No. _____

In the Supreme Court of the United States

THE WISCONSIN LEGISLATURE, BILLIE JOHNSON, ERIC O'KEEFE, ED PERKINS, AND RONALD ZAHN,

Applicants,

v.

MARGE BOSTELMANN IN HER OFFICIAL CAPACITY AS MEMBER OF THE WISCONSIN ELECTIONS COMMISSION, ET AL.

Respondents.

ON APPLICATION FOR STAY AND INJUNCTIVE RELIEF AND ALTERNATIVE PETITION FOR WRIT OF CERTIORARI TO THE SUPREME COURT OF WISCONSIN

APPENDIX TO EMERGENCY APPLICATION FOR STAY – VOL. II

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TABLE OF CONTENTS

Volume I

Volume II

Expert Report in Support of Governor Evers's Proposed District Plans

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December 15, 2021

1 Introduction

I am a Professor in the Department of Mathematics at the University of Colorado Boulder. Much of my research over the course of my career concerns differential geometry and applications of geometry to the study of partial differential equations. My more recent research focuses on mathematical analysis of redistricting, particularly on the use of ensemble analysis. My work includes both theoretical aspects related to the development of algorithms for sampling district plans to create ensembles and applications to identifying district plans with extreme properties. In addition to my academic work, I have conducted expert work using ensemble analysis to analyze district plans for the Colorado Independent Legislative Redistricting Commission ([1], [2]). My CV is attached to this report, and it contains a list of all my publications from the past 10 years.

I have been retained to evaluate the Governor's proposed district plans for the Wisconsin State Assembly, the Wisconsin State Senate, and the U.S. House of Representatives (a.k.a. "Congress"), regarding their statistical properties. At times, the statistical properties of the Governor's plans will be compared to the plans enacted in 2011 and/or the plans recently passed by the Wisconsin State Legislature in Legislative Bills SB 621 and SB 622, referred to throughout this report as the SB 621 and SB 622 plans.

2 Executive Summary

I analyzed the Governor's plans for population equality, core population movement (a way to measure least changes), disenfranchisement (another measure for least changes), majority-minority districts, compactness, and split geographies. In this section I will summarize my findings. More details regarding my findings are contained in Section 3, and details regarding my data sources and methodology are contained in Section 4.

2.1 Population Deviation

According to the 2020 Census, Wisconsin's total population is 5,893,718. Since Wisconsin has 99 State Assembly districts, 33 State Senate districts, and 8 Congressional districts, the ideal district populations are 59,533 for State Assembly districts, 178,598 for State Senate districts, and 736,715 for Congressional districts.

For the Governor's State Assembly plan, the mean deviation from the ideal population is 281 persons, or 0.47% of the ideal population. The largest deviation is 584 persons, or 0.98% of the ideal population. This means that all districts are within 1% of the ideal population, ranging from 0.90% below to 0.98% above the ideal population.

For the Governor's State Senate plan, the mean deviation from the ideal population is 450 persons, or 0.25% of the ideal population. The largest deviation is 1,112 persons, or 0.62% of the ideal population. This means that all districts are within 1% of the ideal population, ranging from 0.57% below to 0.62% above the ideal population.

For the Governor's Congressional plan, the mean deviation from the ideal population is 0.5 persons, or 0.00% of the ideal population. The largest deviation is 1 person, with all districts ranging from 1 person below to 1 person above the ideal population.

2.2 Core Population Movement

Core population movement measures the number of persons who are moved to a different district when redistricting takes place, i.e., persons whose district number in the 2011 enacted plan is different from their district number in the new plan.

The computation of this number is complicated by the fact that the 2011 enacted districts were based on 2010 Census geographies, while proposed plans for new districts are based on 2020 Census geographies. Specifically, all proposed new plans are constructed by assigning each 2020 Census block to a unique district in the plan. Unfortunately, 2020 Census blocks do not line up neatly with 2011 enacted districts, and in cases where a 2020 Census block intersects more than one 2011 district, a choice must be made about which 2011 district to assign that block to.

Both the U.S. Census Bureau and the Legislative Technology Services Bureau (LTSB) of the State of Wisconsin have published assignments of 2020 Census blocks to 2011 enacted districts, and there are minor discrepancies between them whose source I was not able to determine. These discrepancies in turn produce minor discrepancies in the computations of core population movement and other measures for the 2011 enacted plans, depending on which assignment is used for the 2011 enacted districts.

