report). The curve describes "for a given party's average vote share what fraction of the seats they will receive." *Id.*

¶85 A symmetrical plan is one in which the seats-votes curve is the "same for all political parties contesting an election." *Id.* For example, if Republicans get 55% of the statewide vote and win 65% of the seats, Democrats should also win 65% of the seats if they

were to receive 55% of the vote. DX13 at 29 (Trende Report); DX12 at 2-3 (Katz Report). *See also Common Cause v. Rucho*, 318 F.Supp.3d 777, 891-92 (M.D. N.C. 2018); *LULAC*, 548 U.S. at 420 (explaining that partisan bias is measured by "compar[ing] how both parties would fare hypothetically if they each (in turn) had received a given percentage of the vote").

¶86 S.B. 1011 tests for partisan bias by answering an "intuitive" question: would both parties "win half of the seats if they both won half of the votes." DX14 at 16 (Barber Initial Report).

¶87 To run the calculation, the first step is to "shift[] each district's vote by a uniform amount to simulate a 50-50 statewide vote." *Id.* Second, "read off which party would win more seats at that tie." *Id.* If one party wins three or more seats, then the proposed plan is biased in that party's favor. *See* Utah Code §20-19-103(1)(d)(i).

¶88 Partisan bias has emerged as a superior test for measuring partisan symmetry, even in states like Utah. *See* DX12 at 8 (Katz Report) (discussing the efficacy of the partisan bias test even in states where one party dominates statewide elections).

C. The Legislature supplements the partisan bias test with the mean-median difference test.

¶89 Under S.B. 1011, a proposed map must pass not only the partisan bias test but also the mean-median test, which calculates the difference "between a party's average statewide vote share and the party's median vote share across all districts in a proposed redistricting plan." Utah Code §20A-19-103(1)(b).

¶90 The mean-median test "is a simple way to detect skew in the distribution of district vote shares." DX14 at 20 (Barber Initial Report). The idea is "that a party's average vote share across a jurisdiction should be close to the party's vote share in the median district."

DX13 at 30 (Trende Report). If the mean and median coincide, the difference is zero, and the map is symmetric. The higher the divergence, the more a distribution is skewed in favor of one party and against its opponent. DX14 at 20 (Barber Initial Report).

¶91 S.B. 1011 deems a plan acceptable for a given election if the mean-median falls within (-2, 2) percentage points, *see* Utah Code §20A-19-103(1)(b)(ii),[3] "meaning that it is agnostic regarding the direction of any bias." DX14 at 20-21 (Barber Initial Report). Values within that window demonstrate limited skew in a four-seat map; values outside of it signal "unusual skew that warrants scrutiny." *Id.* at 21.

¶92 Like partisan bias, this test is used by courts evaluating redistricting plans. *See, e.g.*, *League of Women Voters v. Commonwealth*, 178 A.3d 737, 774 (Pa. 2018); *Common Cause*, 318 F.Supp.3d at 892-93. It has also been used by special masters when drawing congressional maps. *See* DX13 at 30 (Trende Report).

V. Plaintiffs object to the 2025 Plan and propose their own plans.

¶93 Dissatisfied with the 2025 Plan, Plaintiffs submitted on October 6, 2025, "two maps for consideration by the Court." Doc. 541 at 2. The subsequent evidentiary hearing revealed that these plans were drawn by Plaintiffs' expert Dr. Kassra Oskooii. *See* PX2 (Oskooii Report); Tr.1 232:22-24 (Oskooii). But Dr. Oskooii did not start from scratch. Plaintiffs' Plan 1 began as a simulated map, and Plan 2 began as the 2025 Plan. Tr.1 234:4-14, 236:4-14 (Oskooii).

[3] *See* S.B. 1011, https://le.utah.gov/asp/passedbills/passedbills.asp?session=2025S1 (last visited Oct. 17, 2025).

¶94 Plaintiffs' Plan 1 places District 1 fully within Salt Lake County, splitting the county north of South Jordan and Sandy (and splitting Midvale). District 4 takes the rest of Salt Lake County, the western half of Utah County, and continues west and south to capture Juab, Millard, Sanpete, Sevier, and Tooele counties. District 2 comprises the five northernmost counties, and District 3 takes everything else.

¶95 Plaintiffs' Plan 2 purports to improve upon the 2025 Plan. The primary difference is its treatment of Salt Lake City. Plan 2 places Salt Lake City along with several other cities in District 2 with Tooele County. District 2 then skips over West Jordan and South Jordan before picking up Riverton and Herriman in the south of the county. In contrast, the 2025 Plan includes Salt Lake City in District 3.

VI. The Court hears expert testimony on the 2025 Plan and Plaintiffs' two plans.

¶96 Beginning on October 23, 2025, the Court held a two-day remedial evidentiary hearing. The Court heard nearly fifteen hours of testimony from six expert witnesses and two named plaintiffs about the 2025 Plan and Plaintiffs' proposed plans.

A. Dr. Sean Trende

¶97 Dr. Trende is an expert in map drawing, statistical and quantitative analysis, and partisan symmetry analysis. Tr.2 81:21-24 (Trende). He earned his undergraduate degree at Yale University, his Juris Doctor from Duke University, a Master's in Political Science from Duke, a master's in applied Statistics and a Ph.D. in Political Science from The Ohio State University. DX13 at 4-5 (Trende Report).

¶98 Since 2010, Dr. Trende has served as the senior elections analyst for Real Clear Politics. In this role, he assesses the "competitiveness of races, particularly for the House." He

also writes articles "that try to explain difficult statistical concepts to [the] general readership." Tr.2 75:7-12 (Trende).

¶99 Dr. Trende has served as an expert witness in numerous cases, and as a special master appointed by the Supreme Court of Virginia to redraw the districts for the Commonwealth's representatives to the House of Delegates, State Senate, and U.S. Congress for the next decade. He has worked for both Republicans and Democrats as an expert witness. Tr.2 78:15-24 (Trende); Tr.2 161:8-9. State and federal courts routinely find him credible and reliable. *See, e.g.*, *Szeliga v. Lamone*, 2022 WL 2132194 at *41 (Md. Cir. Ct. Mar. 25, 2022) (observing that Dr. Trende's "presentation was an example of a deliberate, multifaceted, and reliable presentation that this fact finder found and determined to be very powerful"); *Ala. State. Conf. of the NAACP v. Allen*, 2025 WL 2451166 at *58 (N.D. Ala. Aug. 22, 2025) ("[T]he Court finds Dr. Trende's testimony credible. The parties do not dispute his qualification as an expert, and he explained his methods and work clearly and consistently. The Court carefully observed Dr. Trende's demeanor during trial and found him to be candid …. Dr. Trende took care to limit his testimony to his expertise and not to overstate his conclusions.").

¶100 Dr. Trende had visited Utah several times before the evidentiary hearing. Tr.76:24-77:11.

¶101 Dr. Trende was retained initially to evaluate any maps that came before the Legislative Redistricting Committee for purposeful or undue partisan favoritism. Tr.2 80:21-81:1 (Trende). His role evolved to include drawing maps for the Committee. He also evaluated all other maps that were submitted to the Committee, including the 2021 Independent Redistricting Committee maps. Tr.2 81:3-10.

¶102 Before drawing maps to present to the Committee, Dr. Trende reviewed Proposition 4. Tr.2 82:11-14 (Trende). He concluded that it had two sets of provisions: first, "structural standards" that governed things like compactness and municipality splits. Tr.2 82:19-83:1. Second, it had "partisanship requirements." Tr.2 82:23-83:1.

¶103 Dr. Trende described the process of drawing the 2025 Plan. Tr.2 99:5-11 (Trende). He started with a publicly available version of the 2021 Plan using the popular web-based application "Dave's Redistricting." Tr.2 98:8-11, 181:2-6. He then proceeded to identify and "fix" what were, in his view, the 2021 Plan's structural problems, starting with the four-way split of Salt Lake County. Tr.2 99:12-17, 99:24-100:2. To resolve this split, he combined the eastern portions of Salt Lake County that were in District 2 with District 4, and the western portions of Salt Lake County that were in District 1 with District 3. Tr.2 100:9-16. This arrangement made more sense for "compactness reasons." Tr.2 100:13.

¶104 He then resolved the split of Salt Lake City by placing it entirely within District 1, which needed the population boost. Tr.2 100:22-101:2 (Trende); DX13 at 33 (Trende Report). Dr. Trende then placed Sandy and Draper into District 3, which left Millcreek as the only split municipality. Tr.2 101:20-102:1.

¶105 Dr. Trende moved Davis County to District 1 and zeroed out the population by taking the portion of District 1 that was in Summit County and reallocating it to District 3 along with Morgan County. Tr.2 102:14-19 (Trende). He gathered the remaining rural counties into District 4, anchoring the district in the southern end of the I-15 corridor. Tr.2 102:20-103:20.

¶106 Dr. Trende testified that he followed Proposition 4's structural criteria to the greatest extent practicable when drawing what became the 2025 Plan. Tr.2 96:23-97:1 (Trende).

¶107 The 2025 Plan is not "just the 2021 map in disguise," given the substantial changes Dr. Trende made. Tr.2 107:16-20, 108:14-25 (Trende). In total, the 2025 Plan moves 1,271,050 residents (nearly 40% of the State's population) from their 2021 districts. DX13 at 7 (Trende Report). Only 36% of District 2 residents in the 2021 Plan stay in District 2 in the 2025 Plan, and only around 60% of Districts 3 and 4 residents in the 2021 Plan stay in those districts in the 2025 Plan. *Id.* at 6-7. This is a "significant reworking" of prior district lines. *Id.* at 32.

¶108 At no point during the map drawing process did Dr. Trende "consider partisanship." Tr.2 109:24-110:3 (Trende). Nor did he consider the "likely partisan outcome of any election in any of the four districts." Tr.2 110:4-7. He did not design any of the districts to purposefully or unduly favor an incumbent or a political party. Tr.2 110:12-19.

¶109 Once Dr. Trende finishing drawing the map later enacted as the 2025 Plan, he used the "best available data and statistical methods, including measures of partisan symmetry," to evaluate whether the map "purposefully or unduly favored" a political party. Tr.2 111:9-16; 112:7-13 (Trende).

¶110 Determining whether the map "purposefully" favors a political party requires answering the question: "if you had no partisan data, is this a map that … you might come up with if you were truly drawing blind to partisanship?" Tr.2 115:13-21 (Trende).

¶111 Whether the map "unduly favors" a political party, in turn, requires asking if it is "going to tend to produce a bad outcome." Tr.2 115:22-25 (Trende).

¶112 Dr. Trende recognized that the best measure to assess whether a plan was drawn with intent to favor a party is simulation ensembles. Tr.2 116:16-23 (Trende). "The point of the exercise is to get a range of partisanship" to determine what "party-blind maps in Utah really look like." Tr.2 118:1-8. If the proposed map is "way above that range or way below that range," then it would appear as if that map were drawn with partisan intent. Tr.2 118:16-21.

¶113 Dr. Trende compared all of the plans he proposed to the Legislature, including what became the 2025 Plan, to three sets of ensembles: the Harvard ALARM set, his own "base" set, and his "restricted" set. Tr.2 127:25-128:3 (Trende).

¶114 He downloaded the Harvard set from the ALARM Project's public database of simulations, which is developed by a group of political scientists at Harvard. Tr.2 120:21-24 (Trende).

¶115 Dr. Trende created two other ensemble sets. The first was a "base" set, which was programmed to generate maps adhering to population equality, keeping municipalities and counties together, and making geographically compactness districts. Tr.2 127:25-128:1 (Trende). The second was a "restricted" set. Tr.2 135:12-13. It included maps generated "under constraints that make the simulations conform as closely as practicable to the requirements of Proposition 4." Tr.2 137:5-12.

¶116 Dr. Trende also "culled" those sets by eliminating from them maps that failed the partisan bias test, leaving in his "culled" sets only maps that passed the partisan bias test. Tr.2 133:11-134:1, 134:2-10.

¶117 To analyze the 2025 Plan, Dr. Trende compared it to the three full ensemble sets and the culled sets using two tests: "Least Republican Vote Share" and "Ranked Marginal Deviation." Tr.2 129:7-20 (Trende). If a map fell within the 95% confidence interval of the ensemble set, it passed the intent-based test. Tr.2 132:7-14.

¶118 The 2025 Plan passed both tests, falling within the 95% confidence interval when compared to all three ensembles and the culled ensembles. Tr.2 134:15-19; Tr.2 137:17-21 (Trende).

¶119 Dr. Trende then measured whether the 2025 Plan had the effect of unduly favoring a political party. Because Proposition 4 required measures of "partisan symmetry," Dr. Trende concluded that the partisan bias test was required. Tr.2 142:4-14 (Trende). The mean-median test was added to S.B. 1011 after the Democratic minority leader, Senator Escamilla, recommended it as an additional measure. Tr.2 140:2-4; DX13 at 50-51.

¶120 Dr. Trende did not perform the efficiency gap test on the 2025 Plan. The efficiency gap test is not part of S.B. 1011 based on "bipartisan agreement" that the "efficiency gap doesn't work well in states with small numbers of districts." Tr.2 148:11-16 (Trende). Senator Brammer said it was not "reliable statistically in states with fewer than six districts," and Senate Minority Leader Escamilla agreed that it did not apply. DX13 at 58. Given these statements, Dr. Trende believed there was bipartisan agreement among the members of the

Legislature that the efficiency gap was an inappropriate test for measuring compliance with Proposition 4.

¶121 Dr. Trende applied the partisan bias test and the mean-median test to measure the plan's partisan symmetry. The 2025 Plan passed both the partisan bias and the mean-median tests. Tr.2 144:2-11 (Trende).

¶122 Dr. Trende noted that the 2025 Plan included two districts that could be competitive in the 2026 election. Tr.2 145:23-146:17 (Trende). Utah has a history of close races, including in elections under the 2011 congressional redistricting plan, when multiple Democratic candidates were elected under a map that appeared to be *more* favorable to Republicans than the 2025 Plan. Dr. Trende noted that the 2025 Plan has "two districts" that are "more Democratic than a district that elected Democrats and had very close races in the previous cycle." Tr.2 146:14-17.

¶123 Given Dr. Trende's extensive experience and candor about his map-drawing process, the Court finds his analyses and testimony credible, reliable, and helpful.

B. Dr. Jonathan Katz

¶124 Dr. Katz is an expert in statistical methods and redistricting. Tr.2 14:19-24.

¶125 Dr. Katz is a MIT-educated political scientist and statistician, earning his undergraduate degree there, and master's and Ph.D. degrees in political science at the University of California San Diego. Tr.2 10:12-14; 21-25. He serves as a professor at the California Institute of Technology (Caltech).

¶126 He has won awards for his academic work, including the Career Achievement Award from the Society of Political Methodology. He is an Elected Fellow of the American Academy of Arts and Sciences. DX12 Appendix (Katz CV).

¶127 He has served as an expert witness in numerous cases, including cases involving political gerrymandering claims for both Democrats and Republicans as well as independent agencies. He has also served as a consultant to independent redistricting commissions. Some of these cases involved partisan gerrymandering claims. Tr.2 11:3-8; 11:11-20 (Katz).

¶128 Dr. Katz's assignment was to give his opinion about how "political scientists and statisticians measure partisan fairness in electoral maps." Tr.2 12:1-21 (Katz). He did not provide any comments or consultation to the Legislature about S.B. 1011. Tr.2 38:21-39:1.

¶129 He concluded that the "accepted standard" for measuring fairness of maps is "partisan symmetry." A system is fair when it is "symmetric." Tr.2 12:4-12 (Katz). A symmetric system "requires that parties with the same level of voter support be treated equally by the electoral system. In more concrete terms, the symmetry standard requires that each party should receive the same fraction of legislative seats for the same percentage of the vote." DX12 at 2 (Katz Report).

¶130 Dr. Katz distinguished partisan symmetry from proportionality. Tr.2 16:10-17:5 (Katz). He clarified that proportional representation means "that a party's share of the seats should be roughly equal to their share of the vote in the election." DX12 at 3 (Katz Report). But the proportionality measure fails to account for the electoral systems in the United States that are "single-member," "winner-take-all" districts that in practice give a "bonus" in seats to the winning party. DX12 at 3; Tr.2 17:1-5. Symmetry, in contrast, requires only that the

"electoral playing field be level for both parties." DX12 at 4. For example, "it is not necessarily unfair for the Democrats to win 65% of the seats with 55% of the statewide vote, as long as the same opportunity is available to the Republicans." *Id.* at 3.

¶131 This sort of counterfactual reasoning is "standard within measures of symmetry" and within "statistics in general." Tr.2 29:16-17 (Katz).

¶132 Dr. Katz explained that a "deviation[]" from partisan symmetry is "referred to as partisan bias." Tr.2 15:12-16 (Katz). Thus, testing for partisan symmetry necessarily requires measuring for partisan bias. Tr.2 15:15-19; DX12 at 6 (Katz Report).

¶133 Dr. Katz based this conclusion on his 2020 article, coauthored with Gary King and Elizabeth Rosenblatt. DX10; Tr.2 12:5-21 (Katz). This article formally and mathematically confirmed that the only valid, scientific measure of partisan symmetry is partisan bias. DX12 at 9 (Katz Report); Tr.2 13:14-14:14.

¶134 The partisan bias test measures deviations from symmetry by using electoral data in a "seats-votes curve." DX12 at 3 (Katz Report); Tr.2 13:17-14:17 (Katz). The curve describes "for a given party's average vote share what fraction of the seats they will receive." DX12 at 3; Tr.2 15:9-14. A symmetrical plan is one in which the seats-votes curve is the "same for all political parties contesting an election." DX12 at 3; Tr.2 15:15-19. For example, if Republicans get 55% of the statewide vote and win 65% of the seats, Democrats should also win 65% of the seats if they were to receive 55% of the vote. DX12 at 2-3.

¶135 The main criticisms of the partisan bias test were "general" in nature and "largely misplaced." Tr.2 18:6-8 (Katz); DX12 at 11 (Katz Report). The paper leveling these general critiques of the partisan bias test describes purported "paradoxical" results that test

returns in Utah. Dr. Katz testified that the paper suffers from "deep mathematical" flaws and sneaks in "a notion of fairness proportionality." Tr.2 18:9-10, 19:6-7. To get a "fair" result, according to this paper, a map needed to include a Democratic seat. But to obtain that seat, at least according to the partisan bias test, you "pay for it" by "distorting the seats-votes curve." Tr.2 19:14-20. So that distortion shows partisan bias "even though [the Democrats] won one seat." Tr.2 19:19-20. That distortion would not "treat[] the two parties the same." Tr.2 20:13-21.

¶136 Dr. Katz also concluded that other purported measures of partisan fairness do not fully measure partisan symmetry. Tr.2 12:13-21 (Katz). While some of them have "interesting things to say about the electoral system," Dr. Katz showed "mathematically" and "formally" that "none of them completely characterize partisan symmetry" and some "fail completely." Tr.2 21:16-20.

¶137 These alternative tests included lopsided outcomes, declination, mean-median, and the efficiency gap.

¶138 Dr. Katz first commented on the mean-median test. This test, he opined, is a "great test statistic for the hypothesis … that the bias at 50 percent is zero." Tr.2 22:1-4 (Katz). The mean-median difference can be calculated by taking "the mean vote share across all the districts, … for the Democrats," and the "median" vote share, and "compare those two numbers." Tr.2 22:6-11. "[I]f they're different, that's … asymmetry in vote share." Tr.2 22:8-11. If the number is zero, or "close to zero in a statistical sense," then "partisan bias at a half needs to be zero." Tr.2 22:12-19. The problem with the test, according to Dr. Katz, is that is does not measure "how far the deviation is from symmetry." Tr.2 22:20-25.

¶139 Another measure, the "efficiency gap," purports to measures the amount of wasted votes and has received "the most use in practice and in the academic literature." Tr.2 24:3-5 (Katz). If a party "packs" its opponents into a small number of districts and its own supporters into more districts to win as many seats as possible, there will be a high number of wasted votes, in theory showing that the map is unfair. Tr.2 24:11-19.