Depending on which block assignment is used for the 2011 enacted plan, the Governor's State Assembly plan has core population movement of 835,316 persons, representing 14.17% of the

population (Census Bureau data) or 837,659 persons, representing 14.21% of the population (LTSB data). For comparison, the State Assembly plan in SB 621 has core population movement of 933,907 persons, representing 15.85% of the population (Census Bureau data) or 933,604 persons, representing 15.84% of the population (LTSB data).

The Governor's State Senate plan has core population movement of 458,750 persons, representing 7.78% of the population (Census Bureau data) or 461,228 persons, representing 7.83% of the population (LTSB data). For comparison, the State Senate plan in SB 621 has core population movement of 459,322 persons, representing 7.79% of the population (Census Bureau data) or 459,061 persons, representing 7.79% of the population (LTSB data).

The Governor's Congressional plan has core population movement of 322,362 persons, representing 5.47% of the population (Census Bureau data) or 324,415 persons, representing 5.50% of the population (LTSB data). For comparison, the Congressional plan in SB 622 has core population movement of 381,833 persons, representing 6.48% of the population (Census Bureau data) or 384,456 persons, representing 5.62% of the population (LTSB data).

Additionally, there are 13 State Assembly districts (Districts 1, 27, 28, 32, 43, 52, 58, 60, 61, 63, 74, 91, and 92) in the Governor's plan that are unchanged from the corresponding 2011 State Assembly district (in the sense that zero persons are moved either in or out of the district), based on 2020 Census data and the Census Bureau's assignment of 2020 Census blocks to 2011 enacted districts.[1]

2.3 Disenfranchised Population

Disenfranchised population measures the number of persons from odd-numbered State Senate districts who are moved to even-numbered State Senate districts. These voters would have been eligible to vote in a State Senate election in 2022 if they had not been moved, but they will now not be able to vote in a State Senate election until 2024.

The computation of this number is affected by the same ambiguity in the assignment of 2020 Census blocks to 2011 enacted districts described in the previous section.

The Governor's State Senate plan has disenfranchised population of 138,824 persons, representing 2.36% of the population (Census Bureau data) or 139,677 persons, representing 2.37% of the population (LTSB data). For comparison, the State Senate Plan in SB 621 has disenfranchised population of 138,732 persons, representing 2.35% of the population (Census Bureau data) or 138,753 persons, representing 2.35% of the population (LTSB data).

[1]The software used to draw the Governor's plans contained the Census Bureau's block assignment data, and these plans were designed to minimize core population movement accordingly. When recomputed with respect to the LTSB block assignment data, a total of 456 persons are moved either into or out of these 13 districts.

2.4 Majority-Minority Districts

In this section I will report on statistics for the districts in the Governor's plans with majority total minority (i.e., Non-White) Voting Age Population (NWVAP), as well as for districts with majority Black Voting Age Population (BVAP) and majority Hispanic Voting Age Population (HVAP). Statistics for the plans in SB 621 and SB 622 are also included for comparison.

2.4.1 Majority NWVAP Districts

The Governor's State Assembly plan contains 10 districts with at least 50% NWVAP, with the NWVAP percentages of these districts ranging from 51.02% to 81.82%. For comparison, the State Assembly plan in SB 621 contains 9 districts with at least 50% NWVAP, with the NWVAP percentages of these districts ranging from 50.34% to 85.52%.

The Governor's State Senate plan contains 3 districts with at least 50% NWVAP, with the NWVAP percentages of these districts ranging from 60.07% to 62.49%. For comparison, the State Senate plan in SB 621 also contains 3 districts with at least 50% NWVAP, with the NWVAP percentages of these districts ranging from 60.18% to 70.29%.

The Governor's Congressional plan contains 1 district with at least 50% NWVAP, and this district has 52.95% NWVAP. For comparison, the Congressional plan in SB 622 also contains 1 district1 with at least 50% NWVAP, and this district has 52.45% NWVAP.

2.4.2 Majority BVAP Districts

There are differing opinions as to how to compute Black Voting Age Population (BVAP), and in this report I consider two different values based on the following choices:

1. (more inclusive) Black alone or in combination with any number of other races, including Hispanic, referred to here as BVAP1;
2. (less inclusive) non-Hispanic Black alone or non-Hispanic (Black + White) alone, referred to here as BVAP2.

Here I will report statistics for BVAP1; statistics for BVAP2 are included in Section 3.

The Governor's State Assembly plan contains 7 districts with at least 50% BVAP1, with the BVAP1 percentages of these districts ranging from 50.09% to 51.39%. For comparison, the State Assembly plan in SB 621 contains 5 districts with at least 50% BVAP1, with the BVAP1 percentages of these districts ranging from 52.57% to 73.28%.

The Governor's State Senate plan contains 2 districts with at least 50% BVAP1, with the BVAP1 percentages of these districts ranging from 50.33% to 50.62%. For comparison, the State Senate

plan in SB 621 also contains 2 districts with at least 50% BVAP1, with the BVAP1 percentages of these districts ranging from 56.13% to 58.76%.

Neither Congressional plan contains any districts with at least 50% BVAP1.

2.4.3 Majority HVAP Districts

The Governor's State Assembly plan contains 2 districts with at least 50% HVAP, with the HVAP percentages of these districts ranging from 52.11% to 66.56%. For comparison, the State Assembly plan in SB 621 also contains 2 districts with at least 50% HVAP, with the HVAP percentages of these districts ranging from 52.96% to 65.90%.

Neither State Senate or Congressional plan contains any districts with at least 50% HVAP.

2.5 Compactness

District **compactness** refers to the idea that a district should not be too "spread out." There is no single measure that adequately defines this concept, but the two most commonly reported measures are the **Polsby-Popper** score and the **Reock** score. It should be emphasized that both of these scores are very sensitive to differences in map projections and resolutions. See Section 4 for details of how I performed these computations.

A discrete alternative proposed by Duchin and Tenner in [3] is the **cut edges** score, which counts the number of adjacent pairs of Census blocks that lie in different districts. This number may be thought of as a discrete analog of the total perimeter of all district boundaries. Unlike the other two scores, it is not sensitive to map projections. It also has the additional feature that, since Census blocks tend to have shorter perimeter in more densely populated areas, it more closely models the number of **persons** who live near district boundaries rather than the physical lengths of the district boundaries.

For the Governor's State Assembly plan, Polsby-Popper scores range from 0.056 to 0.523, with a mean of 0.251. Reock scores range from 0.147 to 0.652, with a mean of 0.397. This plan contains 18,441 cut edges. These numbers are similar to those in the 2011 enacted plan.

For the Governor's State Senate plan, Polsby-Popper scores range from 0.053 to 0.433, with a mean of 0.217. Reock scores range from 0.135 to 0.607, with a mean of 0.392. This plan contains 11,147 cut edges. These numbers are similar to those in the 2011 enacted plan.

For the Governor's Congressional plan, Polsby-Popper scores range from 0.127 to 0.397, with a mean of 0.243. Reock scores range from 0.334 to 0.599, with a mean of 0.458. This plan contains 3,774 cut edges. These numbers are similar to those in the 2011 enacted plan.

2.6 Split Geographies

County splits measure the number of counties that are split between two or more districts, and **municipal splits** measure the number of municipalities (cites, towns, or villages) that are split between two or more districts.

The Governor's State Assembly plan splits 53 counties and 174 municipalities. For comparison, the 2011 enacted plan splits 58 counties and either 188 or 125 municipalities, depending on which 2020 Census block assignment is used.

The Governor's State Senate plan splits 45 counties and 118 municipalities. For comparison, the 2011 enacted plan splits 46 counties and either 123 or 84 municipalities, depending on which 2020 Census block assignment is used.

The Governor's Congressional plan splits 12 counties and 47 municipalities. For comparison, the 2011 enacted plan splits 12 counties and either 57 or 51 municipalities, depending on which 2020 Census block assignment is used.

3 Detailed Analysis

In this section I will present my detailed findings regarding population deviation, core population movement, disenfranchised population, majority-minority districts, compactness, and split geographies for each of the Governor's plans. Details regarding my data sources and methodology are contained in Section 4.

3.1 Population Deviation

According to the 2020 Census, Wisconsin's total population is 5,893,718. Since Wisconsin has 99 State Assembly districts, 33 State Senate districts, and 8 Congressional districts, the ideal district populations are 59,533 for State Assembly districts, 178,598 for State Senate districts, and 736,715 for Congressional districts.