¶140 Even so, the efficiency gap does not "measure partisan symmetry" for two reasons. Tr.2 25:10-24 (Katz). "[I]n the original formulation, [the efficiency gap] requires that turnout be constant across districts, which is demonstrably false in American politics." Tr.2 25:13-24. Even in the "corrected" efficiency gap formulation, though, "the implied seats-votes curve has three terms." Tr.2 26:2-8. In practice, this means "the efficiency gap could be nonzero" for any number of reasons: either because voter turnout is nonzero, the "responsiveness" to the plan is not equal to two, or "partisan bias" is not equal to zero, or "any combination" of these factors. Tr.2 26:15-27:2. In other words, "nothing" can be learned from a "positive efficiency gap." Tr.2 27:6-9.

¶141 Dr. Katz's 2020 article coauthored with King and Rosenblatt, DX10, proved "mathematically" and "formally" the failure of the efficiency gap as a proposed measure of partisan symmetry. Tr.2 21:16-20, 27:10-21.

¶142 The Court finds Dr. Katz's analyses and testimony, buttressed by his substantial experience in political science and statistics, credible, reliable, and helpful in answering the question at hand.

C. Dr. Michael Barber

¶143 Dr. Michael Barber is an expert in computational redistricting, statistics, quantitative analysis, and partisan symmetry analysis. Tr.2 266:8-11 (Barber).

¶144 Dr. Barber is a Princeton-educated political scientist and statistician. Tr.2 262:7 (Barber). He is a professor at Brigham Young University, where he has taught in the political science department since 2014. Tr.2 261:5-9; DX14 at 3 (Barber Initial Report).

¶145 He has deep roots in the State of Utah. He was born in Provo, visited family in Vernal every summer during his childhood, and earned his bachelor's degree at BYU; he considers Utah his home. Tr.2 261:17, 261:18-262:1 (Barber).

¶146 Dr. Barber teaches courses on statistics and data visualization. Tr.2 263:4-264:1 (Barber). He has won awards for his academic work, including an award for best dissertation in the study of legislative politics and BYU's Young Scholar Award and Early Career Scholar Award. Tr.2 264:15-25. He has published more than 20 peer-reviewed articles. DX14 at 3 (Barber Initial Report).

¶147 Dr. Barber has served as an expert witness in numerous cases, including cases involving partisan gerrymandering claims. Tr.2 265:3-18 (Barber). Dr. Barber has been retained by majority-Republican and majority-Democratic legislative bodies. Tr.2 265:19-266:6.

¶148 Dr. Barber's assignment was to evaluate the 2025 Plan and Plaintiffs' proposed plans under the three statutory tests—Ranked Marginal Deviation (RMD), Partisan Bias, and Mean-Median Difference—and the three additional tests proposed by Plaintiffs' experts—Least Republican Vote Share (LRVS), Standard Deviation of Vote Shares (SDVS), and Efficiency Gap (EG). Tr.2 266:19-267:11 (Barber); DX14 at 3 (Barber Initial Report).

¶149 To conduct the RMD, LRVS, SDVS, and EG tests, Dr. Barber generated a simulation ensemble of 50,000 Utah congressional plans using the publicly available, open source, and peer-reviewed Redist algorithm. Tr.2 275:22-278:24, 279:2-3 (Barber). The computational efficiency of the Redist algorithm allowed him to generate this ensemble in less than half an hour. Tr.2 279:23. The partisan bias and mean-median difference tests do not require a simulation ensemble analysis. Tr.2 267:15-18.

¶150 When forming his opinions, Dr. Barber reviewed Plaintiffs' proposed maps and Plaintiffs' experts' reports as well as their underlying data, when applicable. Tr.2 308:11, 310:5-13 (Barber); DX14 at 17 (Barber Initial Report). He reviewed S.B. 1011, Tr.2 268:16-21, 280:7-8, 302:3-5, but he did not provide any comments or consultation to the Legislature about S.B. 1011, Tr.2 341:9-14.

¶151 Detailed below, Dr. Barber concluded that the 2025 Plan passed the statutory RMD, partisan bias, and mean-median difference tests, while Plaintiffs' plans did not. Tr.2 269:2, 7, 11-12 (Barber); DX14 at 6 (Barber Initial Report). In addition, he found that while the 2025 Plan was not a partisan outlier when analyzed under the LRVS, SDVS, or EG tests, Plaintiffs' plans were. Tr.2 296:18-25, 298:1-7, 299:7-10, 299:14-300:7; DX14 at 30-31, 34-35, 42.

¶152 In addition to the foregoing analyses and in response to Dr. Chen's reports, Dr. Barber ran the same four ensemble tests (RMD, LRVS, SDVS, EG) using various subsets of his 50,000 simulated maps. *See* DX16 at 13 (Barber Rebuttal Report) (listing every variation of each test). These supplemental tests confirmed Dr. Barber's initial findings that the 2025

Plan is not a partisan outlier. DX16 at 8 ("The enacted 2025 congressional plan is not an outlier under any measure.").

¶153 Dr. Barber's analyses and testimony, buttressed by his substantial experience in redistricting litigation and simulation generation, were credible, reliable, and helpful in answering the question at hand.

D. Dr. Jowei Chen

¶154 Plaintiffs offered Dr. Jowei Chen as an expert in redistricting political geography, statistical measures of partisan favoritism, and redistricting simulation analysis. Tr.1 16:9-14 (Chen).

¶155 Dr. Chen is a professor of political science at the University of Michigan. PX3 at 14 (Chen Initial Report). He received his Ph.D. in 2009 and describes himself as one of the "first scholars in th[e] field of using computer simulations in redistricting." Tr.1 14:11-13 (Chen).

¶156 Dr. Chen submitted three reports as part of his work in this case: an initial report on October 17 (PX3), a supplemental report in response to Dr. Barber's initial report on October 21 (PX4), and a rebuttal report in response to Dr. Barber's supplemental report on October 22 (PX5).

¶157 Dr. Chen generated 10,000 simulated Utah congressional maps using an algorithm he modified specifically for this case—an algorithm that no other computational redistricting expert uses. Tr.1 93:4-15 (Chen). Dr. Chen's algorithm took days to generate this 10,000-map ensemble, Tr.1 107:22-23 (Chen), in contrast to Dr. Barber's open-source Redist algorithm, which generated 50,000 maps in minutes, Tr.2 279:23 (Barber).

¶158 Dr. Chen generated additional simulation sets of Utah congressional maps but did not produce them in this case. Tr.1 107:24-108:11 (Chen).

¶159 Dr. Chen's algorithm is neither publicly available nor open source. Tr.1 103:7-8, 103:20-104:14 (Chen). It has not been peer reviewed. Tr.2 311:15-312:3 (Barber).

¶160 Dr. Chen refused to answer in the affirmative when asked repeatedly whether his algorithm produced a representative sample of possible Utah congressional maps drawn in compliance with the law. Tr.1 106:21-107:17 (Chen); Tr.2 337:7-14 (Barber).

¶161 Within the last five years, computational redistricting experts have criticized Dr. Chen's methodology as relying on "ad hoc adjustments" "to create desired properties" and failing to account for "the extent to which one kind of plan might tend to appear more often than another." DX2 at 770 (Duchin & Spencer, *Models, Race, and the Law*, 2021).

¶162 Dr. Chen describes his algorithm as a Sequential Monte Carlo. Tr.1 94:6-11 (Chen). Sequential Monte Carlo (SMC) simulation models contain an "essential and expected feature"—duplicate maps. DX16 at 4 (Barber Rebuttal Report). This "basic property" of SMC-based simulations "reflects the correct statistical weighting of neutral, well-performing plans." *Id.* at 6. For example, Dr. Barber's 50,000-map simulation set uses a SMC method and, as a result, contains duplicate maps. *Id.* at 4-5; Tr.2 337:18-339:4 (Barber). Duplicates simply reflect "the natural, mathematically necessary replication of high-probability maps in an SMC ensemble." DX16 at 6 (Barber Rebuttal Report); *see also* Tr.2 153:14-154:24 (Trende describing reason for duplicate maps).

¶163 But as Dr. Chen reports, not one of his 10,000 maps supposedly generated using an SMC simulation model is a duplicate of another. PX5 at 2 (Chen Rebuttal Report); Tr.1

108:12-22 (Chen); Tr.2 340:16-17 (Barber). A 2024 article by computation redistricting experts stated that Dr. Chen, when working as a defense expert in New Mexico's recent partisan gerrymandering case, "cosmetically altered his SMC sample by perturbing the boundaries of districts so that he could claim that no districts were duplicated." DX3 at 2 (Cannon, DeFord, & Duchin, *Repetition Effects in a Sequential Monte Carlo Sampler*, 2024). Dr. Chen called this "a complete lie." Tr.1 134:1-7.

¶164 Dr. Chen thus contradicts himself by insisting his algorithm is a Sequential Monte Carlo that produces no duplicate maps. That's not how SMC models function. DX16 at 6-7 (Barber Rebuttal Report).

¶165 Instead, Dr. Chen's algorithm "repeatedly produces a district centered in the same region of northern Salt Lake County," evidencing "systematic geographic bias." *Id.* at 6. Because there is "no published documentation, no peer-reviewed validation, and no evidence that his model has been tested for convergence, diversity, or representativeness," it is "impossible to know whether his algorithm explores the space of possible maps appropriately or whether it is stuck in a narrow, biased region of outcomes." *Id.*

¶166 Dr. Chen's algorithm anchored a heavily Democratic district in the same portion of northern Salt Lake County in more than 90% of his simulated maps. *Id.* at 7. Dr. Barber's analyses demonstrated that a heightened respect for neutral districting criteria does not explain this statistically anomalous result. DX15 at 8-19 (Barber supplemental Report); Tr.2 315:2-320:12, 323:12-15, 323:12-325:3.

¶167 Dr. Chen programmed his algorithm to split three counties once each. Tr.1 113:3-114:19 (Chen). He did this, even though he agreed that a congressional districting plan

could achieve population equality by keeping 27 out of 29 counties whole and then splitting the remaining two counties, or even by keeping 28 out of 29 counties whole and splitting the remaining county. Tr.1 113:3-114:19. This had the effect of never splitting Salt Lake County more than once, even though Salt Lake County, by virtue of its large population, must always be split at least once. Tr.1 114:17-115:3.

¶168 For these reasons and those detailed in the Conclusions of Law, Dr. Chen's analyses and testimony are not sufficiently credible, reliable, or otherwise helpful to support Dr. Chen's conclusion that the 2025 Plan exhibits purposeful or undue political favoritism.

E. Dr. Christopher Warshaw

¶169 Dr. Warshaw is a political science professor at Georgetown. Plaintiffs called Dr. Warshaw as an expert in American politics with specialties in political representation, elections, redistricting, and gerrymandering. Tr.1 154:20-25.

¶170 In this case, Dr. Warshaw recommended several alternative measures of partisan symmetry in lieu of the partisan bias and mean-median tests. Specifically, he opined that three other tests would work better in a state like Utah: the Least Republican Vote Share, the Standard Deviation of Vote Shares, and the efficiency gap. PX1 (Warshaw Reports).

¶171 Despite recommending these three tests, Dr. Warshaw analyzed the 2025 Plan using only the efficiency gap. PX1 at 1.

¶172 Dr. Warshaw's overall conclusion that the efficiency gap is a useful and appropriate metric applied to Utah's congressional districts is undermined by a past expert report he authored opining that the measure is "substantially less reliable" in states with a small number of congressional districts. DX6 at 5 (Warshaw expert report in New Mexico).

¶173 Dr. Warshaw also previously testified that the efficiency gap was more "volatile" in smaller states. DX7 at 891 (Warshaw expert testimony in Pennsylvania).

¶174 Even on redirect, Dr. Warshaw stated that the "efficiency gap is less probative in a smaller state." Tr.1 220:25-221:1 (Warshaw). He could not answer clearly and affirmatively whether the efficiency gap was a better metric "than the other measures of partisan symmetry in states with a small number of districts." Tr.1 220:14-22. Despite his past repeated, unqualified statements that the efficiency gap was "substantially less reliable" in smaller states, his answer was that it "would depend on the conditions," including the "competitiveness of the state." Tr.1 220:18-22.

¶175 As for Dr. Warshaw's testimony that the Least Republican Vote Share and the Standard Deviation of Vote Shares are better measures of partisan symmetry, *see* Tr.1 221:6-15 (Warshaw), that simply bolsters Dr. Barber's conclusions that the 2025 Plan passes both tests. *See infra.* Conclusions of Law III.b.2.

¶176 Dr. Warshaw conceded that the efficiency gap was not a measure of partisan symmetry as "provided by" Dr. Katz's article. Tr.1 211:18-23 (Warshaw). Only by changing the definition of partisan symmetry to encompass "asymmetries and the distribution of votes across parties" could he claim that the efficiency gap qualified as a measure of partisan symmetry. Tr.1 211:20-212:1.

¶177 Dr. Warshaw's overall opinion that the enacted plan returned a large efficiency gap as compared to all other states was undermined by his admission that the efficiency gap measure has varying levels of reliability depending on the size of a given state. Tr.2 204:12-205:1 (Dr. Warshaw's previous expert report concluding that the efficiency gap was

"substantially less reliable" in small states); 206:8-15 (Dr. Warshaw's past testimony that the efficiency gap in states with fewer than six congressional seats is more volatile year to year); 206:16-19 (acknowledging that the efficiency gap in smaller states tends to be less informative about partisan bias); 213:3-12 (Warshaw).

¶178 For the reasons detailed in the Conclusions of Law, Dr. Warshaw's approach in this case, applying only the efficiency gap to the 2025 Plan, cannot be squared with Proposition 4's requirement that a map be judged by measures of "partisan symmetry." Nor is the test reliable in Utah, even if it did count as a measure of partisan symmetry.

F. Dr. Kassra Oskooii

¶179 Plaintiffs presented Dr. Kassra Oskooii as an expert in redistricting and mapping. Tr.1 231:25-232:1 (Oskooii).

¶180 Dr. Oskooii is an Associate Professor of Political Science at the University of Delaware. Tr.1 229:18 (Oskooii); PX2 at 3-4 (Oskooii Report).

¶181 Plaintiffs retained Dr. Oskooii to make changes to the redistricting maps that eventually became Plaintiffs' Plan 1 and Plan 2. Tr.1 234:8-14 (Oskooii); PX2 at 3-4 (Oskooii Report).

¶182 Before testifying at the remedial hearing, Dr. Oskooii had never been to Utah. Tr.1 254:10-12 (Oskooii).

¶183 He has no specialized expertise in or first-hand knowledge of the geography, politics, or history of Utah. Tr.1 232:5-8 (Oskooii).

¶184 When drawing Plan 1, he started from a single map taken from a computer-drawn simulation set and manipulated the boundaries between Districts 2 and 3, shifting

specific populations in Woodruff, Huntsville, Rich County, and Weber County. PX2 at 5-7 (Oskooii Report). He did all this to resolve a *potential* road contiguity issue in Rich County. *Id.*; Tr.1 252:14-253:2 (Oskooii).

¶185 Dr. Oskooii agreed that, as a general principle of redistricting, road contiguity and internal ease of access within a district are important features of a good redistricting plan. Tr.1 253:3-254:8 (Oskooii). Dr. Oskooii acknowledged that, under Plaintiffs' Plan 1, the fastest route between southwest Utah in District 3 and southeast Utah also in District 3 requires entering Arizona and passing through a tribal reservation. Tr.1 262:22-265:5. Dr. Oskooii did not correct this issue when drawing Plaintiffs' Plan 1.

¶186 Plan 1 also situates the city of Alpine in District 3 such that Alpine residents cannot access the rest of District 3 except via over-mountain roads or by first exiting District 3. Tr.1 260:18-262:10 (Oskooii). Dr. Oskooii did not correct this when drawing Plan 1. Dr. Oskooii does not know which roads in Utah are paved, or whether mountain roads get cleared of snow in the winter. Tr.1 262:6-19.

¶187 When drawing Plan 2, he started from the 2025 Plan and made multiple changes in a purported effort to reduce municipal and county splits "while making the least disruptive changes possible." Tr.1 266:18-19 (Oskooii). He placed Millcreek entirely within District 2 and North Salt Lake entirely within District 1. He did not resolve the split of Pleasant Grove.

¶188 He also moved Bluffdale from District 2 to District 3 to resolve one county split. PX2 at 7-11 (Oskooii Report). He acknowledged, though, that the small portion of Bluffdale that crossed county lines in the 2025 Plan has zero population and so cannot affect the partisan gerrymandering calculus as a matter of mathematics. Tr.1 278:1-10 (Oskooii).

¶189 In a stated effort to equalize population between districts, he moved the cities of Midvale, South Jordan, and West Jordan to District 3, and the cities of Holladay and Salt Lake City to District 2. PX2 at 10.

¶190 In all, his so-called "least changes" Plan 2 "reallocated about 500,000" Utahns in Salt Lake County—40% of the county's population. Tr.2 309:23-310:4 (Barber); Tr.1 270:7-9, 270:18-22 (Oskooii).

¶191 In supposed service to the goal of municipal integrity, Dr. Oskooii divided residential communities between Districts 2 and 3 in unincorporated areas outside Huntsville in both Plans 1 and 2. Tr.1 235:1-5 (Oskooii). And in Plan 2, he split communities in unincorporated areas of Oquirrh just outside West Jordan's and West Valley City's municipal limits. Tr.1 278:16-19.

PROPOSED CONCLUSIONS OF LAW

I. The 2025 Plan satisfies the Proposition 4 procedural requirements ordered by this Court.

¶192 "It is axiomatic that laws enacted by the legislature are presumed to be constitutional and that the legislature is accorded wide latitude in complying with constitutional directives." *Utah Safe to Learn-Safe to Worship Coal. v. State*, 2004 UT 32, ¶35. "[T]he court is not the legislature and can nullify" redistricting legislation only if it is "wholly unreasonable and arbitrary." *Parkinson v. Watson*, 4 Utah 2d 191, 203 (1955); *see also* Utah Const. art. IX, §1; U.S. Const. art. I, §4. Plaintiffs bear the burden to show that the 2025 Plan is invalid. *Salt Lake Cnty. v. Utah State Tax Comm'n*, 2024 UT 11, ¶27. Plaintiffs have not met their burden here.

¶193 The Court finds that that the 2025 Plan complies with the procedural provisions of Proposition 4 that the Court held govern these remedial proceedings.

¶194 Proposition 4 requires the Legislature to make any proposed map "available on the Legislature's website or other equivalent electronic platform, for a period of no less than 10 calendar days and in a manner and format that allows the public to assess the plan for adherence to the redistricting standards and requirements contained in this chapter and that allows the public to submit comments on the plan to the Legislature." Utah Code §20A-19-204(4).

¶195 The Legislative Redistricting Committee made all five proposed maps available to the public for more than 10 days on the Legislative Redistricting Committee's public website: redistricting.utah.gov. Beyond making the five proposed plans publicly available in a highly interactive format, the Committee allowed the public to draw, submit, and comment on their own proposed plans. Sixty-four proposals were submitted. The Committee also hosted two public hearings, during which dozens of members of the public spoke to the Committee in person and via Zoom.

¶196 Proposition 4 requires the Legislature to make the data and software upon which the maps are drawn "reasonably available." Utah Code §20A-19-103(7). The methodology, software, and data sets Dr. Trende used to create and evaluate the proposed maps were made available for public inspection and use. No data, code, or software relied upon by the Legislature was hidden from the public.

¶197 Proposition 4 prohibits the Legislature from considering any partisan "political data and information, such as partisan election results, voting records, political party affiliation information, and residential addresses of incumbent elected officials and candidates or prospective candidates for elective office." Utah Code §20A-19-103(6). The Committee took great

care to shield itself and other members of the Legislature from any partisan information when creating and reviewing potential maps. Staff screened public comments for partisan content and the co-chairs and presiding officers prohibited discussion about partisan political data. When presenting the five proposed plans to the Committee, Dr. Trende simply communicated that the plans had passed the partisan bias test (and other standards), and gave the Committee no other partisan information, such as anticipated partisan vote share of the proposed districts. When the Committee and later the Legislature voted to adopt Map C, they did so blind to partisan outcomes.

¶198 In sum, the Legislative Redistricting Committee hosted lengthy public hearings, received feedback from Utahns and members of the minority party, published proposed plans along with underlying data for ten days before taking a vote, and avoided the use and discussion of partisan information throughout the legislative process.