Tables 1, 2, and 3 show the mean, maximum positive/negative, and overall deviations from these ideal populations for each of the Governor's plans, in both absolute and percentage terms.

State Assembly	Governor's Plan	
Deviation from Ideal Population	Persons	Percentage
Mean Deviation	281	0.47%
Largest Positive Deviation	584	0.98%
Largest Negative Deviation	−537	−0.90%
Overall Range in Deviation	± 1,121	±1.88%

Table 1: Population Deviation for Governor's State Assembly District Plan

State Senate	Governor's Plan	
Deviation from Ideal Population	Persons	Percentage
Mean Deviation	450	0.25%
Largest Positive Deviation	1,112	0.62%
Largest Negative Deviation	−1026	−0.57%
Overall Range in Deviation	± 2,138	± 1.19%

Table 2: Population Deviation for Governor's State Senate District Plan

U.S. Congress	Governor's Plan	
Deviation from Ideal Population	Persons	Percentage
Mean Deviation	0.5	0.00%
Largest Positive Deviation	1	0.00%
Largest Negative Deviation	−1	0.00%
Overall Range in Deviation	± 2	±0.00%

Table 3: Population Deviation for Governor's Congressional District Plan

3.2 Core Population Movement

Core population movement measures the number of persons who are moved to a different district when redistricting takes place, i.e., persons whose district number in the 2011 enacted plan is different from their district number in the new plan.

The computation of this number is complicated by the fact that the 2011 enacted districts were based on 2010 Census geographies, while proposed plans for new districts are based on 2020 Census geographies. Specifically, all proposed new plans are constructed by assigning each 2020 Census block to a unique district in the plan. Unfortunately, 2020 Census blocks do not line up neatly with 2011 enacted districts, and in cases where a 2020 Census block intersects more than one 2011 district, a choice must be made about which 2011 district to assign that block to. There are multiple options for how to make this choice, e.g., assigning a block to the district that contains its

centroid, assigning a block to the district that it overlaps with the greatest area, assigning a block to the district that contains the largest percentage of its population, etc. Further complicating this question is that computations of centroids and areas are sensitive to map projections, so algorithms that start with different map projections may end up assigning some blocks to different districts, even if they use the same algorithm in both cases.

Both the U.S. Census Bureau and the Legislative Technology Services Bureau (LTSB) of the State of Wisconsin have published assignments of 2020 Census blocks to 2011 enacted districts, and there are minor discrepancies between them whose source I was not able to determine. These discrepancies in turn produce minor discrepancies in the computations of core population movement, depending on which assignment is used for the 2011 enacted districts. Total core population movement values for each of the Governor's plans relative to both versions of the 2011 enacted plans, in both absolute and percentage terms, are shown in Tables 4 and 5, along with data for the plans in SB 621 and SB 622 to provide context.

	Governor's Plan		SB 621/622 Plans	
Core Population Movement	Persons	Percentage	Persons	Percentage
State Assembly Plans	835,316	14.17%	933,907	15.85%
State Senate Plans	458,750	7.78%	459,322	7.79%
Congressional Plans	322,362	5.47%	381,833	6.48%

Table 4: Core Population Movement for All District Plans (Census Bureau Data)

	Governor's Plan		SB 621/622 Plans	
Core Population Movement	Persons	Percentage	Persons	Percentage
State Assembly Plans	837,659	14.21%	933,604	15.84%
State Senate Plans	461,228	7.83%	459,061	7.79%
Congressional Plans	324,415	5.50%	384,456	6.52%

Table 5: Core Population Movement for All District Plans (LTSB data)

Additionally, there are 13 State Assembly districts (Districts 1, 27, 28, 32, 43, 52, 58, 60, 61, 63, 74, 91, and 92) in the Governor's plan that are unchanged from the corresponding 2011 State Assembly district (in the sense that zero persons are moved either in or out of the district), based on 2020 Census data and the Census Bureau's assignment of 2020 Census blocks to 2011 enacted districts.[2]

[2]The software used to draw the Governor's plans contained the Census Bureau's block assignment data, and these plans were designed to minimize core population movement accordingly. When recomputed with respect to the LTSB block assignment data, a total of 456 persons are moved either into or out of these 13 districts.