¶199 This "transparent" process, Doc. 470 (Op.) at 15, 50, 71, followed this Court's invitation to "enact a new or alternative redistricting plan that abides by and conforms to the redistricting standards, procedures, and requirements" of Proposition 4, Doc. 506 at 2.

¶200 If the 2021 Plan was enjoined for arising in the "absence" of Proposition 4's "integral" "procedural requirements," Op. at 73, the 2025 Plan must be upheld as following every applicable requirement of "the law in Utah on redistricting," *id.* at 71.

II. The 2025 Plan satisfies Proposition 4's substantive redistricting standards.

A. Proposition 4's ranked redistricting criteria do not cabin the Legislature's discretion to balance competing interests and make policy choices.

¶201 Proposition 4 states that its redistricting criteria should be followed "to the greatest extent practicable" and in "order of priority." Utah Code §20A-19-103(3). When

moving for summary judgment, Legislative Defendants argued that this "rigid priority list" "impermissibly cabined legislative discretion." *See* Op.28. The Court disagreed with that argument, reasoning that while these standards "cannot be disregarded or ignored" entirely, the "statute itself provides some discretion in balancing competing interests and in making policy considerations." *Id.*

¶202 The Court rejects Plaintiffs' extreme reading that the "very existence" of an alternative plan that unifies more municipal splits or has a higher average compactness score renders a Legislature's duly enacted plan noncompliant with Proposition 4. Doc. 583 at 35 (Plaintiffs' Remedial Brief). Consider what that interpretation would mean for this case and all future redistricting efforts. Here, sixty-four proposed congressional maps were drawn and submitted by members of the public during the statutory comment period. And two more by Plaintiffs. If Plaintiffs are right, then if even a single proposed map contains fewer municipal and county splits than the enacted plan, the Legislature would risk guaranteed liability under Proposition 4 (until the statute of limitations expired) if it did not adopt that map.

¶203 Further, because Proposition 4 ranks keeping cities and counties whole above all other criteria, save compliance with federal law, the Legislature's legitimate "policy considerations," like ensuring placement of military installations in all four congressional districts, would always lose in a head-to-head with keeping cities and counties together. Op.28. Other unintended and absurd results would follow from Plaintiffs' incorrect reading. For example, and as reflected in their proposed maps, they would *always* require splitting unincorporated, populated areas instead of incorporated areas to achieve equal population across districts. This reading abuses the text; the Court rejects it.

¶204 Proposition 4's requirement to follow its standards "to the greatest extent practicable" does not mean that if a so-called "improvement" can be made, it *must* be made. Instead, Proposition 4 recognizes that the Legislature must assess what is "practicable"—in other words, what map is possible given legitimate legislative policy considerations and prerogatives and the nature of the legislative process.

¶205 Discussed below, the 2025 Plan follows Proposition 4 redistricting standards while reflecting the Legislature's "discretion in balancing competing interests and in making policy considerations." Op.28.

B. The 2025 Plan complies with federal law.

¶206 The U.S. Constitution requires that congressional districts be equal in population "using the best census data available." *Karcher v. Daggett*, 462 U.S. 731 (1983); *see also* U.S. Const. art. I, §2; *id.* amend. XIV.

¶207 The 2025 Plan equalizes population across all four districts, each of which contains 817,804 persons. There is no population deviation. Tr.2 103:24 (Trende); DX13 at 14 (Trende Report).

¶208 The 2025 Plan does not illegally dilute the voting strength of any minority group under the Voting Rights Act. *See* 52 U.S.C. §10301.

¶209 There are no identifiable minority groups "sufficiently large" enough to constitute a majority in a congressional district, meaning that the preconditions for vote dilution are not present in this State's congressional districting system. *See Thornburg v. Gingles*, 478 U.S. 30, 50 (1986); *see* Tr.2 83:13-16 (Trende); DX13 at 14 (Trende Report).

¶210 The 2025 Plan adheres to federal law.

C. The 2025 Plan prioritizes minimizing the division of municipalities and counties across multiple districts.

¶211 Proposition 4 places second in its ranked list of redistricting criteria "minimizing the division of municipalities and counties across multiple districts, giving first priority to minimizing the division of municipalities and second priority to minimizing the division of counties." Utah Code §20A-19-103(3)(b).

¶212 The 2025 plan splits only three municipalities: Millcreek, North Salt Lake, and Pleasant Grove.

¶213 It also splits only three counties: Davis, Salt Lake, and Utah. Because Salt Lake County's population is 1,185,238, any congressional map must split this county at least once. DX13 at 14 (Trende Report); Tr.1 114:20-115:3 (Oskooii); Tr.2 282:8-15 (Barber).

¶214 The 2025 Plan places Box Elder, Cache, Davis, Rich, and Weber counties in District 1. Together, these five counties' populations places District 1 just 328 persons over the population target. To make that minor downward adjustment, the 2025 Plan splits Davis County at North Salt Lake.[4]

¶215 The 2025 Plan splits Utah County into three pieces, at the border of Utah County and Salt Lake County. Bluffdale's city lines cross into Utah County, and rather than split Bluffdale, the 2025 Plan keeps Bluffdale whole. And the Utah County portion of Bluffdale has zero population. DX14 at 7 (Barber initial Report). Plaintiffs' expert Dr. Oskooii acknowledged that because the small portion of Bluffdale that crosses into Utah County has zero

[4] The northernmost district in Plaintiffs' two plans comprises the same five counties as District 1 in the 2025 Plan. To achieve population equality, both of Plaintiffs' plans split neighborhoods in unincorporated areas in Weber County near Huntsville, where Dr. Barber's sister lives. Tr.2 303:2-3 (Barber).

population, that minor, technical split of Utah County cannot affect the partisan gerrymandering calculus as a matter of mathematics. Tr.1 278:3-10 (Oskooii); Tr.2 308:17-23 (Barber).

¶216 Under the 2025 Plan, Millcreek is divided between only two districts, not multiple districts as it was in the 2021 Plan. DX13 at 13 (Trende Report); Tr.2 101:20-102:1 (Trende). And it does so here in a regular manner. It assigns the "northern and eastern flanks of the city to District 3 and the southern and western flanks of the city to District 2." DX14 at 7-8 (Barber initial Report). Millcreek's own boundaries, though, are far from regular. *Id.* at 7. The city juts to the west under South Salt Lake, jumps over I-215 to the east, and all but surrounds the Brickyard Shopping Plaza (part of Salt Lake City) with two pincer-like protrusions.

D. The 2025 Plan's districts are geographically compact.

¶217 Proposition 4 next requires prioritizing the creation of "districts that are geographically compact." Utah Code §20A-19-103(3)(c).

¶218 The Court finds the 2025 Plan's districts to be geographically compact.

¶219 Dr. Trende measured compactness using four metrics: Reock, Polsby-Popper, Convex Hull, and IKIWISI (I Know It When I See It). DX13 at 15-16 (Trende Report); *see generally* Tr.2 86:16-88:24 (Trende).

¶220 Reock calculates the ratio of a district's area to the area of its minimum bounding circle. In other words, it "imagine[s] the smallest circle that wholly encloses the district without cutting it" and asks what "percentage of that circle that the district would fill." DX13 at 15 (Trende Report).

¶221 Polsby-Popper compares a district's shape to that of a circle with the same perimeter as the district. *Id.* Convex-hull imagines a "rubber band snapped around a district," and asks "what percentage of that rubber band the district would fill." *Id.* at 16.

¶222 Finally, the newer IKIWISI metric incorporates interview responses from "judges, redistricting experts, public officials, lawyers and ordinary citizens." *Id.*

¶223 Based on the resulting scores, and taking into account Utah's geography, the 2025 Plan's districts are geographically compact. *Id.* at 17; Tr.2 105:14-19 (Trende).

E. The 2025 Plan's districts are contiguous and drivable.

¶224 In Utah, districts should be "contiguous and … allow for the ease of transportation throughout the district." Utah Code §20A-19-103(3)(d).

¶225 In the 2025 Plan, all "four districts are comprised of contiguous territory." DX13 at 18 (Trende Report); Tr.2 106:5-7 (Trende).

¶226 In the 2025 Plan, all four districts allow for "ease of transportation" as well as can be accomplished in Utah's geographically large congressional districts. "District 1 is primarily drawn along the I-15 corridor." DX13 at 18 (Trende Report). "District 2 follows I-80 into Salt Lake County." *Id.* The 2025 Plan also connects Salt Lake Valley communities to Wasatch Back communities via I-215 and Parley's Canyon without interruption. *See* DX14 at 11 (Barber initial Report).

¶227 All of the Salt Lake County Canyons—Emigration, Parleys, Millcreek, Big and Little Cottonwood, as well as American Fork and Provo Canyons in Utah County—are assigned to District 3, which then picks up I-80 and takes it "eastward into Summit County." DX13 at 18 (Trende Report). District 3 also includes crossings over the Colorado River (at

Moab) and Green River (at Green River). *Id.* "District 4 is built along the I-15 corridor." *Id.*; Tr.2 103:12-16: (Trende).

F. The 2025 Plan respects the State's unique communities.

¶228 Utah congressional districts should "preserv[e] traditional neighborhoods and local communities of interest." Utah Code §20A-19-103(3)(e).

¶229 The Legislature prioritized keeping the Uintah Basin, Tribal lands and reservations, institutions of higher education, and military installations respectively together. Each of these locations represents important communities.

¶230 The 2025 Plan ensures that these communities are kept together in each district to the greatest degree practicable.

¶231 Additionally, by minimizing county and city splits, the 2025 Plan, by definition, keeps those de facto communities of interest together. *See Abrams v. Johnson*, 521 U.S. 74, 99-100 (1997) (recognizing counties as "communities of interest"); *In re Apportionment of Colo. Gen. Assembly*, 45 P.3d 1237, 1248 (Colo. 2002) ("Counties and the cities within their boundaries are already established as communities of interest in their own right.").

G. The 2025 Plan respects natural and geographic features.

¶232 Proposition 4's penultimate districting factor is that districts "follow[] natural and geographic features, boundaries, and barriers." Utah Code §20A-19-103(3)(f).

¶233 The 2025 Plan "avoids crossing mountains, except where an interstate or major highway is available, avoids crossing major rivers, except via bridge, does not cross the Great Salt Lake, and avoids crossing the Great Salt Lake Desert given the dearth of North-South roadways in that area of the state." DX13 at 19 (Trende Report).

H. The 2025 Plan respects boundary agreement among different districts.

¶234 Last in its ranking of districting criteria, Proposition 4 states that districts should "maximiz[e] boundary agreement among different types of districts." Utah Code §20A-19-103(3)(g).

¶235 Dr. Trende did not consider this factor when drawing the 2025 Plan, reasoning that other districts "were drawn under prior, superseded standards," *i.e.* not Proposition 4. DX13 at 19 (Trende Report).

¶236 Regardless, as Plaintiffs report, the 2025 Plan maximizes boundary agreement virtually as well as Plaintiffs' plans. *See* Doc. 541 at 5 (Plaintiffs' Notice of Map Submissions).

Boundary Agreement*			
State House	56	54	51
State Senate	13	13	12
State School Board	3	2	3
	Plaintiffs' Plan 1	Plaintiffs' Plan 2	2025 Plan

III. The 2025 Plan does not purposefully or unduly favor any partisan outcome.

¶237 In addition to respecting Proposition 4's "mandatory, neutral, prioritized redistricting standards," Op. at 29, the 2025 Plan does not "divide districts in a manner that purposefully or unduly favors or disfavors any incumbent elected official, candidate or prospective candidate for elective office, or any political party." Utah Code §20A-19-103(4)(a).

A. Proposition 4 places the task of identifying objective tests and standards to evaluate partisan favor in the sole discretion of the Legislature.

¶238 Even under Proposition 4, the "Legislature retain[s] the ultimate responsibility" for redistricting. *LWV I*, 2024 UT at ¶198.

¶239 "[G]iven the general, non-specific nature of the language" in Proposition 4, "the legislature retains discretion in determining what judicial standards are applicable and they retain discretion to determine the 'best available data and scientific and statistical methods' to use in evaluating redistricting plans for compliance with state and federal law and the Proposition 4 redistricting standards." Doc. 470 at 29-30.

¶240 S.B. 1011 establishes judicial standards and determines the best available data and scientific and statistical methods to use when evaluating the 2025 Plan or any other congressional redistricting plan.

¶241 S.B. 1011 requires that redistricting plans be evaluated for compliance with Utah law under "the best available data and scientific and statistical methods, including measures of partisan symmetry," and forbids "divid[ing] districts in a manner that purposefully or unduly favors or disfavors any incumbent elected official, candidate or prospective candidate for elective office, or any political party." Utah Code §20A-19-103(4)-(5).

¶242 Accordingly, S.B. 1011 requires "[a]ny judicial review of a congressional redistricting plan to determine whether the Legislature or Commission complies with this section regarding purposefully or unduly favoring or disfavoring a political party shall base the review on the outcomes" of the three statutorily prescribed tests: simulation ensemble analysis, partisan bias test, and the mean-median test. *Id.* §20A-19-103(8).

¶243 The ensemble analysis, partisan bias test, and mean-median difference test are the Legislature's chosen tests for assessing whether Utah's congressional plan purposefully or unduly favors a political party or outcome. *See id.* §20A-19-103(4)-(5).

¶244 To test for purposeful partisan intent, S.B. 1011 requires use of the "ranked marginal deviation" (RMD) test. *Id.* §20A-19-103(1)(a)(ii)(A). This test requires a comparison to at least 4,000 computer-drawn maps using a "sequential Monte Carlo simulation." *Id.* §20A-19-103(1)(a)(i). The simulation set must be culled "to include only redistricting plans that pass the partisan bias test." *Id.* §20A-19-103(1)(iii)(B). Any proposed redistricting plan's RMD score must fall within the 95% confidence interval for both the culled and unculled set of maps. A 95% confidence interval is the "standard statistical significance threshold and is used by the vast majority of scientific and statistical research to indicate something as statistically significant or an outlier." DX14 at 24 (Barber initial Report); Tr.2 131:19-23, 133:1-2 (Trende).

¶245 An ensemble analysis has been accepted and used in multiple courts for redistricting purposes, including state courts in Maryland, New York, Ohio, North Carolina, New Mexico, and Pennsylvania. *See, e.g., Harkenrider v. Hochul*, 197 N.E.3d 437 (N.Y. 2022); *Harper v. Hall*, 868 S.E.2d 499 (N.C. 2023); *LWV*, 178 A.3d 737; *Republican Party of N.M. v. Oliver*, 2023 WL 8182964 (N.M. Nov. 27, 2023); *Republican Party of N.M. v. Oliver*, No. D-506-CV-202200041 (N.M. 5th Dist. Oct. 6, 2023); *League of Women Voters of Ohio v. Ohio Redistricting Comm'n*, 195 N.E.3d 974 (Ohio 2022).

¶246 If a proposed redistricting plan passes the ensemble analysis, it does not exhibit partisan purpose. *See* Utah Code §20A-19-103(1)(a)(ii).

¶247 To test for undue partisan *effect*, S.B. 1011 first requires a redistricting plan to demonstrate partisan symmetry by passing the partisan bias test. *Id.* §20A-19-103(4)(c).

¶248 Generally speaking, a map exhibiting partisan symmetry "treat[s] similarly-situated parties equally." Bernard Grofman & Gary King, *The Future of Partisan Symmetry as a Jud.*

Test for Partisan Gerrymandering after LULAC v. Perry, 6 ELECTION L. J. 1, 6 (2007); Tr.2 20:8-16 (Katz) (describing an unfair map as one that does not "treat[] the two parties the same"). The partisan bias test, accordingly, measures deviations from partisan symmetry.

¶249 The partisan bias test is a reliable and accepted method for assessing partisan symmetry.[5] DX10 (Jonathan N. Katz, Gary King & Elizabeth Rosenblatt, *Theoretical Foundations and Empirical Evaluations of Partisan Fairness in District-Based Democracies*, 114 AM. POL. SCI. REV. 164 (2020)); DX13 at 49 (Trende Report) ("a statute that uses the 'best available data and scientific and statistical methods' to measure 'partisan symmetry' would employ the partisan bias test."); DX12 at 9-12 (Katz Report) (describing the problems with alternative tests).

¶250 The test is a reliable method of assessing partisan symmetry of a single State's congressional districts. Katz, King, and Rosenblatt's opinion that "[p]roper computation or estimation of the seats-votes curve for the U.S. House … should instead be performed nationally" addresses a critique about how to best craft a statistical model. It does not contradict the assertion that the partisan bias test can accurately measure a single State's congressional districts by considering data from that State alone. *See* PX10 (Dr. Katz's expert report applying the partisan bias test to New York's congressional districts); Tr.2 142:4-14 (Trende)

[5] During cross examination, Dr. Katz was asked about the alternative model "symmetry democracy with minority party protection." Tr.2 55:8-11. This model would pair "legal rules for protecting minority parties from being locked out altogether from representation" with a modified symmetry test by lowering the "responsiveness" of the seats-votes curve. Tr.2 55:12-16. Dr. Katz clarified that this test was "meant … for cases where" the system was "nondemocratic" or otherwise legally or structurally noncompetitive. Tr.2 56:8-17. And in any case, this test would directly violate Proposition 4 by explicitly and "purposefully favor[ing]" a political party—the minority party. Not to mention that it would run counter to the "purpose behind Proposition 4," which was to create "*neutral* standards." Op. at 43 (emphasis added); *see also id.* at 29, 58.

("[P]artisan symmetry is measured by partisan bias … I don't think you have a choice."); Tr.2 269:13-271:17 (Barber) (applying the partisan bias test to all maps).

¶251 This test is reliable even in states like Utah, where one party enjoys a large percentage of the vote share. That's because the reliability of measuring "partisan vote swing"—the extent to which demographics must shift to measure partisan bias—does not "degrade with the size of the partisan swing." DX12 at 12 (Katz Report); Tr.2 30:12-31:19(describing the accuracy of the partisan swing assumption even in districts like Utah).

¶252 Even "exceedingly unlikely" electoral outcomes "such as Washington D.C. voting overwhelming Republican" or Utah voting overwhelming Democrat can be simulated and measured for symmetry using the partisan bias test. DX12 at 12 (Katz Report) (quoting DX10 (Katz, King, & Rosenblatt, *Theoretical Foundations*)).

¶253 The counterfactual reasoning employed by the partisan bias test is "standard" within statistics. Tr.2 29:16-17 (Katz). And it is not unique to the partisan bias test: "every diagnostic" used to determine a map's fairness "necessarily relies on counterfactuals, because no elections have been held under any of the proposed maps." DX14 at 17 (Barber Initial Report). All of the tests "re-aggregate past statewide results to the proposed districts to predict how future congressional contest would perform," which is an "inherently prospective" exercise. *Id.* "The virtue of partisan symmetry is that it makes this counterfactual explicit and testable." *Id.* The alternative is to "postpone any evaluation until after multiple real elections have occurred, which is incompatible with timely judicial review." *Id.*

¶254 Under S.B. 1011, a redistricting plan must also pass the mean-median difference test to ensure partisan symmetry. Utah Code §20A-19-103(1)(g).

¶255 The mean-median difference test measures "the difference between a party's average statewide vote share and the party's median vote share across all districts in a proposed redistricting plan." *Id.* §20A-19-103(1)(b). If the difference "is greater than a 2% deviation from the mean," then the proposed plan "fails the mean-median difference test" and is not a symmetrical map. *Id.*

¶256 Combined, the partisan bias test and the mean-median difference test are reliable and accepted methods for assessing partisan symmetry. *See* Tr.2 65:16-21 (Dr. Katz testifying he would use both the partisan bias test and mean-median test to assess the seats-votes curve).

¶257 In a bipartisan effort, the efficiency gap was rejected as an unreliable method for assessing partisan symmetry in Utah. Tr.2 148:11-16 (Trende); Legis. Redistricting Comm. (Sept. 22, 2025), https://bit.ly/3KS56yx, at 57:45 (Sen. Escamilla agreeing "a hundred percent" that the efficiency gap does not apply).