3.3 Disenfranchised Population

Disenfranchised population measures the number of persons from odd-numbered State Senate districts who are moved to even-numbered State Senate districts. These voters would have been eligible to vote in a State Senate election in 2022 if they had not been moved, but they will now not be able to vote in a State Senate election until 2024.

The computation of this number is affected by the same ambiguity in the assignment of 2020 Census blocks to 2011 enacted districts described in the previous section. The disenfranchised population for the Governor's State Senate plan relative to both versions of the 2011 enacted plan, in both absolute and percentage terms, is shown in Tables 6 and 7, along with data for the plan in SB 621 to provide context.

	Governor's Plan		SB 621 Plan	
Disenfranchised Population	Persons	Percentage	Persons	Percentage
State Senate Plans	138,824	2.36%	138,732	2.35%

Table 6: Disenfranchised Population for State Senate District Plans (Census Bureau Data)

	Governor's Plan		SB 621 Plan	
Disenfranchised Population	Persons	Percentage	Persons	Percentage
State Senate Plans	139,677	2.37%	138,753	2.35%

Table 7: Disenfranchised Population for State Senate District Plans (LTSB data)

3.4 Majority-Minority Districts

In this section I will report on statistics for the districts in the Governor's plans with majority total minority (i.e., Non-White) Voting Age Population (NWVAP), as well as for districts with majority Black Voting Age Population (BVAP) and majority Hispanic Voting Age Population (HVAP). Statistics for the plans in SB 621 and SB 622 are also included for comparison.

3.4.1 Majority NWVAP Districts

Tables 8, 9, and 10 show all districts in each of the Governor's plans with Non-White Voting Age Populations of at least 50%, ranked in order of highest to lowest NWVAP, along with analogous data for the plans in SB 621 and SB 622 to provide context.

State Assembly	Governor's Plan		SB 621 Plan	
District rank	District	NWVAP%	District	NWVAP%
1	8	81.82%	11	85.52%
2	9	68.04%	8	80.16%
3	16	65.15%	17	70.90%
4	12	63.91%	12	70.31%
5	18	63.41%	9	69.02%
6	11	61.76%	16	67.97%
7	14	61.75%	18	63.93%
8	10	60.28%	10	56.42%
9	17	58.81%	66	50.34%
10	66	51.02%		

Table 8: Districts with at least 50% NWVAP in State Assembly District Plans

State Senate	Governor's Plan		SB 621 Plan	
District rank	District	NWVAP%	District	NWVAP%
1	6	62.49%	4	70.29%
2	4	61.96%	6	67.6%
3	3	60.07%	3	60.18%

Table 9: Districts with at least 50% NWVAP in State Senate District Plans

U.S. Congress	Governor's Plan		SB 622 Plan	
District rank	District	NWVAP%	District	NWVAP%
1	4	52.95%	4	52.45%

Table 10: Districts with at least 50% NWVAP in Congressional District Plans

3.4.2 Majority BVAP Districts

There are differing opinions as to how to compute Black Voting Age Population (BVAP), and here I will consider two different values based on the following choices:

1. (more inclusive) Black alone or in combination with any number of other races, including Hispanic, referred to here as BVAP1;
2. (less inclusive) non-Hispanic Black alone or non-Hispanic (Black + White) alone, referred to here as BVAP2.

All districts that have at least 50% BVAP under the more inclusive version (BVAP1) are included

here. Tables 11 and 12 show all districts in the Governor's State Assembly and State Senate plans with Black Voting Age Populations of at least 50%, ranked in order of highest to lowest BVAP1, along with analogous data for the plans in SB 621 to provide context. (There are no such districts in either Congressional plan.)

State Assembly	Governor's Plan			SB 621 Plan		
District rank	District	BVAP1%	BVAP2%	District	BVAP1%	BVAP2%
1	10	51.39%	49.99%	11	73.28%	71.47%
2	14	50.85%	49.48%	17	61.81%	60.18%
3	18	50.63%	48.88%	12	57.01%	55.49%
4	17	50.29%	48.89%	16	54.13%	52.58%
5	12	50.24%	48.74%	18	52.57%	50.80%
6	11	50.21%	48.91%			
7	16	50.09%	48.51%			

Table 11: Districts with at least 50% BVAP1 in State Assembly District Plans

State Senate	Governor's Plan			SB 621 Plan		
District rank	District	BVAP1%	BVAP2%	District	BVAP1%	BVAP2%
1	4	50.62%	49.22%	4	58.76%	57.18%
2	6	50.33%	48.76%	6	56.13%	54.49%

Table 12: Districts with at least 50% BVAP1 in State Senate District Plans

3.4.3 Majority HVAP Districts

Table 13 shows all districts in the Governor's State Assembly plan with Hispanic Voting Age Populations of at least 50%, ranked in order of highest to lowest HVAP, along with analogous data for the plan in SB 621 to provide context. (There are no such districts in either State Senate or Congressional plans.)

State Assembly	Governor's Plan		SB 621 Plan	
District rank	District	HVAP%	District	HVAP%
1	8	66.56%	8	65.90%
2	9	52.11%	9	52.96%

Table 13: Districts with at least 50% HVAP in State Assembly District Plans

3.5 Compactness

District **compactness** refers to the idea that a district should not be too "spread out." There is no single measure that adequately defines this concept, but the two most commonly reported measures are the **Polsby-Popper** score and the **Reock** score.

The Polsby-Popper score measures the ratio of a district's area to the square of its perimeter, multiplied by 4π. The possible values for this score range from 0 to 1, with a "perfect" compactness score of 1 achieved exactly when the district's boundary is a perfect circle.

The Reock score measures the ratio of a district's area to the area of the smallest circle that completely contains the district. As for Polsby-Popper, the possible values for this score range from 0 to 1, with a "perfect" compactness score of 1 achieved exactly when a district's boundary is a perfect circle.

It should be emphasized that both of these scores are very sensitive to differences in map projections and resolutions. See Section 4 for details of how I performed these computations.

A discrete alternative proposed by Duchin and Tenner in [3] is the **cut edges** score, which counts the number of adjacent pairs of Census blocks that lie in different districts. This number may be thought of as a discrete analog of the total perimeter of all district boundaries. Unlike the other two scores, it is not sensitive to map projections. It also has the additional feature that, since Census blocks tend to have shorter perimeter in more densely populated areas, it more closely models the number of **persons** who live near district boundaries rather than the physical lengths of the district boundaries.

All three of these scores for each of the Governor's plans are shown in Tables 14, 15, and 16, along with the values for both versions of the 2011 enacted plans for comparison. Note that Polsby-Popper and Reock scores are computed for each individual district, while the cut edges score is a single score for an entire district plan.

State Assembly	2011 Plan (Census)			2011 Plan (LTSB)			Governor's Plan		
Compactness Scores	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
Polsby-Popper	0.260	0.562	0.050	0.260	0.562	0.048	0.251	0.523	0.056
Reock	0.396	0.664	0.147	0.390	0.664	0.147	0.397	0.652	0.147
Cut Edges	19,001			18,994			18,441		

Table 14: Compactness Scores for State Assembly District Plans

State Senate	2011 Plan (Census)			2011 Plan (LTSB)			Governor's Plan		
Compactness Scores	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
Polsby-Popper	0.230	0.465	0.055	0.230	0.464	0.053	0.217	0.433	0.053
Reock	0.405	0.667	0.128	0.402	0.667	0.128	0.392	0.607	0.135
Cut Edges	10,998			10,928			11,147		

Table 15: Compactness Scores for State Senate District Plans

U.S. Congress	2011 Plan (Census)			2011 Plan (LTSB)			Governor's Plan		
Compactness Scores	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
Polsby-Popper	0.214	0.432	0.118	0.209	0.432	0.118	0.243	0.397	0.127
Reock	0.440	0.537	0.302	0.440	0.537	0.302	0.458	0.599	0.334
Cut Edges	4,218			4,293			3,774		

Table 16: Compactness Scores for Congressional District Plans

3.6 Split Geographies

County splits measure the number of counties that are split between two or more districts, and **municipal splits** measure the number of municipalities (cites, towns, or villages) that are split between two or more districts. The numbers of county and municipal splits for each of the Governor's plans are shown in Tables 17 and 18, along with the values for both versions of the 2011 enacted plans for comparison.

Note that both versions of the 2011 enacted plans are in agreement regarding the numbers of county splits, but they are strikingly different regarding the numbers of municipal splits. See Section 4 for details of how I performed these computations.