¶258 S.B. 1011 requires all three tests to detect partisan intent and undue partisan effect. *See* Proposed Redistricting Standards Bill Now Include Three Tests, Utah State Senate (Oct. 3, 2025) https://senate.utah.gov/proposed-redistricting-standards-bill-now-include-three-tests/; *see also* Legis. Redistricting Comm. (September 22, 2025) https://bit.ly/3KS56yx, at 1:01:12 (Sen. Escamilla proposing that S.B. 1011 including more than one test, including the mean-median test); *id.* at 1:16:43 (Rep. Owens expressing concern about only having one test of partisan symmetry in the bill); *id.* at 29:46, 44:36, 1:16:22 (members of the public calling for more than one test of partisan symmetry). Legis. Redistricting Comm. Meeting (Sept. 24, 2025), https://bit.ly/4n2xDyB, at 2:08:31 (same).

¶259 S.B. 1011 clarifies Proposition 4. The ensemble analysis, partisan-bias test, and mean-median difference test do not impair Proposition 4. Instead, they clarify and build on its general terms. S.B. 1011 falls within the Legislature's core Article IX discretion—enacting standards and tests for the fair administration of redistricting. It is not "wholly unreasonable" or "arbitrary." *Parkinson*, 4 Utah 2d at 203.

¶260 Any proposed congressional redistricting plan must meet the requirements of S.B. 1011.

B. The 2025 Plan does not purposefully favor a political party.

¶261 The 2025 Plan was drawn, debated, and voted on blind to party politics. It passed S.B. 1011's "ensemble analysis" designed to root out partisan intent. Utah Code §20A-19-103(4)(b). That comparison to an ensemble of computer-drawn, politically neutral simulations confirms that the 2025 Plan was drawn ambivalent to partisan outcomes.

1. Dr. Trende did not gerrymander what became the 2025 Plan.

¶262 Of the five maps Dr. Trende prepared and presented to the Legislative Redistricting Committee, Map C—what later became the 2025 Plan—represented Dr. Trende's attempt to bring the 2021 Plan "into line with the provisions of Prop 4." DX13 at 42 (Trende Report).

¶263 He first set out to resolve the "four-way split of Salt Lake County and accompanying city splits." *Id.* at 32. No one disputes that Salt Lake County with its population of 1,185,238 must be split. The dispute is where the split lies and how many times, if more than once, the county should be split.

¶264 Dr. Trende chose to split the county once, with the District 2 portion taking most of the cities to the west of I-15, and the District 3 portion taking most of the cities to the east of I-15 along with Salt Lake City.

¶265 Given the relative positions of Districts 2 and 3, the logical choice is to split Salt Lake County between those two districts instead of between any combination including Districts 1 and 4. DX13 at 33.

¶266 District 2's portion of Salt Lake County rendered the district "severely overpopulated," meaning that District 2 could not also take Salt Lake City if the city were to remain intact. *Id.* Thus, Dr. Trende opted to place Salt Lake City in District 3 and all of Davis County in District 1 to equalize population. *Id.* at 34.

¶267 The final steps taken in equalizing District 2's population were to add Midvale and Murray and just enough of Millcreek. *Id.* at 35. All of Millcreek could not be added in this configuration without pushing District 2 over its population limit. *Id.*

¶268 Unifying the 2021 Plan's split of Summit County and placing Morgan County in District 3 nearly equalized population in District 1. *Id.*

¶269 The significant population added to District 2 from Salt Lake County meant that every county south of Tooele (and not in District 3) had to be placed in District 4. *Id.*

¶270 All that remained was Utah County, which had to be split between Districts 3 and 4. The only municipality Dr. Trende split there to equalize population was Pleasant Grove. The southern portion went into District 4, and the northern into District 3. *Id.*

¶271 While Dr. Trende used the 2021 Plan as a starting point, the 2025 Plan in no way resembles a so-called "least changes" map. It effectively "dismembers the preceding plan." *Id.* at 6.

¶272 For example, only 36% of District 2 residents in the 2021 Plan stay in District 2 in the 2025 Plan, and only around 60% of Districts 3 and 4 residents in the 2021 Plan stay in those districts in the 2025 Plan. *Id.* at 6-7.

¶273 The 2025 Plan is not a case of the Legislature making tweaks to previous districts lines. This is a "significant reworking" of prior district lines. *Id.* at 32. In total, the 2025 Plan moves 1,271,050 residents (nearly 40% of the State's population) from their 2021 districts. *Id.* at 6.

¶274 Finally, at "no point did [Dr. Trende] reference any partisan data until the map was complete, and then only to measure partisan symmetry." *Id.* at 42; Tr.2 109:24-110:19. Specifically, he testified repeatedly that while drawing the enacted map he did not consider the likely partisan outcome of any election in any of the four districts (Tr.2 110:4-7), he did not design any of the districts to purposefully favor an incumbent or a political party (Tr.2 110:12-15), he did not design any of the districts so they would unduly favor an incumbent or political party (Tr.2 110:16-19); in short, he did not consider partisanship in any way (Tr.2 109:24-110:3).

¶275 Nor did Dr. Trende look at the political lean or projected performance of these districts during the map drawing process. DX13 at 42 (Trende Report). He simply ran the partisan bias test on this neutrally drawn map, confirmed that it passed the test, and delivered it to the Legislature with four other compliant maps.

¶276 Although Dr. Trende drew the 2025 Plan using Dave's Redistricting Application, which by default displays political data in the form of an election composite spanning the 2012 to 2020 elections, the data was all but meaningless. It did not (and could not) allow him to draw the map with the purpose to favor any political party. Tr.2 183:18-19, 259:5-8 (Trende).

¶277 The election composite on Dave's Redistricting covered elections from 2012 to 2020. The data is over a decade old. It is also skewed, as it contains results from the 2012 election, which was uniquely situated in Utah history given Mitt Romney's status as the first member of the Church of Jesus Christ of Latter-day Saints to run for President. The composite is therefore particularly unhelpful for understanding Utah's political coalitions in 2025. *See* Utah R. Evid. 201(b)(2) (allowing a court to take judicial notice of a fact which "can be accurately and readily determined from sources whose accuracy cannot be reasonably questioned").

¶278 There is no reason to doubt Dr. Trende's repeated testimony that he did not consider partisan data when drawing the 2025 Plan. His demeanor was candid, and his testimony was otherwise credible.

¶279 Further confirmation that Dr. Trende did not gerrymander the 2025 Plan is that the Plan passes each of the intent- and effect-based tests. These results demonstrate that the 2025 Plan was not drawn with the intent to gerrymander nor does it have the effect of a gerrymander. *See infra* Conclusions of Law III.B.-C.

¶280 This conclusion necessarily follows from the undisputed course of events during these remedial proceedings. Trende initially performed only the Least Republican Vote Share test when sending the maps to the Legislative Committee. *See* PX12; Tr.2 129:1-20

(Trende). Only later, after S.B. 1011 became public, did Trende perform the RMD test. Tr.2 129:1-20. Thus when Trende drew the plan that became the 2025 Plan, he did not know—and could not have known—that the Legislature would adopt the RMD test in S.B. 1011. There is no way Trende could have reverse-engineered a map's partisan characteristics to meet a test he did not know would eventually govern the map's evaluation. Because the map passes the RMD test that the Legislature ultimately chose, it is incontrovertible evidence that Trende drew the map without respect to partisanship.

2. Dr. Trende's and Dr. Barber's ensemble analyses confirm that the Legislature did not purposefully favor a partisan result when enacting the 2025 Plan.

¶281 To test for partisan intent, S.B. 1011 calls for an "ensemble analysis," in which the proposed plan is compared to "at least 4,000 redistricting plans" drawn by a computer without respect to partisanship. Utah Code §20A-19-103(1)(a)(i).

¶282 To evaluate the 2025 Plan according to S.B. 1011's ensemble analysis, Dr. Trende used a computer simulation to generate 100,000 congressional districting maps that ignore partisan data, minimize county and city splits, deviate no more than +/-1% from the ideal district population, contain contiguous districts, avoid splitting Tribal lands and reservations, respect Utah's unique landforms and geography, and ensure ease of transportation within districts. DX13 at 36-37 (Trende Report).[6]

[6] When presenting proposed plans to the Legislative Redistricting Committee, Dr. Trende also performed the ensemble analysis using a 6,000-map simulation set generated by the ALARM Project and a 100,000 "base" simulation set he programed using the Redist algorithm. PX12. These ensembles are informative but ultimately less directly relevant than Dr. Trende's "restricted" simulation set—the one described in his report—because they were not programmed to adhere as closely to Proposition 4's redistricting criteria.

¶283 When compared to the full ensemble of 100,000 maps in Dr. Trende's restricted set, the 2025 Plan falls at the 94th percentile when using the Ranked Marginal Deviation (RMD) test that the Legislature enacted well after Dr. Trende drew the 2025 Plan and presented it to the Redistricting Committee for its consideration. *Id.* at 38; Tr.2 129:1-20 (Trende) *see also* Utah Code §20A-19-103(1)(a)(ii)(A). When compared to the culled ensemble of 32,259 maps that passed the partisan bias test, the 2025 Plan fell at the 65th percentile. DX13 at 38 (Trende Report).

¶284 And though Proposition 4 does not require using Plaintiffs' preferred Least Republican Vote Share (LRVS) test, Dr. Trende nevertheless performed that test for the 2025 Plan. When he compared that plan to the full ensemble in his restricted set, its LRVS score fell at the 94th percentile; when compared to the culled ensemble, the 2025 Plan's LRVS score fell at the 83rd percentile. *Id.* Dr. Trende's politics-neutral simulation comparison reveals that the 2025 Plan passes the "ensemble analysis" mandated by S.B. 1011, demonstrating no partisan intent. Utah Code §20A-19-103(4)(b).

¶285 Plaintiffs' expert Dr. Chen devoted the vast majority of his initial report along with its seven appendices to a criticism of Dr. Trende's "base" simulation set. *See generally* PX3 (Chen Initial Report). Dr. Chen never acknowledged that Dr. Trende's "restricted" set rendered his "base" set largely irrelevant. *See supra* n.6. Dr. Chen devoted little more than a paragraph in his report, *see* PX3 ¶125, one appendix, PX3 at App'x F, and a sentence from his live testimony, Tr.1 64:9-10, to Dr. Trende's "restricted" simulation set.

¶286 Dr. Trende's "restricted" set satisfies S.B. 1011's mandate for a "Sequential Monte Carlo simulation." Utah Code §20A-19-103(1)(f). S.B. 1011 defines an SMC simulation

as "a probabilistic algorithm that simultaneously generates a representative ensemble of districting plans for comparison in an ensemble analysis by building redistricting plans through a step-by-step random sampling method, weighting and resampling the plans to reflect legal and geometric criteria." *Id.*

¶287 S.B. 1011 does not require SMC simulations to adhere to Proposition 4's ranked substantive criteria maximally, as if any simulated map could be cherry picked and passed as a viable enacted plan; indeed, to do would often "break" the simulation and misunderstands the purpose of a simulation comparison. *See* Tr.2 284:5-10 (Barber). For example, the publicly available and widely used Redist simulation software composes sample plans "by assembling precincts," and "precincts are just a little too big to reach perfect equal population." Tr.2 283:9-11 (Barber). Programming a little "wiggle room" and "flexibility" into the simulation is crucial for the simulation to function as intended. Tr.2 283:19, 284:11-13. The goal, after all, is to "generate[] a representative ensemble of districting plans" that "reflect legal and geometric criteria"; the goal is not to generate the final plan itself. Utah Code §20A-19-103(1)(f); *see also* Tr.2 117:6-21 (Trende describing the purpose of simulation analyses).

¶288 Thus, Dr. Chen's criticisms about minor population deviation, compactness scores, or county splits in Dr. Trende's "restricted" set are misplaced. Likewise, the contiguity "violations" in Dr. Trende's simulations highlighted by Dr. Chen (PX3 ¶115) affect so few residents as to have no bearing on the partisan distribution between districts in the simulated plans. *See* Tr.2 149:22-150:24 (Trende). Just because Dr. Chen programed his algorithm to maximize compactness, for example, does not render Dr. Trende's simulations with lower compactness averages unrepresentative. To the contrary, as discussed *infra* Conclusions of Law

III.B.3., Dr. Chen's over-programmed algorithm itself fails to produce a *representative* sample of maps—the whole point of the SMC simulation requirement.

¶289 Dr Barber's independent analysis based on a separate ensemble renders irrelevant Dr. Chen's cumbersome assaults against Dr. Trende's simulations.

¶290 Dr. Barber's simulation methodology "rests on peer-reviewed algorithms." DX14 at 23 (Barber Initial Report). Dr. Barber generated 50,000 congressional plans that prioritize Proposition 4's ranked substantive requirements[7] while entirely ignoring partisan data. *Id.*

¶291 To ensure that the simulated plans followed Proposition 4's ranked districting criteria, Dr. Barber compared those simulated plans to the 2025 Plan and Plaintiffs' plans and observed that his simulation "produce[d] compactness and boundary statistics that mirror the range observed in the submitted maps." *Id.* at 24.

¶292 For example (and shown below), the median number of county splits in Dr. Barber's simulations is two, compared to three in the 2025 Plan and Plaintiffs' plans. *Id.* at 25. While the 2025 Plan may contain 11 "total municipal splits," no municipality is split between more than two districts. Millcreek, for example, while technically split into six pieces due to the abnormal shape of its boundaries, is divided only between Districts 2 and 3. *See id.* at 7.

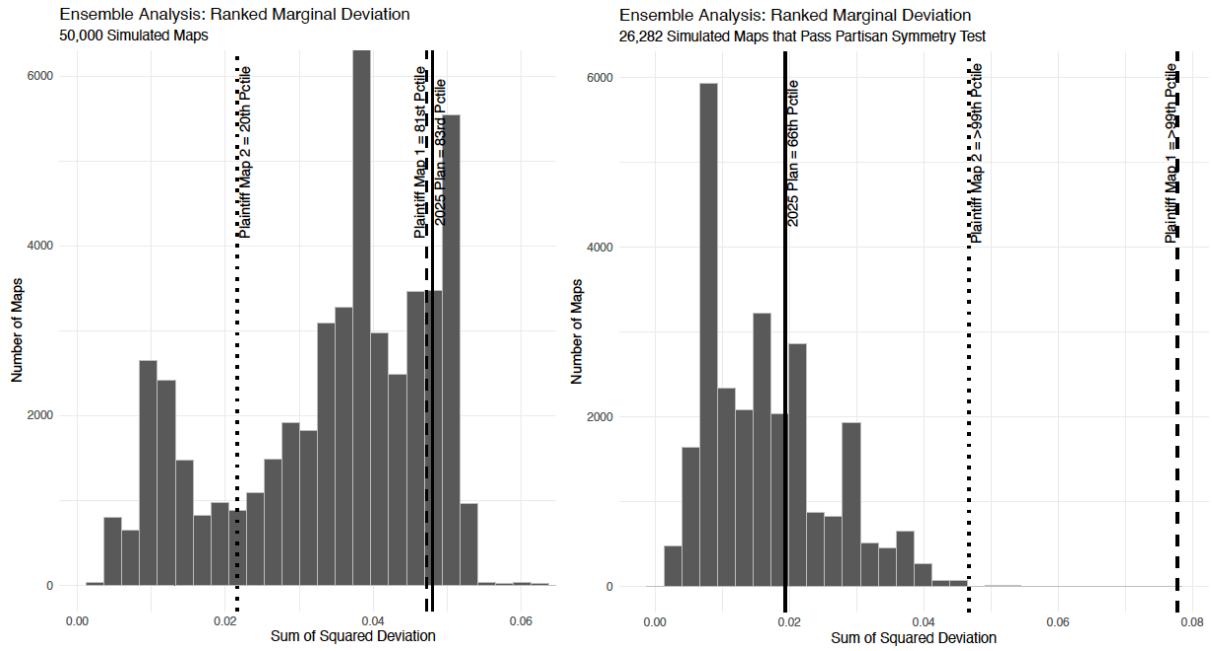
[7] Specifically, Dr. Barber's algorithm generated maps that "adhere[d] closely to … population equality, contiguity, minimal county and municipal splits, and geographic compactness." DX14 at 24 (Barber Initial Report). Dr. Barber did not instruct his algorithm to adjust for Proposition 4's lower-ranked criteria (e.g. natural boundaries, communities of interest) as these entail more subjective judgment calls and are naturally respected to an appropriate degree by maintaining municipal and county integrity. Tr.2 at 284:19-285:22 (Barber).

	Submitted Plans			50,000 Simulations		
Statistic	Plaintiffs' Map 1	Plaintiffs' Map 2	Legislature 2025 Plan	2.5%	Median	97.5%
Municipal splits	1	1	3	1	2	5
Total municipal splits	2	2	11	1	2	5
County splits	3	3	3	1	2	3
Total county splits	3	3	4	2	4	5
Reock (mean)	0.49	0.49	0.49	0.41	0.47	0.53
Polsby–Popper (mean)	0.44	0.37	0.40	0.27	0.35	0.41

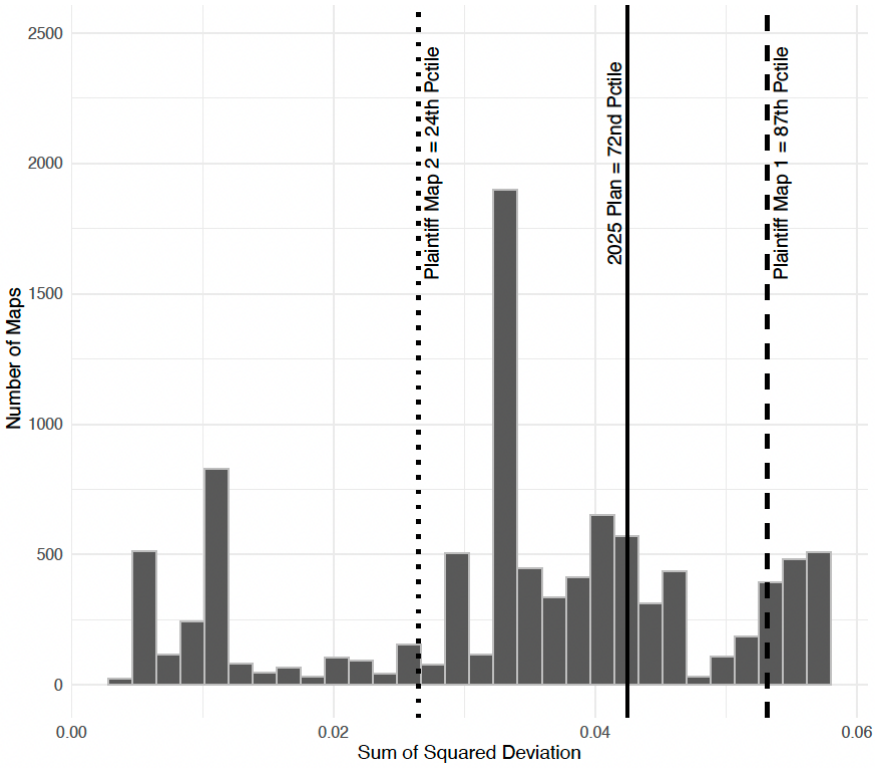
¶293 "Because the ensemble is statistically indistinguishable from the submitted plans on these structural metrics, and because we know that partisan data was not available to the computer when it drew these 50,000 maps, they can be relied upon as a valid benchmark of what a set of plans drawn under Proposition 4's criteria, without any partisan input, looks like." *Id.* at 24-25; *see also* Tr.2 287:4-20 (Barber).

¶294 Using the election index prescribed in S.B. 1011, Dr. Barber computed election metrics for each of the 50,000 simulated plans as well as the 2025 Plan and Plaintiffs' two plans. DX14 at 26 (Barber Initial Report). He then calculated the Ranked Marginal Deviation, as S.B. 1011 requires, for all plans analyzed. *Id. See* Utah Code §20A-19-103(1)(a)(ii)(A).

¶295 Dr. Barber's calculations reveal that when compared to the 50,000-map ensemble, the 2025 Plan's Ranked Marginal Deviation "average falls at roughly the 83rd percentile, below the one-sided 95 percent trigger." DX14 at 26 (Barber Initial Report) (shown below left). And when compared to the 26,282-map culled ensemble of maps that pass Proposition 4's partisan symmetry test, the 2025 Plan's average sits at "about the 66th percentile." *Id.* at 25 (shown below right).



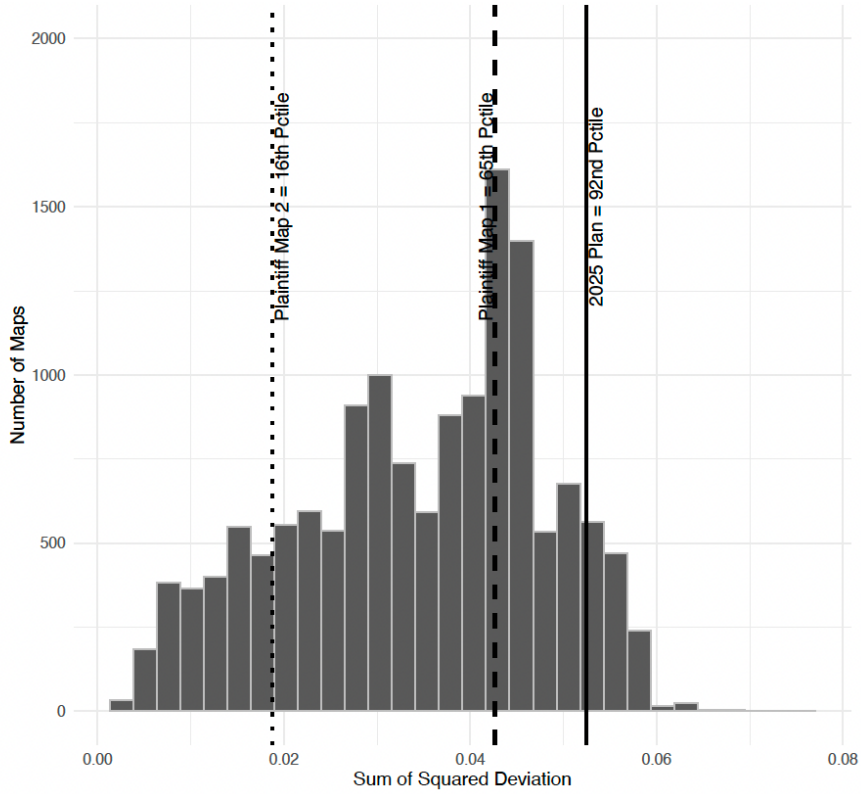
¶296 In response to Dr. Chen's accusation that Dr. Barber's simulations split too many cities and counties on average, did not generate compact-enough districts, and split Salt Lake County too many times too frequently, Dr. Barber refined his 50,000 simulations "to include only plans with four or fewer total county and municipal splits, a Reock compactness score at least as high as the three maps under consideration, and a configuration that includes a district entirely within Salt Lake County." DX15 at 22 (Barber Supplemental Report). These "Super Prop 4 Sims" numbered 9,824. *Id.*; Tr.2 324:8-13 (Barber). Dr. Barber then re-ran S.B. 1011's ensemble analysis using the "Super Prop 4" subset and found that "the conclusions remain the same. The 2025 Plan continues to fall squarely within the neutral range of simulated outcomes." DX15 at 22 (Barber Supplemental Report). In other words, Dr. Barber's conclusions "are not dependent on any lenient assumptions or parameter choices. They hold even under the narrowest and most demanding interpretation of the redistricting criteria." *Id.*



¶297 Shown above, *id.* at 23, the 2025 Plan's RMD average falls at the 72nd percentile when compared against Dr. Barber's refined set of 9,824 maps.

¶298 Dr. Chen then submitted a rebuttal report with the new accusation that Dr. Barber's simulations contain too many duplicate maps. *See* PX5 (Chen Rebuttal Report). Besides betraying a misunderstanding of how Sequential Monte Carlo simulations function, *see infra* Conclusions of Law III.B.3., Dr. Chen's criticism again fails to undermine Dr. Barber's conclusions.

¶299 Dr. Barber re-ran his ensemble analysis yet again, this time using only the 14,668 unique maps from his original simulation set. DX16 at 8 (Barber Rebuttal Report). And yet again, Dr. Barber found that the 2025 Plan's RMD deviation fell below the 95% statutory threshold, shown below. *Id.* at 8-9.



¶300 In sum, based on independent, separate, and numerous ensemble analyses conducted by Dr. Trende and Dr. Barber, the 2025 Plan falls well within the law's 95% threshold, thereby passing S.B. 1011's ensemble analysis.

¶301 Under Proposition 4, the 2025 Plan "does not purposefully favor or disfavor a political party." Utah Code §20A-19-103(4)(b).

3. Dr. Chen's ensemble analysis is fatally flawed and cannot show that the 2025 Plan is the result of purposeful partisan favoritism.

¶302 Dr. Chen generated 10,000 simulated Utah congressional maps using an algorithm he developed specifically for this case—an algorithm that no other computational redistricting expert uses. Tr.1 93:4-15 (Chen). Dr. Chen's algorithm took days to generate 10,000 maps, Tr.1 108:18-22 (Chen), in contrast to Dr. Barber's open-source Redist algorithm, which generated 50,000 maps in minutes, Tr.2 279:22-24 (Barber).

¶303 Dr. Chen's algorithm is neither publicly available nor open source. Tr.1 103:1-8, 103:20-25 (Chen); DX15 at 4 (Barber Supplemental Report). "Very little is known" about it. DX15 at 4. There is no public "version of the algorithm's code, no technical documentation, and no peer-reviewed academic publication that explains or validates how it samples plans or ensures that those samples are representative of the full space of legally valid redistricting outcomes." *Id.* Because his bespoke algorithm has not been "broadly scrutinized," it is "much harder to know exactly what it's doing and how it's operating versus" the open-source, publicly available Redist algorithm used by Dr. Barber, Dr. Trende, and other computational redistricting experts. Tr.2 311:15-19 (Barber). In short, Dr. Chen's algorithm "functions as a 'black box,'" in that "analysts and courts have no way to know whether its output is a faithful depiction of what neutral redistricting under Utah's criteria would actually produce." DX15 at 4-5 (Barber Supplemental Report).

¶304 To that very point, Dr. Chen refused to answer in the affirmative when asked repeatedly whether his algorithm produced a representative sample of possible Utah congressional maps drawn in compliance with the law. Tr.1 106:24-107:17 (Chen); Tr.2 337:7-13 (Barber).

¶305 Dr. Chen describes his algorithm as a Sequential Monte Carlo. Tr.1 93:11-16 (Chen). Sequential Monte Carlo (SMC) simulation models contain an "essential and expected feature"—duplicate maps. DX16 at 4 (Barber Rebuttal Report). This "basic property" of SMC-based simulations "reflects the correct statistical weighting of neutral, well-performing plans." *Id.* at 6. For example, Dr. Barber's 50,000-map simulation set uses a SMC method and, as a result, contains duplicate maps. *Id.* at 4-5; Tr.2 337:19-339:4 (Barber). Duplicates simply

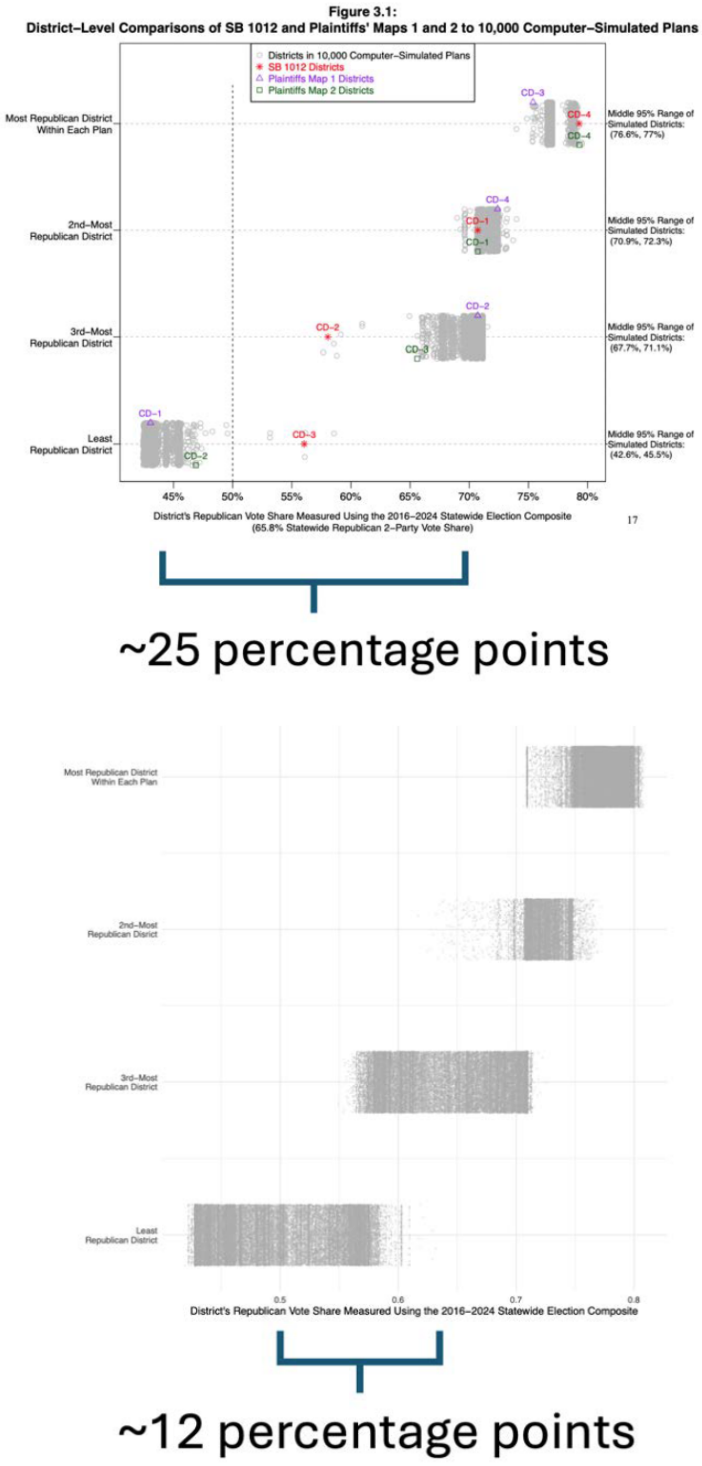
reflect "the natural, mathematically necessary replication of high-probability maps in an SMC ensemble." DX16 at 6 (Barber Rebuttal Report).

¶306 But as Dr. Chen reports, not one of his 10,000 maps supposedly generated using an SMC simulation model is a duplicate of another. PX5 at 2 (Chen Rebuttal Report); Tr.1 108:12-22; Tr.2 339:16-17 (Barber). Dr. Chen thus contradicts himself by insisting his algorithm is a Sequential Monte Carlo that produces no duplicate maps. That's not how SMC models function. DX16 at 6-7 (Barber Rebuttal Report).

¶307 Instead, Dr. Chen's algorithm "repeatedly produces a district centered in the same region of northern Salt Lake County," evidencing "systematic geographic bias." *Id.* at 6. Because there is "no published documentation, no peer-reviewed validation, and no evidence that his model has been tested for convergence, diversity, or representativeness," it is "impossible to know whether his algorithm explores the space of possible maps appropriately or whether it is stuck in a narrow, biased region of outcomes." *Id.*

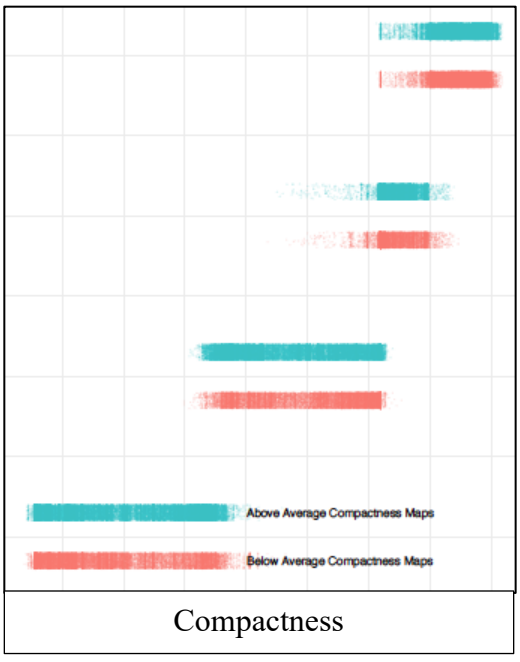
¶308 Indeed, Dr. Chen's algorithm anchored a heavily Democratic district in the same portion of northern Salt Lake County in more than 90% of his simulated maps. *Id.* at 7. The political effects of this geographic phenomenon can be seen in the dot plots below. The top graph shows the partisan index of districts in Dr. Chen's 10,000 maps; the bottom graph shows the same for Dr. Barber's 50,000-map ensemble. *See* DX15 at 7 (Barber Supplemental Report). In Dr. Chen's simulation, "one district clusters near 40 percent Republican vote share, while the others cluster around much higher values, leaving a nearly 25-point gap between them." *Id.* at 6. In Dr. Barber's, "the least-Republican and next-least-Republican districts overlap in their partisan distributions, reflecting that the algorithm is sampling a broad

range of plausible configurations in which districts vary incrementally in composition." *Id.* "This smooth transition is precisely what one expects from a properly functioning redistricting simulation." *Id.*



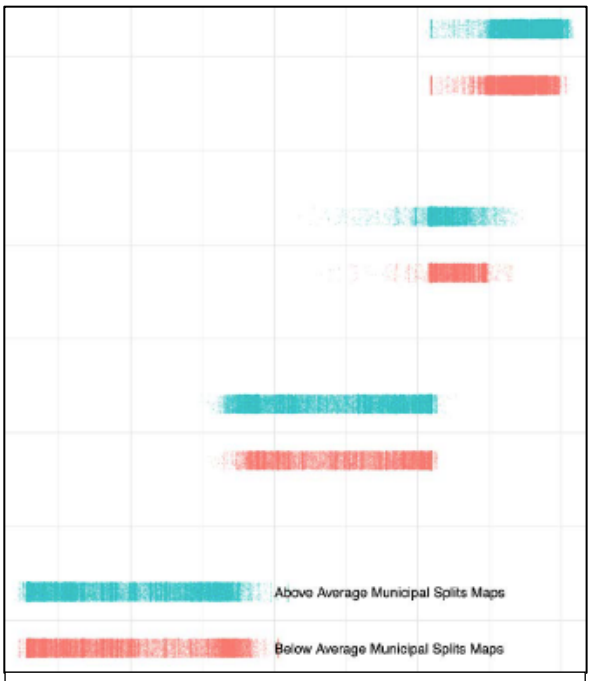
¶309 The "very large gap" between the least-Republican district and the next-least-Republican district in Dr. Chen's simulations is "unlike any other set of simulations" Dr. Barber has seen in his "work in redistricting." Tr.2 313:18-22 (Barber). In an attempt to solve the mystery of the gap, Dr. Barber methodically examined, by process of elimination, whether heightened prioritization of compactness, minimizing county splits, or minimizing municipal splits, could explain the "stark difference" between Dr. Chen's simulation ensemble and his own. Tr.2 313:16-17 (Barber); *see also id.* 336:18-337:13; DX15 at 8-19 (Barber Supplemental Report).

¶310 Shown below, Dr. Barber found that "modest adjustments to the neutral criteria within [his] redist-based simulations ha[d] no systematic effect on partisan balance." DX15 at 8 (Barber Supplemental Report). In other words, the "ensembles do not shift toward producing a Democrat-leaning district when compactness improves, when county splits are reduced, or when municipal splits are minimized." *Id.*



Compactness

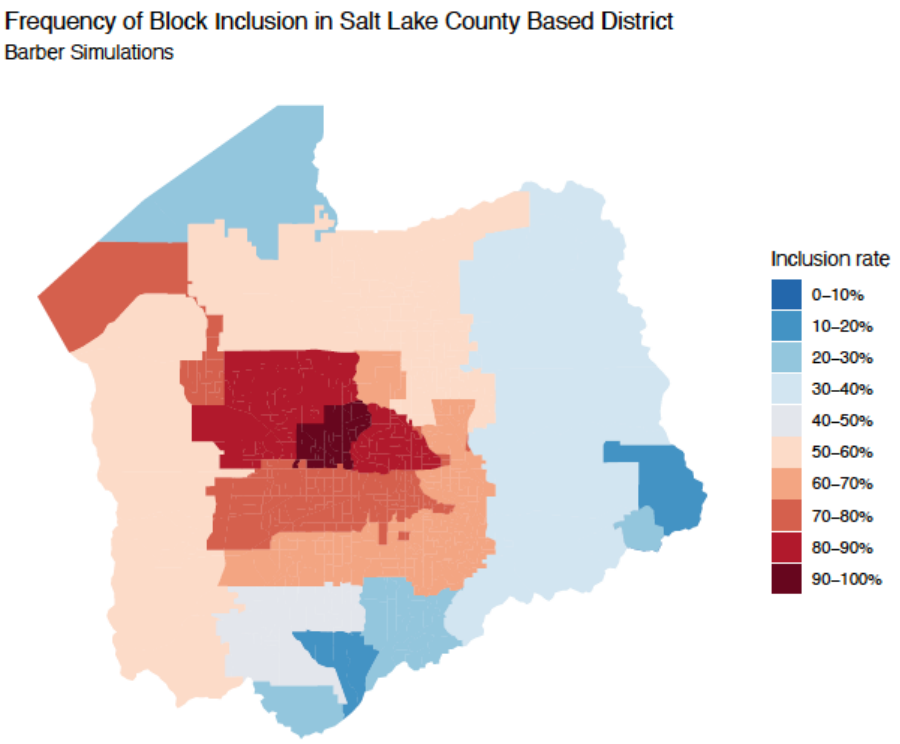
County Splits



Municipal Splits

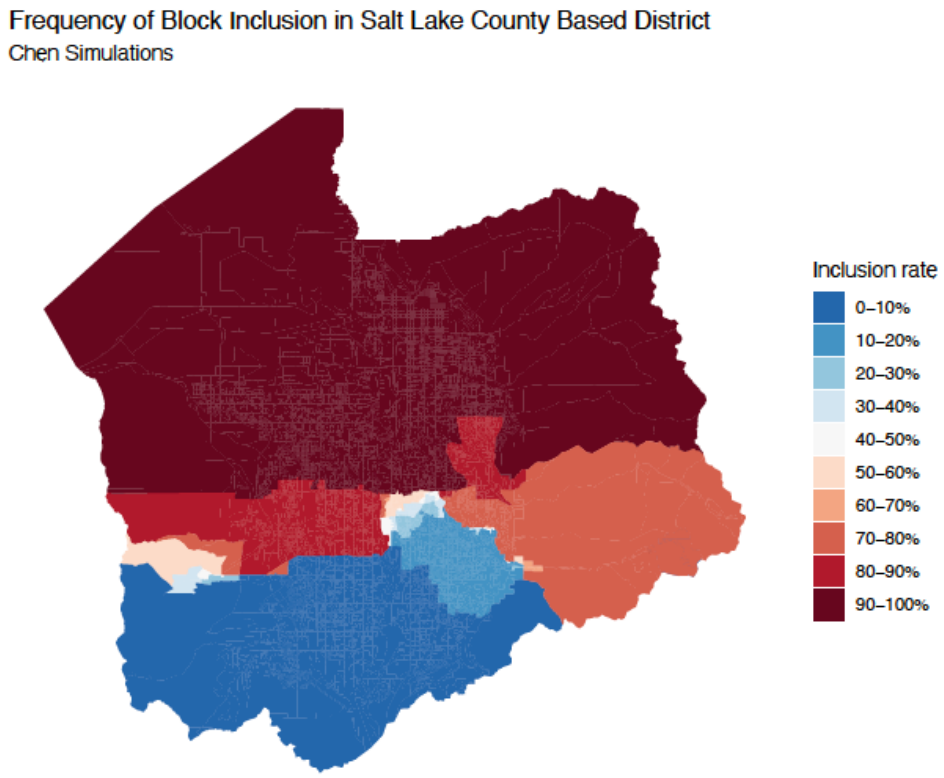
¶311 Because "legitimate differences in how the neutral redistricting principles are applied" cannot explain the "magnitude and structure" of Dr. Chen's ensemble's "discontinuity in partisan composition," Dr. Barber turned his attention to Salt Lake County. *Id.* at 8. First, he examined how his own simulations treated Salt Lake County. He found that about 50% of his simulated plans created a district wholly contained within Salt Lake County. *Id.* at 21; Tr.2 319:1-3.[8]

[8] Dr. Chen's passing jabs at Dr. Barber's prioritization of population equality, count of municipal splits, and calculation of Polsby-Popper compactness are nothing more than distractions. *See* Tr.2 315:21-316:13 (Barber on equal population); Tr.2 317:14-25 (Barber on municipal splits); Tr.2 319:1-21 (Barber on Polsby-Popper calculation).