County Splits	2011 Plan (Census)	2011 Plan (LTSB)	Governor's Plan
State Assembly	58	58	53
State Senate	46	46	45
U.S. Congress	12	12	12

Table 17: County Splits for All District Plans

Municipal Splits	2011 Plan (Census)	2011 Plan (LTSB)	Governor's Plan
State Assembly	188	125	174
State Senate	123	84	118
U.S. Congress	57	51	47

Table 18: Municipal Splits for All District Plans

4 Data and Methodology

4.1 Data Sources

My analysis is based on the following data:

- A shapefile for 2020 Census blocks, including the U.S. Census Bureau's 2020 PL 94-171 Population data and the Census Bureau's assignments of 2020 Census blocks to 2011 enacted districts, obtained from the Redistricting Data Hub at https://redistrictingdatahub.org;
- A shapefile for 2020 Census blocks without water, including assignments of 2020 Census blocks to counties, municipalities and 2011 enacted districts, obtained from the Legislative Technology Services Bureau (LTSB) of the State of Wisconsin's Open Data Page web page at https://legis.wisconsin.gov/ltsb/gis/data/;
- 2020 Census block assignment files for Governor Evers's proposed district plans for the U.S. House of Representatives, the Wisconsin State Assembly, and the Wisconsin State Senate;
- 2020 Census block assignment files for district plans for the U.S. House of Representatives, the Wisconsin State Assembly, and the Wisconsin State Senate recently passed by the Wisconsin State Legislature in Legislative Bills SB 622 and SB 621.

By matching Census blocks according to their unique identifiers (called variously "GEOID20" or "BLOCKID"), I combined all of these files into a single shapefile containing all relevant data to use for my analysis.

In the Census Bureau shapefile, the 2011 enacted plan assignments are encoded in the fields "SLDL18" for the State Assembly plan, "SLDU18" for the State Senate plan, and "CD116" for the Congressional plan. In the LTSB shapefile, the 2011 enacted plan assignments are encoded in the fields "ASM" for the State Assembly plan, "SEN" for the State Senate plan, and "CON" for the Congressional plan. There are minor discrepancies between these two shapefiles regarding the 2020 Census block assignments to the 2011 enacted plans. These discrepancies in turn create discrepancies between the values computed for core population movement, disenfranchised population, compactness measures, and split geographies for the 2011 enacted plans, depending on which version is used. I was not able to determine the source of the discrepancies.

4.2 Methodology

4.2.1 Population Deviation

District populations for all plans were computed by summing the values for the PL 94-171 category "P0010001" (Total Population) over all the 2020 Census blocks assigned to each district. (This produces exactly the same results as summing the "PERSONS" category from the LTSB shapefile.)

4.2.2 Core Population Movement and Disenfranchised Population

Core population movement for each district plan was computed by summing the values for the PL 94-171 category "P0010001" (Total Population) over all the 2020 Census blocks for which the assigned district number for that plan differed from the assigned district number for the corresponding 2011 enacted plan.

In a similar fashion, disenfranchised population for each district plan was computed by summing the values for the PL 94-171 category "P0010001" (Total Population) over all the 2020 Census blocks for which the assigned State Senate district number in the 2011 enacted plan is odd and the assigned State Senate district number in the new plan is even.

4.2.3 Majority-Minority Districts

- Non-White Voting Age Population (NWVAP) was computed as the difference of Total Voting Age Population (PL 94-171 category P0030001, or "PERSONS18" in the LTSB shapefile) minus non-Hispanic, White-only Voting Age Population (PL 94-171 category P0040005, or "WHITE18" in the LTSB shapefile).
- Black Voting Age Population (BVAP) was computed in two ways:
    1. ("BVAP1") As the sum of all PL 94-171 categories including Black Voting Age Population plus any other combination of races, without regard to ethnicity. There are 32 PL 94-171 categories included in this sum.
    2. ("BVAP2") The sum of PL 94-171 categories P0040006 (Non-Hispanic, Black-only Voting Age Population) and P0040013 (Non-Hispanic, (Black + White) only Voting Age Population). This sum is represented as "BLACK18" in the LTSB shapefile.
- Hispanic Voting Age Population (HVAP) is PL 94-171 category P0040002, or "HISPANIC18" in the LTSB shapefile.