¶312 Shown in the stylized graphic above, the deepest red precincts in the center of Salt Lake County are those that Dr. Barber's simulation places most frequently in a Salt Lake County-based district. *Id.* at 14-15. The color gradation from dark red to light blue reveals "even coverage"—"what one would expect from an unbiased algorithm that systematically samples all feasible district configurations." *Id.* at 14.

¶313 In contrast, Dr. Chen's simulations created a Salt Lake County-only district just 9% of the time (894 out of 10,000 maps). DX15 at 21 (Barber Supplemental Report); Tr.2 323:3-4. Despite rarely containing such a district, Dr. Chen's simulations often, about 70% of the time, create a district that draws 95% of its population from Salt Lake County and the remaining 5% from Davis County to the north. Tr.2 325:24-326:4. The figure below depicts this phenomenon.



¶314 As shown, Dr. Chen's "algorithm has a very, very strong preference for a northern Salt Lake County district." Tr.2 330:1-2 (Barber); *see also* 312:12-13. This suggests to Dr. Barber that "there's something in the programming of the algorithm that is creating a northern Salt Lake County district … nearly all of the time." Tr.2 331:3-7. This is not the result of "a representative sample of potential maps," but "of a biased algorithm." Tr.2 331:8-12.

¶315 Dr. Chen suggested that keeping Bluffdale and Draper in the same district as northern Utah County naturally leads to this result. Tr.1 86:13-88:3 (Chen). Dr. Barber disposes of this attempted justification by drawing attention to the Chen simulation's inconsistent treatment of *other* cities in southern Salt Lake County, which are almost never included in a Salt Lake County-based district, and cities in northern Salt Lake County, which are almost always included with a bit of Davis County to anchor a heavily Democratic district. Tr.2 331:22-333:20.

¶316 The result of this bias is to generate a heavily Democratic district anchored in the northern half of Salt Lake County in "9,994 out of 10,000" simulated plans. PX3 ¶35 (Chen Initial Report).

¶317 Relatedly, an additional, troubling feature of Dr. Chen's algorithm is its programming to protect the "590 neighborhoods and communities of interest utilized by the Utah Independent Redistrict Commission, which the UIRC and staff developed from extensive public comment and submissions from Utah residents during the 2021 UIRC redistricting process." *Id.* at 9. These submissions contain numerous, explicit references to *partisan* interests, including: #15 ("Democrats need representation"); #133 ("The Avenues are liberal"); #144 ("East Central Salt Lake City" is "mostly liberal"); #224 ("My community is very diverse and liberal"); #226 ("My community is upper middle class and fairly liberal"); #406 ("My community is liberal"); #426 ("tend to lean Democratic"); #441 ("inhabitants of Salt Lake City lean more liberal"); #514 ("more in line with the Democratic Party"); #554 ("liberal part of Salt Lake City"); #588 ("more liberal and less LDS"). Tr.1 126:23-131:6; DX5 (Chen Communities of Interest). Even crediting Dr. Chen's insistence that this partisan data had "virtually no effect" on the lines that he drew, Tr.1 20:6 (Chen), his simulations were programmed to ingest, process, and give weight to this "Partisan political data and information." *But see* Utah Code §20A-19-103(6).

¶318 Finally, Dr. Barber had his computer generate as many of Dr. Chen's maps as time permitted in order to visually verify that Dr. Chen's algorithm was virtually always creating a northern Salt Lake County district. Tr.2 333:23-334:4 (Barber); *see also* DX15 App'x A (containing images of the first 1,861 maps in Dr. Chen's simulation set). Flipping through

these maps revealed a northern Salt Lake County district that almost "never moves"; it just appears "over and over and over and over." Tr.2 335:25-336:1, 336:7-8.

¶319 The Court agrees with Dr. Barber and concludes that Dr. Chen's algorithm has not generated a representative sample of congressional redistricting plans for the state of Utah. Tr.2 337:7-13. As such, it is not an appropriate simulation set by which to conduct S.B. 1011's mandatory ensemble analysis. *See* Utah Code §20A-19-103(1)(a)(i).

C. The 2025 Plan does not unduly favor or disfavor a political party.

¶320 The 2025 Plan does not unduly favor any partisan outcome.

¶321 As defined by S.B. 1011, "'Unduly favor or disfavor' … for purposes of a congressional map, means the map is asymmetrical under the measures of partisan symmetry and fails the mean-median difference test." Utah Code §20A-19-103(1)(g).

¶322 "Measures of partisan symmetry," in turn, refers to "the partisan bias test" and "an ensemble analysis with subsequent culling to include only redistricting plans that pass the partisan bias test." *Id.* §20A-19-103(1)(c).

¶323 The 2025 Plan satisfies Proposition 4's partisan symmetry requirement by passing the culled ensemble analysis, *see supra* Conclusions of Law III.B.2., the partisan bias test, and mean-median difference test.

1. The 2025 Plan passes the partisan bias test.

¶324 The parties do not dispute that the 2025 Plan passes the partisan bias test.

¶325 After drawing the 2025 Plan, Dr. Trende tested it for partisan symmetry using the partisan bias test. It passed. DX13 at 50 (Trende Report).

¶326 Dr. Barber's independent analysis confirms the 2025 Plan's partisan symmetry under this test. Using the 13-election partisan index required by S.B. 1011, Dr. Barber tested the 2025 Plan and Plaintiffs' two plans for partisan bias. *See* Utah Code §20A-19-103(1)(d) (providing instructions on how to conduct partisan bias test).

¶327 "A map 'passes' if at the 50/50 statewide vote margin, each major party wins 2 of the 4 congressional seats. If either party wins more than 2 of the seats, it 'fails' the test." DX14 at 19 (Barber Initial Report). Shown below, Dr. Barber's analysis demonstrates that the 2025 Plan "consistently satisfies the symmetry standard in every election for which we have data." *Id.*; Tr.2 271:2-3 (Barber).

Election	2025 Plan	Plaintiff Map 1	Plaintiff Map 2
2016 President	Pass	Fail	Fail
2016 Governor	Pass	Fail	Fail
2016 Attorney General	Pass	Fail	Fail
2016 Auditor	Pass	Fail	Fail
2016 Treasurer	Pass	Fail	Fail
2020 President	Pass	Fail	Pass
2020 Governor	Pass	Fail	Pass
2020 Attorney General	Pass	Fail	Pass
2020 Auditor	—	—	—
2020 Treasurer	—	—	—
2024 President	Pass	Fail	Pass
2024 Governor	Pass	Fail	Pass
2024 Attorney General	Pass	Fail	Pass
2024 Auditor	Pass	Fail	Pass
2024 Treasurer	Pass	Fail	Pass
Average of Elections	**Pass**	**Fail**	**Pass**

2. The 2025 Plan passes the mean-median difference test.

¶328 Under S.B. 1011, if "the difference between a party's average statewide vote share and the party's median vote share across all districts in a proposed redistricting plan" "is

greater than a 2% deviation from the mean," then the proposed plan "fails the mean-median difference test" and is not a symmetrical map. Utah Code §20A-19-103(1)(b).

¶329 The parties do not dispute that the 2025 Plan passes the mean-median difference test.

¶330 In Dr. Barber's experience, a 2% deviation from the mean threshold is a "reasonable standard." Tr.2 272:21-23.

¶331 Dr Trende found that the 2025 Plan exhibited a mean-median difference of 1.45%—a passing score. DX13 at 51 (Trende Report).

¶332 Dr. Barber separately calculated the 2025 Plan's mean-median difference using two different methods. Under the first (shown below), the 2025 Plan's score falls "comfortably within the window" at 1.45. DX14 at 21 (Barber Initial Report).

Election	2025 Plan	Plaintiff Map 1	Plaintiff Map 2
2016 President	1.70	-7.27	-3.31
2016 Governor	1.12	-6.47	-2.97
2016 Attorney General	0.76	-6.27	-2.89
2016 Auditor	1.61	-6.20	-2.76
2016 Treasurer	1.96	-6.06	-2.74
2020 President	1.40	-5.87	-2.25
2020 Governor	0.56	-6.47	-2.75
2020 Attorney General	1.46	-5.94	-2.29
2024 President	1.97	-4.72	-1.30
2024 Governor	0.59	-5.78	-2.66
2024 Attorney General	2.02	-5.30	-1.89
2024 Auditor	1.90	-5.22	-1.88
2024 Treasurer	1.97	-5.21	-1.83
Average of Elections	**1.45**	**-5.82**	**-2.38**

¶333 Under the alternative method, Dr. Barber used to calculate mean-median (shown below), the 2025 Plan passes with a score of 1.67. *Id.* at 22.

Election	2025 Plan	Plaintiff Map 1	Plaintiff Map 2
2016 President	2.46	-6.92	-2.88
2016 Governor	1.62	-6.43	-2.84
2016 Attorney General	1.13	-6.39	-2.95
2016 Auditor	1.96	-6.27	-2.76
2016 Treasurer	2.31	-6.09	-2.73
2020 President	1.69	-6.19	-2.31
2020 Governor	0.95	-6.65	-2.71
2020 Attorney General	1.72	-6.35	-2.42
2024 President	1.88	-5.65	-1.82
2024 Governor	0.98	-5.96	-2.57
2024 Attorney General	1.90	-6.38	-2.51
2024 Auditor	1.81	-6.12	-2.42
2024 Treasurer	1.86	-6.16	-2.40
Average of Elections	**1.67**	**-6.23**	**-2.55**

¶334 In short, the 2025 plan "performs the way a compliant plan should." *Id.* at 21. "Read alongside the partisan symmetry test, the mean-median results reinforces the broader conclusion that the 2025 Plan is not a partisan outlier." *Id.*

¶335 Because it passes both the ensemble analysis (Ranked Marginal Deviation) and the partisan symmetry tests (Partisan Bias and Mean-Median), the 2025 Plan does not "purposefully or unduly favor[] or disfavor[] any incumbent elected official, candidate, or prospective candidate for elective office, or any political party," as a matter of law. Utah Code §20A-19-103(4)(a).

3. The 2025 Plan may not lawfully be scrutinized under Plaintiffs' preferred tests.

¶336 S.B. 1011 requires judicial evaluation of the 2025 Plan using the ensemble analysis, partisan bias test, and mean-median test. Utah Code §20A-19-103(8).

¶337 Plaintiffs asked this court to rely on alternative tests—namely, the efficiency gap (EG), least republican vote share (LRVS), and standard deviation of vote shares (SDVS).

These are but three of "dozens of proposed partisan fairness measures designed for single member district systems." DX13 at 29 (Trende Report). They are not the tests the Legislature enacted; they have no place here.

¶338 Even if they could be considered lawfully, they should be rejected because they are not the "best available data and scientific and statistical methods" for evaluating Utah maps.

¶339 Recent academic research has demonstrated that—except for partisan bias—those tests either do not measure partisan symmetry at all or do so only under narrow circumstances. *See* DX12 at 9-11 (Katz Report); DX10 (describing the problems with each test); Tr.2 21:14-29:9 (Katz) (same).

¶340 The efficiency gap, for example was "never intended to be used in a state with four congressional districts" or in "uncompetitive states." DX13 at 57 (Trende Report); DX12 at 11 (Katz Report) (observing that the "efficiency gap is not a reliable measure of partisan fairness"); *see also* Annika King, Jacob Murri, Jake Callahan, Adrienne Russell, & Tyler J. Jarvis, *Mathematical Analysis of Redistricting in Utah*, 9 Stat. & Pub. Pol'y 136, 136-48 (2022) (applying the efficiency gap to Utah is "deeply problematic"). It performs "poorly in small delegations like Utah's four seats because its arithmetic is too coarse and volatile at that scale." DX14 at 39 (Barber Initial Report); Tr.1 203:4-204:15 (Warshaw) (admitting that the efficiency gap is likely to be "substantially less reliable" in small states).

¶341 It's no surprise, then, that there was broad bipartisan legislative agreement that the efficiency gap test is not appropriate for use in Utah. During the first Legislative Redistricting Committee hearing, Senator Escamilla agreed with Senator Brammer that the

efficiency gap was not an appropriate test here, stating "I a hundred percent agree with you that the efficiency gap does not apply" to Utah. *See* Utah State Legislature, Legis. Redistricting Comm. Meeting (Sept. 22, 2025), https://bit.ly/3KS56yx at 57:45. From her research, she concluded that the test was unhelpful and skewed in any state with fewer than "eight districts." *Id.* Given the state of the social science literature, nothing about this bipartisan legislative agreement was improper.

4. Still, the 2025 Plan is not a partisan outlier under Plaintiffs' preferred tests.

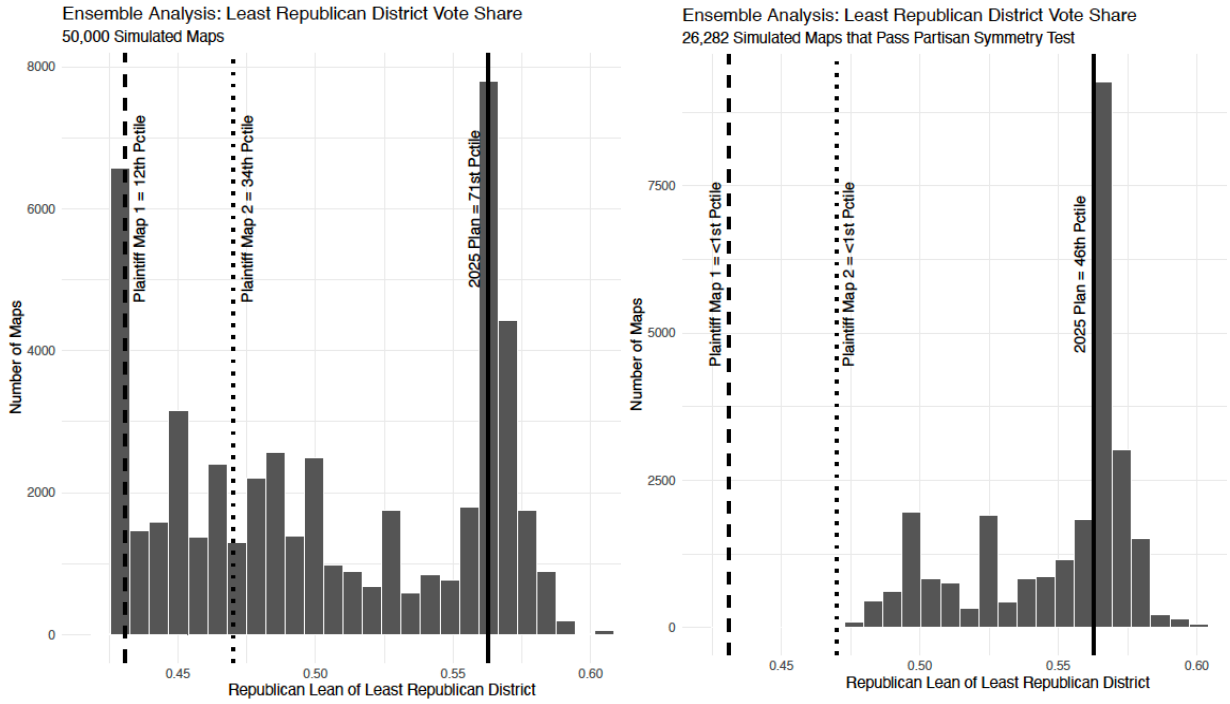
¶342 The 2025 Plan is no partisan outlier even under Plaintiffs' Least Republican Vote Share, Standard Deviation of Vote Shares, or Efficiency Gap tests.

¶343 Plaintiffs offer the **Least Republican Vote Share** test "on the theory that Utah's partisan geography makes the lowest-Republican district the best place to look for 'cracking.'"DX14 at 30 (Barber Initial Report). LRVS "asks where does the lowest-ranked district sit relative to the distribution from the neutral simulations." *Id.*

¶344 The fact that in the 2025 Plan the "least Republican" district is "Republican-leaning" is not "evidence of cracking, because the simulations show that outcome is quite common … [a]bout 50 percent of neutral plans (and 93.5% of the culled simulations) produce a Republican-leaning district at the bottom rank." *Id.* "What matters is whether the bottom-ranked district in a given map is an outlier compared to the neutral ensemble." *Id.*

¶345 When Dr. Trende initially presented Maps A, B, C (the 2025 Plan), D, and E to the Legislative Redistricting Committee, he reported that each passed the ensemble analysis using the Least Republic Vote Share test. PX12 (Trende Summary Sheets).

¶346 Dr. Barber separately performed an LRVS analysis. Dr. Barbar's analysis confirms Dr. Trende's results and reveals that the least-Republican district is not an outlier. *See* Tr.2 293:12-294:12, 295:13-25 (Barber).



¶347 As shown, the 2025 Plan's least-Republican district when compared against either Dr. Barber's full 50,000-map simulation ensemble (left) or the culled ensemble (right) "is typical of neutral Utah plans and well short of any outlier threshold." DX14 at 31 (Barber Initial Report).

¶348 Specifically, "the 2025 Plan's least-Republican district falls around the 71st percentile" when compared to the full simulation ensemble, and the "67th percentile" when compared to the culled ensemble. *Id.* at 30. Both percentiles are "comfortably inside the distribution and below S.B. 1011's 95 percent threshold." *Id.*

¶349 And when compared against Dr. Barber's 9,824 "Super Prop 4 Sims" with fewer municipal and county splits, higher compactness, and a Salt Lake County-only district, the

2025 Plan's least-Republican district falls at the 65th percentile, demonstrating virtually no movement from the larger ensemble analyses. DX15 at 24 (Barber Supplemental Report).

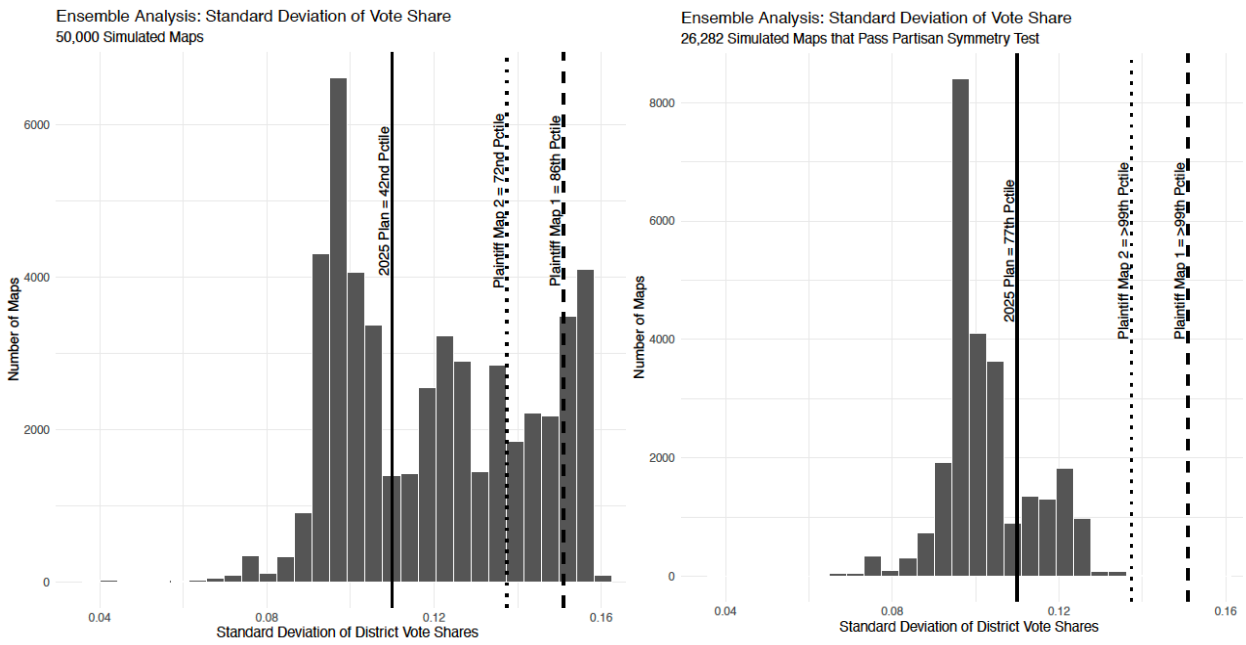
¶350 Likewise, when the LRVS test is run using Dr. Barber's unique-maps-only set of 14,668 maps, the 2025 Plan's comes in at the 78th percentile, still well under the 95% threshold. DX16 at 10 (Barber Rebuttal Report).

¶351 Plaintiffs next offer the **Standard Deviation of Vote Shares** test. The 2025 Plan passes this metric as well. In a four-district system like Utah's congressional districts, SDVS purports to identify "cracking" by looking "at how tightly clustered the four district vote shares are around their mean." DX14 at 34 (Barber Initial Report).

¶352 On "this metric, lower values are the ones that raise flags for political cracking. Higher values reflect more variation across the four districts and are, instead, a signature of packing." *Id.*

¶353 Dr. Barber's SDVS analysis, consistent with other simulation comparisons, reveals that the 2025 Plan's SDVS sits "comfortably inside the distribution and, importantly for this test, not unusually low." *Id.*

¶354 As shown, compared against the full simulation ensemble (left), the 2025 Plan's SDVS "sits around the 42nd percentile," and "moves to the 77th percentile" when compared against the culled ensemble (right). *Id.* The "2025 Plan does not show either a low-variance cracking or high-variance packing pattern." *Id.*



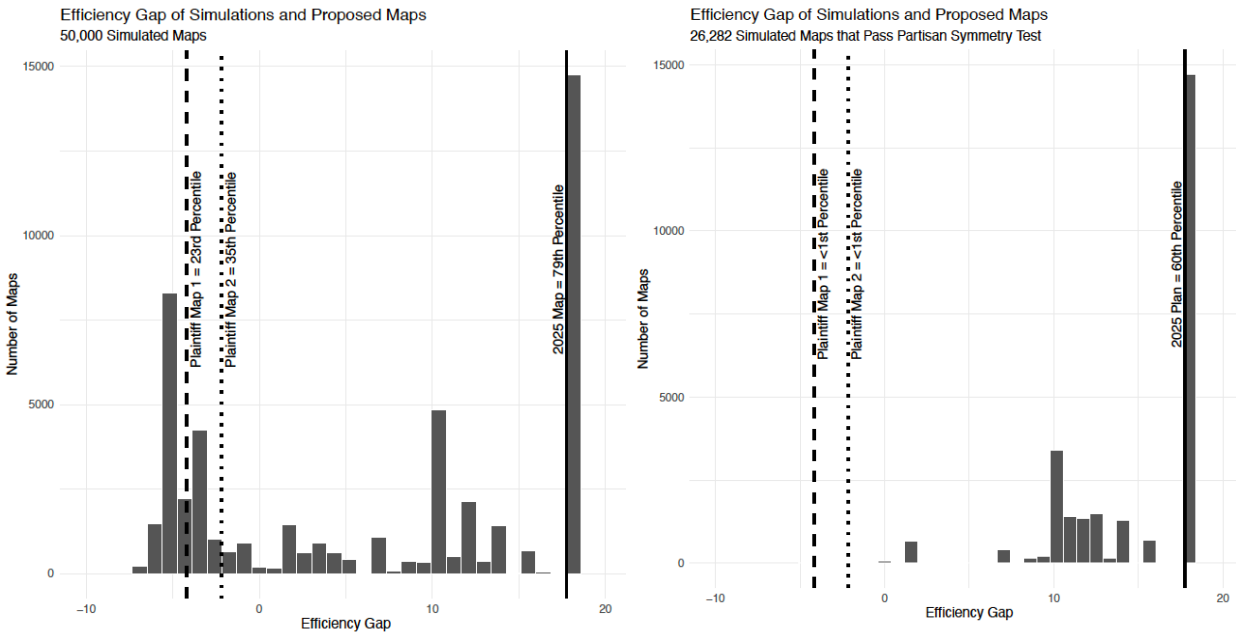
¶355 When compared against Dr. Barber's "Super Prop 4 Sims," the 2025 Plan's SDVS score falls right in the middle at the 53rd percentile. DX15 at 25 (Barber Supplemental Report). And the plan's SDVS sits at the 35th percentile when compared to Dr. Barber's 14,668 unique-map-only simulation set, still well above any outlier percentile. DX16 at 12 (Barber Rebuttal Report).

¶356 Finally, Plaintiffs insist that proposed congressional plans should satisfy the **Efficiency Gap** metric. This is curious, given testimony from Plaintiffs' expert Dr. Warshaw in multiple cases that the efficiency gap should *not* be applied in states with fewer than six districts like Utah. In those cases, he even refused to include those states in his EG analyses. *See Ohio A. Philip Randolph Inst. v. Householder*, 373 F. Supp. 3d 978, 1028 n. 329 (S.D. Ohio 2019); DX7 at 891 (Dr. Warshaw's testimony on the efficiency gap limited to states with more than six congressional districts).

¶357 Aside from EG's inapplicability here, there "is substantial peer-reviewed criticism that the EG does not actually measure partisan bias and can behave perversely." DX14 at 38 (Barber Initial Report) (collecting sources). In short, EG "can be unstable, not scale-invariant, and sensitive to turnout imbalances, so it is a weak proxy for partisan bias in practice." *Id.* at 39. Plaintiffs may not reject the Legislature's chosen metrics—especially not for one decried as "sociological gobbledygook," Tr. of Oral Arg. at 40, *Gill v. Whitford*, 585 U.S. 48 (2018) (No. 16-1161) (Roberts, C.J.); *see also* DX12 at 10-11 (Katz Report) (EG "is not a reliable measure of partisan fairness"); DX13 at 47 (Trende Report) (EG is "foundationally flawed"); DX14 at 38-41 (Barber Initial Report); Tr.2 21:16-20, 27:10-21 (Katz testifying that EG "fail[s] completely" to measure partisan symmetry).

¶358 Even so, the 2025 Plan's efficiency gap, while high, is not an outlier when compared to neutral simulation ensembles. Tr.2 298:13-299:4 (Barber).

¶359 As shown below, the 2025 Plan's EG sits "around the 79th percentile on average" in the full ensemble and "resembles the vast majority of maps" in the culled simulation set. DX14 at 42 (Barber Initial Report).

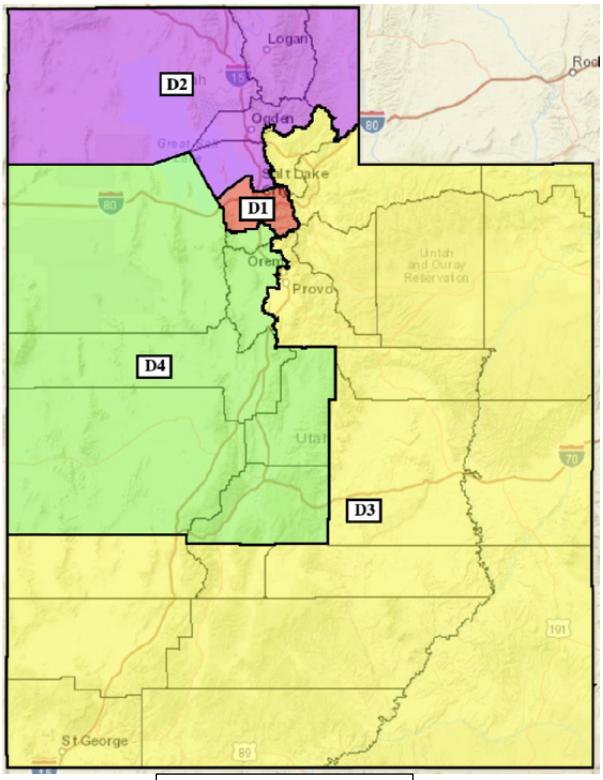


¶360 This "apples-to-apples comparison against a neutral baseline of simulated maps" accounting "for the state's political geography and typical voting patterns" once again reveals the 2025 Plan not to be an outlier. DX14 at 42 (Barber Initial Report).

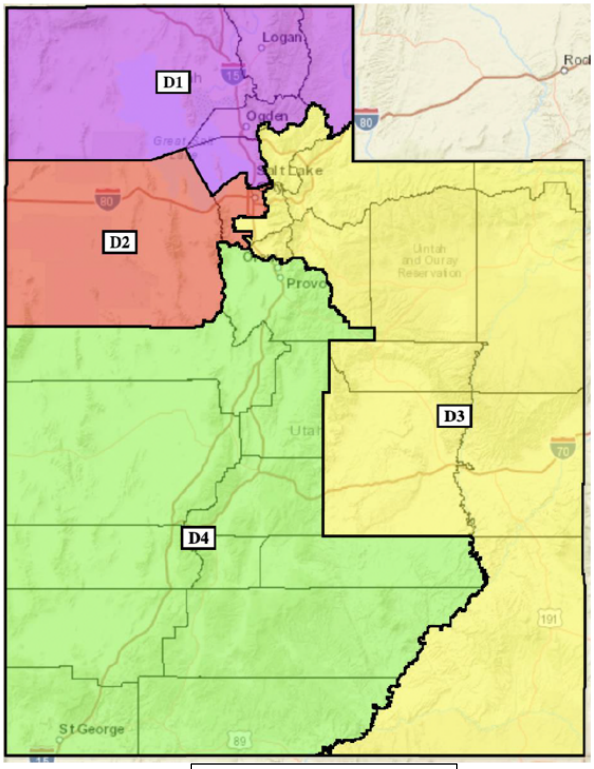
¶361 A comparison of the 2025 Plan's EG to simulated maps in Dr. Barber's two refined ensemble sets ("Super Prop 4" and unique-map-only) further confirms that the 2025 Plan is not a partisan outlier. DX15 at 26 (75th percentile compared to "Super Prop 4 Sims"); DX16 at 12 (83rd percentile compared to unique-map-only set).

IV. Plaintiffs' Plans Purposefully or Unduly Favor the Democratic Party.

¶362 Plaintiff's plans are non-compliant with Proposition 4. Plaintiffs' Plan 1 fails both the partisan bias and mean-median tests. Plaintiffs' Plan 2 fails mean-median. Beyond failing these mandatory metrics of partisan symmetry, Plaintiffs' plans resemble partisan gerrymanders under S.B. 1011's ensemble analysis as well as their own preferred tests.



Plaintiffs' Plan 1



Plaintiffs' Plan 2

¶363 Plaintiffs' Plan 1 places District 1 fully within Salt Lake County, splitting the county above South Jordan and Sandy (and splitting Midvale). District 4 takes the rest of Salt Lake County, the western half of Utah County, and continues west and south to capture Juab, Millard, Sanpete, Sevier, and Tooele counties. District 2 comprises the five northernmost counties, and District 3 takes everything else.[9]

¶364 Plaintiffs' Plan 2 purports to improve upon the 2025 Plan. The primary difference is its treatment of Salt Lake City and other cities in Salt Lake County. Plan 2 places Salt Lake City along with a few cities to the south in District 2 with Tooele County. District 2 then skips over West Jordan and South Jordan before picking up Riverton and Herriman in the

[9] An interactive version of Plaintiffs' Plan 1 can be accessed at https://davesredistricting.org/maps#viewmap::e8d5934c-1a42-4765-8519-406ab5afeabc

south of the county. The 2025 Plan includes Salt Lake City in District 3. Plaintiffs' treatment of the State's most populous city has major consequences for Plaintiffs' plans' lack of partisan symmetry. *See infra* Conclusions of Law III.C.[10]

A. Plaintiffs ignore Utah's natural features and important communities.

¶365 A cursory examination of district lines in Plaintiffs' two plans reveals at least two major failures to respect Utah's significant geographical boundaries and unique communities of interest.

¶366 Plaintiffs' Plan 1 cuts off Alpine in District 3 from the rest of the Salt Lake Valley communities which are in District 4. Alpine residents cannot access the rest of District 3 except via over-mountain roads or by first exiting District 3. Tr.1 260:18-262:10 (Oskooii); Tr.2 303:16-304:3 (Barber) (describing Alpine as "orphaned" in Plan 2).

¶367 In an apparent effort to avoid dividing municipalities, Plan 1 "splits a housing development in half" in Huntsville. Tr.2 302:22-303:15 (Barber) (noting this is where his sister lives). The development includes about "20 houses." Plan 1 chops off about three of them in a corner of the subdivision, instead of keeping something as "small and cohesive as a housing development together." Tr.2 303:5-12 (Barber).

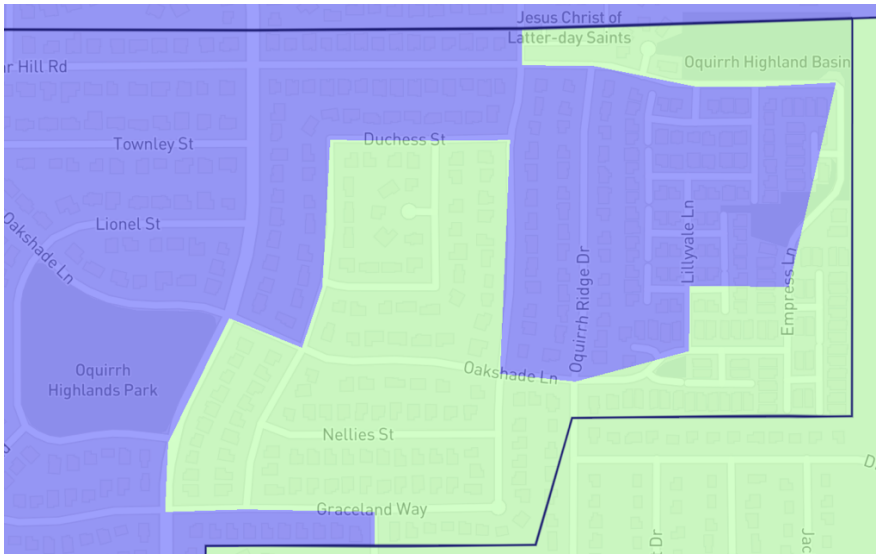
¶368 Plaintiffs' Plan 1 also places the State's southernmost eight counties[11] into District 3. This creates obvious problems with "ease of transportation throughout the district." Utah Code §20A-19-103(3)(d). For example, the three fastest routes from Panguitch in Garfield County to Bluff or Monticello in San Juan County require either leaving District 3 or

[10] An interactive version of Plaintiffs' Plan 2 can be accessed at https://davesredistricting.org/maps#viewmap::66f159a3-89c6-4bb4-9f47-fb8ec3ff0056

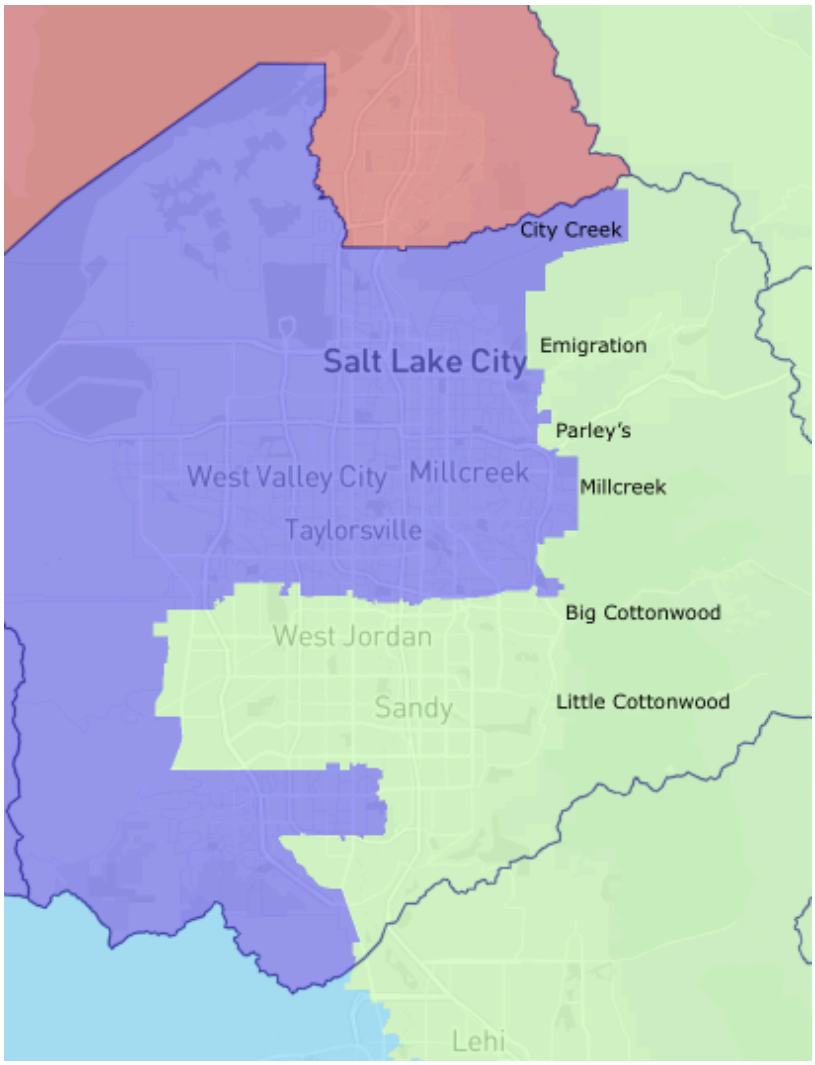
[11] Beaver, Garfield, Iron, Kane, Piute, San Juan, Washington, and Wayne.

leaving Utah. DX14 at 10 (Barber Initial Report); Tr.1 263:13-265:5 (Oskooii) (acknowledging that a congressperson would have to either leave her district or leave Utah into northern Arizona to travel from Garfield County to San Juan County). The 2025 Plan avoids this burden on intradistrict travel by using the Colorado River as a natural boundary between Districts 3 and 4. *See supra* Conclusions of Law II.G.

¶369 Plaintiffs' Plan 2 includes the same split of the Huntsville subdivision. Tr.2 304:14-19 (Barber). Shown below, it splits communities in unincorporated areas of Oquirrh just outside West Jordan's and West Valley City's municipal limits. Tr.1 278:15-19 (Oskooii).



¶370 Plan 2 also "divides a major community of interest in Salt Lake County by splitting the six primary canyons that empty into the Salt Lake Valley among different districts." DX14 at 9 (Barber Initial Report); *see also* Utah Code §20A-19-103(3)(e).



¶371 Under this configuration, "City Creek Canyon is placed in District 2, while Emigration, Parley's, Millcreek, Big Cottonwood, and Little Cottonwood are placed in District 3." DX14 at 9 (Barber Initial Report). Salt Lake City is in District 2 while Emigration Canyon is in District 3. *Id.* "Similarly, Parley's and Millcreek Canyons are in District 3, but the communities at their mouths—Salt Lake City, Millcreek, and Holladay—are in District 2." *Id.*; Tr.2 305:20-307:7 (Barber) (observing that this configuration of the districts "scrambles representation").

¶372 The 2025 Plan, in contrast, joins "all six canyons with the east-bench communities at their base," "align[ing] a clear community of interest, streamlin[ing] transportation considerations, and assign[ing] responsibility for these important shared resources to a single representative." DX14 at 11 (Barber Initial Report).

¶373 Plaintiffs' Plan 2 also makes an "unusual decision" about how to "allocate[] the municipalities in Salt Lake County" and by so doing ignores Utah's natural boundaries. Tr.2 304:14-305:4 (Barber).

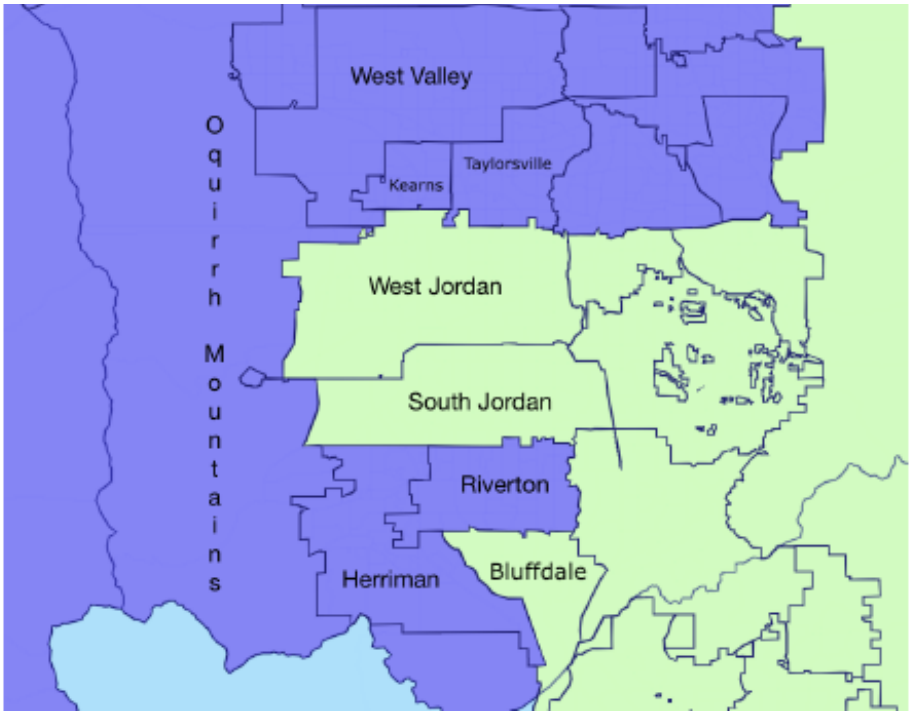
¶374 Plan 2 shifts Salt Lake City, Millcreek, and Holladay to District 2 and Bluffdale, West Jordan, South Jordan, and Midvale to District 3. Tr.1 239:21-240:6 (Oskooii) (explaining the changes made to create Plan 2). Dr. Oskooii's stated justification was that these shifts were the "least disruptive" way to achieve zero population deviation. Tr.1 240:9-10; *see also id.* 238:19-239:7 (explaining the rationale behind moving the Salt Lake Valley municipalities into separate districts).

¶375 But these changes can in no way be considered the "least disruptive" means of achieving equal population among districts. Plan 2 "reallocated about 500,000 people and created a somewhat oddly shaped treatment of the municipalities in Salt Lake County." Tr.2 309:23-310:4 (Barber). It was unnecessary to move half a million people—about 40% of Salt Lake County's population—to "equalize" population after resolving the Millcreek split.

¶376 Plaintiffs' Plan 2 also splits the community of interest comprising Herriman, Riverton, and Bluffdale, placing the first two in District 2 and Bluffdale in District 3. DX14 at 12 (Barber Initial Report). These three cities are in the same public school district and county council districts, Tr.1 274:23-275:23 (Oskooii), and otherwise "have much in common," facing

"similar issues such as rapid growth, traffic congestion, lack of infrastructure, and a perceived lack of county funding." DX14 at 12; Tr.2 304:20-305:14 (Barber) (explaining that the south-west cities have "similar interests" and are facing "similar issues" and sometimes "lobby together for county representation and county funding").

¶377 Further, the only way to travel from this community to and from the cities in the northern half of the Salt Lake Valley while staying in District 2 is via the unpopulated Oquirrh Mountain Range. DX14 at 12 (Barber Initial Report).

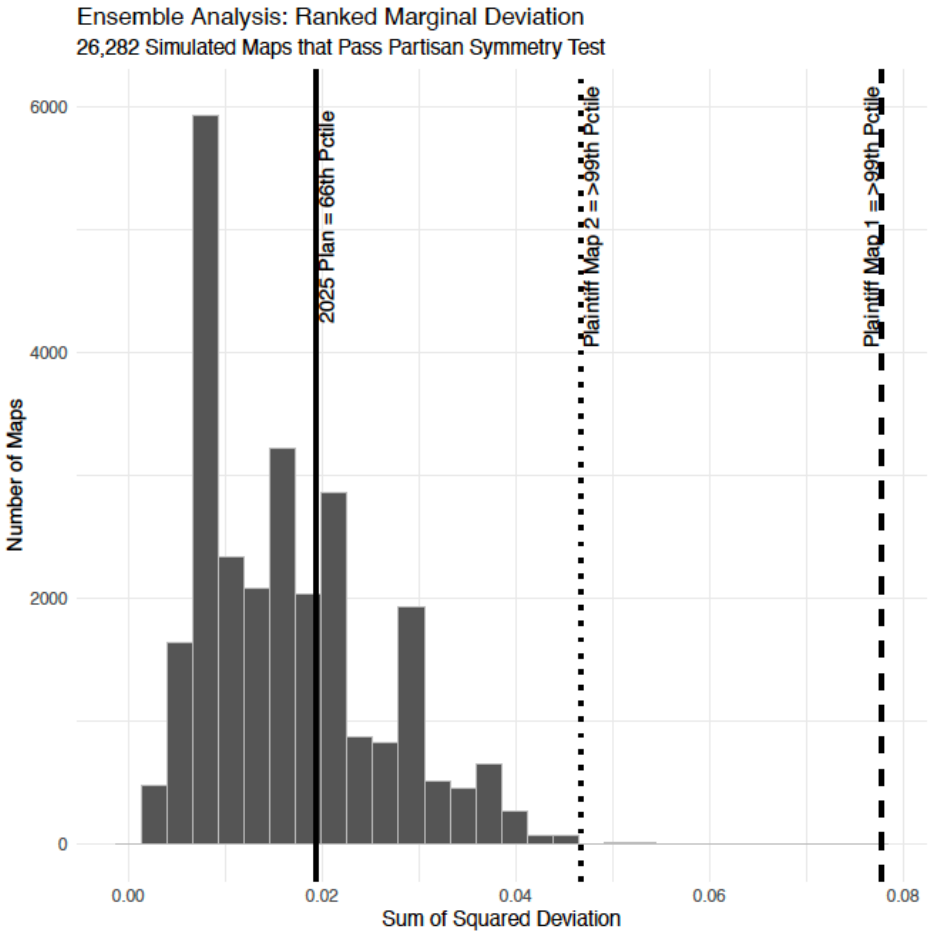


¶378 The 2025 Plan "takes a more coherent approach by grouping all of the cities of the west and south west side of Salt Lake Valley, that share many similar concerns, together." *Id.*

B. Plaintiffs' Plans fail the ensemble analysis.

¶379 The Legislature could not have enacted either of Plaintiffs' plans because each fails Proposition 4's requirement that a redistricting plan "not purposefully favor or disfavor a political party." Utah Code §20A-19-103(4)(b).

¶380 Under Utah law, a proposed redistricting plan fails the mandatory ensemble analysis if its Ranked Marginal Deviation score "is greater than the result … of 95% of the ensemble districts after culling the ensemble to include only redistricting plans that pass the partisan bias test." *Id.* §20A-19-103(1)(a)(iii)(B). Dr. Barber performed this analysis on Plaintiffs' plans, with the results shown below. DX14 at 27-28 (Barber Initial Report).



¶381 While the 2025 Plan sits at the 66th percentile, well within the range of neutral, symmetrical simulations, both of Plaintiffs' plans fall off the chart. *Id.*

¶382 Plan 2 resembles only a handful of over 26,000 maps passing the partisan symmetry requirement.[12]

¶383 Plan 1 is a more extreme outlier than any map in the simulation set. These maps fail the statutory ensemble analysis, providing evidence of an illegal intent to favor a political party.

C. Plaintiffs' Plans fail either the partisan bias test, the mean-median test, or both.

¶384 In addition, the Legislature could not have enacted Plaintiffs' Plan 1 because it fails the partisan bias test and, as a result, fails Proposition 4's partisan symmetry requirement.

¶385 Not only does Plan 1 fail the partisan bias test, but it fails "in every election across all three cycles, which indicates a persistent structural tilt under the 50-50 thought experiment." DX14 at 19 (Barber Initial Report). The reason for the dramatic asymmetry is that Plan 1 "'borrows' Democratic votes from that second most Democratic district in order to make a single more Democratic district initially." *Id.* It is undisputed that Plaintiffs' Plan 1 fails the partisan bias test. *See* PX3 ¶61 (Chen Initial Report).

¶386 While Plaintiffs' Plan 2 passes the partisan bias test with mixed results (failing the 2016 contests), it fails the mean-median test, as does Plaintiffs' Plan 1. DX14 at 22 (Barber Initial Report).

[12] Dr. Chen, when performing his own ensemble analysis, found that Plan 2 failed the RMD test. PX3 ¶57 (Chen Initial Report).

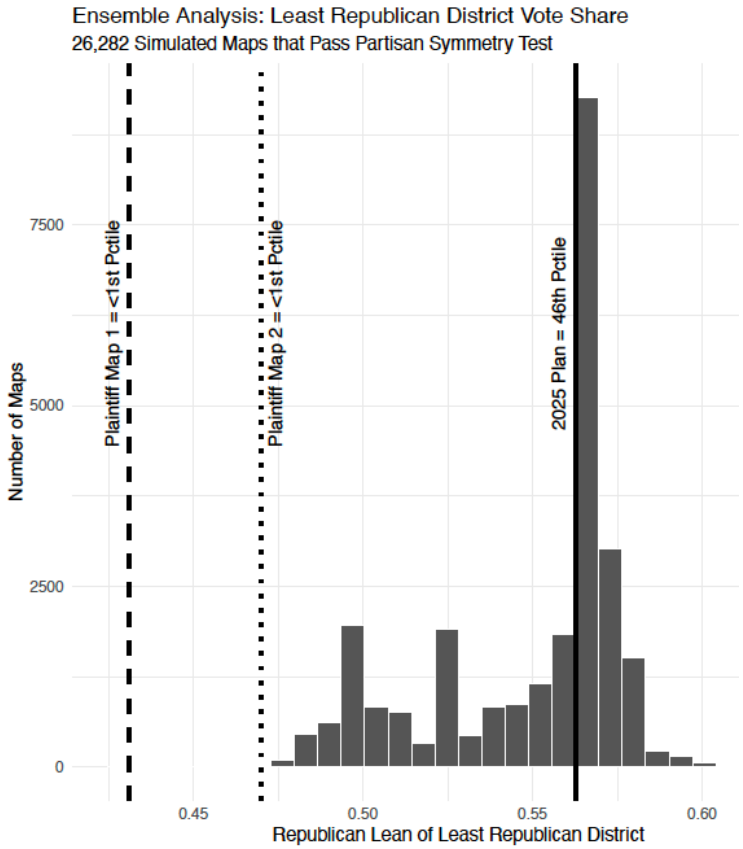
¶387 It is undisputed that Plaintiffs' plans fail the mean-median test. *See* PX3 ¶70 (Chen Initial Report).

¶388 Both plans fail under either of Dr. Barber's methods for calculating the mean-median difference. DX14 at 22 (Barber Initial Report). Compared to the 2025 Plan, which "performs the way a compliant plan should," Plaintiffs' Plan 1 "is a different story." *Id.* at 21. Each entry falls well outside the (-2, 2) range. All are "below -4.7 and many below -6.0." *Id.* There "is not a single election in which Map 1 satisfies the S.B. 1011 mean-median requirement." *Id.*

¶389 The "story" told by these persistently and dramatically failing scores is that Plan 1 "'packs' Republicans into three overwhelmingly Republican districts in order to make a safely Democratic district," which "has the effect of pushing up the median district (the midpoint between the second and third districts in a 4 district play), and therefore lowering the mean-median score." *Id.* The Legislature could not enact this "partisan outlier" that "categorically" fails the mean-median measure of partisan symmetry. *Id.* Plaintiffs' Plan 2 likewise "fails the test" with its -2.38 score, exhibiting a lack of partisan symmetry and, accordingly, undue favor for a partisan outcome. *Id.*; *see also* Utah Code §20A-19-103(4)(a), (c).

D. Plaintiffs' Plans resemble partisan gerrymanders under Plaintiffs' preferred tests.

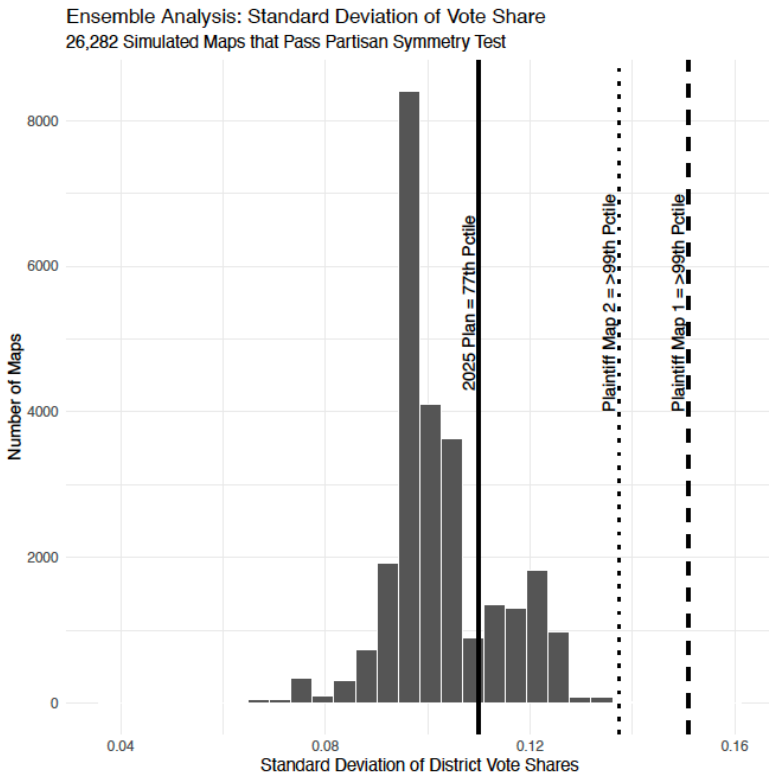
¶390 Again, Plaintiffs' own preferred alternative tests for partisan symmetry are irrelevant. But even if they applied, those tests show that Plaintiffs' plans are partisan outliers when held up against neutral simulation ensembles.



¶391 First, **Least Republican Vote Share**. A Republican-leaning "least-Republican" district is far from unusual in the context of Utah's congressional districts. DX14 at 30 (Barber Initial Report).

¶392 In fact, the least-Republican district in the overwhelming majority of Dr. Barber's simulated plans (93.5%) that pass the partisan bias test leans Republican. *Id.* What *is* unusual are Plaintiffs' Democratic-leaning "least-Republican" districts. Shown above, just a few, if any, non-biased simulations contain a least-Republican district as Democratic-leaning as Plaintiffs'.

¶393 Under Plaintiffs' plans, Republicans are packed into three districts in order to "construct a single Democratic seat." *Id.* at 6.



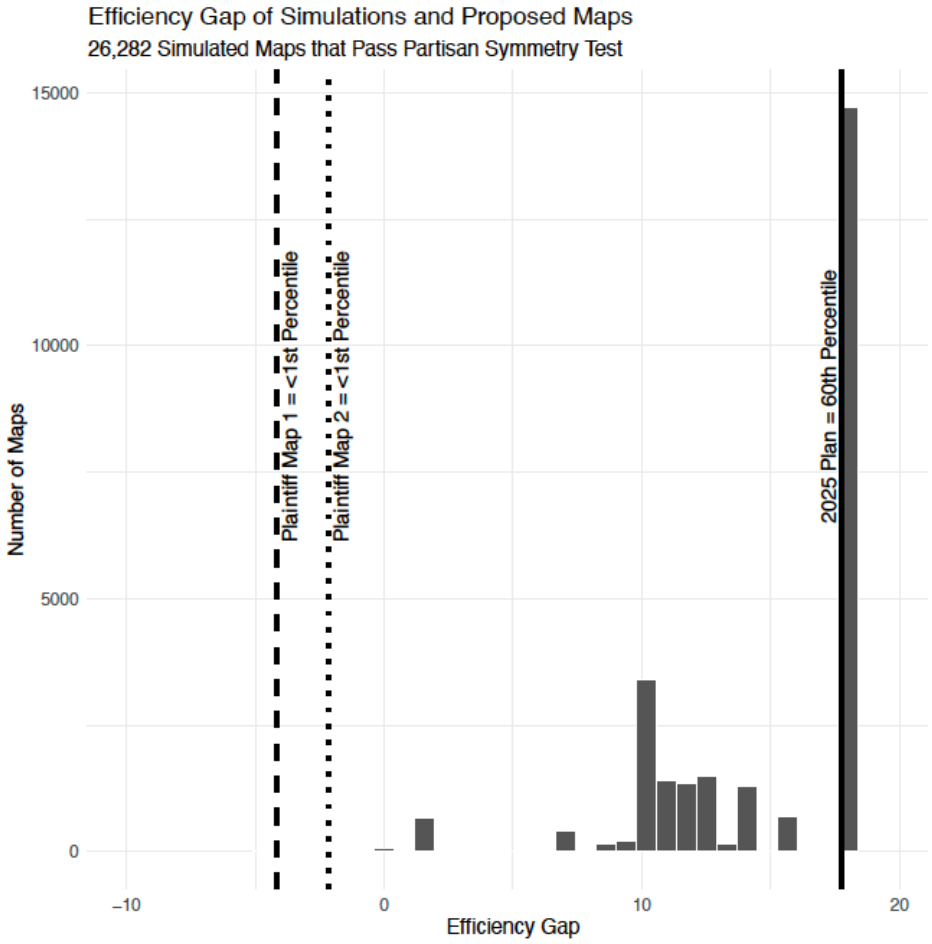
¶394 Next, **Standard Deviation of Vote Shares**. Extremely low SDVS scores demonstrate a cracking scheme, while higher values are "a signature of packing." *Id.* at 34.

¶395 In Utah's congressional context, a "plan that placed as many members of the majority party into three districts to create a district that was favorable to the minority party would exhibit an unusually high standard deviation of vote shares." *Id.*

¶396 Here Plaintiffs' plans bear the signature mark of a packing scheme. When compared against 26,282 politically neutral plans that pass the partisan bias test, both of Plaintiffs' plans fall above the 99th percentile.

¶397 This pattern "is consistent with packing Republicans into three districts to manufacture an anomalously low, Democratic-leaning fourth district," which "inflates that standard deviation of vote shares." *Id.*

¶398 The 2025 Plan, in contrast "does not show either a low-variance cracking or high-variance packing pattern." *Id.*



¶399 Finally, **Efficiency Gap**. Plaintiffs' Plans are extreme outliers under the Efficiency Gap test when compared to over 25,000 symmetrical simulations. *Id.* at 43. Nearly 15,000 of these neutral maps align with the 2025 Plan's EG, yet "only a handful of the thousands of maps … resemble Plaintiffs Maps 1 and 2." *Id.* at 42.

¶400 In fact, proving just how unreliable and inapplicable EG is to Utah's congressional districts is the fact that the vast majority of these simulated maps have an EG of 10% or higher. If a passing EG "threshold" is somewhere around 8%, *id.* at 39, then the deployment

of this metric in this context is nothing less than a means of ensuring that whatever EG-compliant map passes is all but guaranteed to have partisan bias.

¶401 In sum, the 2025 Plan does not purposefully or unduly favor any partisan outcome. But Plaintiffs' plans do purposefully or unduly favor a partisan outcome.

¶402 "[U]sing the methods the statute names as well as those requested by Plaintiffs, the 2025 Plan is not a partisan outlier nor shows signs of undue political favoritism to one political party." *Id.* at 6. The 2025 Plan passes every test; Plaintiffs' plans fail them all.

CONCLUSION

This Court should adopt the Legislative Defendants' proposed findings of fact and conclusions of law, deny the preliminary injunction, and enter an order directing the Lieutenant Governor to conduct the 2026 elections using the 2025 Plan.

Dated: November 6, 2025

Respectfully submitted,

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CERTIFICATE OF SERVICE

I filed this brief on the Court's electronic filing system, which will email everyone requiring notice.

Dated: November 6, 2025

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