District-based population percentages for each of these groups were computed by calculating the ratio of the population of that group to the total Voting Age Population (PL 94-171 category P0030001, or "PERSONS18" in the LTSB shapefile) in each district.

4.2.4 Compactness

Polsby-Popper scores for each district were computed from district shapes rendered in the map projection used in the LTSB shapefile using the built-in updater for this purpose that is included in the open-source Python package "Gerrychain," available from https://github.com/mggg/GerryChain.

Reock scores for each district were computed from district shapes rendered in the map projection used in the LTSB shapefile using open-source Python code, available from https://github.com/mggg/plan-evaluation-processing/tree/main/evaltools/geography.

Cut edges scores for each district plan were computed using the built-in updater for this purpose that is included in Gerrychain.

4.2.5 Split Geographies

The LTSB shapefile assigns each Census block to a unique county under the field "CNTY_FIPS" and to a unique municipality under the field "COUSUBFP." There are 72 unique values occurring in the "CNTY_FIPS" field, corresponding to Wisconsin's counties. There are 1,850 unique values occurring in the "COUSUBFP" field, corresponding to Wisconsin's municipalities (cities, towns, and villages).

County splits for each district plan were computed by counting the number of unique values in the "CNTY_FIPS" field that each occur in multiple blocks assigned to different districts in that plan.

Municipal splits for each district plan were computed by counting the number of unique values in the "COUSUBFP" field that each occur in multiple blocks assigned to different districts in that plan.

5 Previous Expert Testimony and Compensation

I have not served as an expert witness in any other case in the past 4 years. I am being compensated at the rate of $250 per hour for my work on this case.

References

[1] Jeanne Clelland, Daryl DeFord, Beth Malmskog, and Flavia Sancier-Barbosa, *Ensemble Analysis for 2021 State Legislative Redistricting in Colorado*, submitted to the Colorado Independent Legislative Redistricting Commission, September 26, 2021. Available online at https://coloradoincontext.wordpress.com/.

[2] _____, *Ensemble Analysis for 2021 State Legislative Redistricting in Colorado, Part 2: Comparison of Final Approved Plans to Ensembles*, submitted to the Colorado In-

dependent Legislative Redistricting Commission, October 21, 2021. Available online at https://coloradoincontext.wordpress.com/.

[3] Moon Duchin and Bridget Tenner, *Discrete geometry for electoral geography*, arXiv e-prints (2018), arXiv:1808.05860.

Response Expert Report of Thomas M. Bryan

Expert in Demography for the Wisconsin Legislature

Johnson v. Wisconsin Elections Commission

December 30, 2021

RESPONSE EXPERT REPORT OF THOMAS M. BRYAN

I, Thomas Mark Bryan, affirm the conclusions I express in this report are provided to a reasonable degree of professional certainty.

I. EXECUTIVE SUMMARY

1. Subsequent to my original report in this case, I have received five additional remedial submissions, which I refer here to as:

    - Governor's New Plan;
    - BLOC Plan;
    - Bewley Plan;
    - Citizen Mathematicians (or "Math") Plan; and
    - Hunter Plan

2. In the Assembly, the Legislature's plan features the second-best deviation percentage, the second-best overall core retention, the second-best geographic splits and the second-fewest incumbent pairings. The highest-scoring plans in these categories were distributed among the other proposals, and no other proposal performed consistently as well as the Legislature's plan.

3. In the Senate, the Legislature's plan features the second-best deviation percentage, the highest overall core retention, the second-best disenfranchisement, the second-best geographic splits and the best incumbent pairings (that is, there aren't any). The highest-scoring plans in these categories were distributed among the other proposals, and no other proposal performed consistently as well as the Legislature's plan.

II. ASSIGNMENT

4. The Wisconsin Legislature has asked me to independently review and assess the features and characteristics of the newly proposed plans. I focus this report on the Governor's, BLOC's and Bewley's remedial proposals. My focus on these is driven by their relatively higher levels of core retention (with 85.6%, 84.1% and 83.8% respectively in their proposed assembly plans) than the Citizen Mathematicians and Hunter proposals, indicating a stronger adherence to the Wisconsin Supreme Court's direction to develop a "least changes" plan.

5. In **Section III**, I provide an overall comparison of the plans and then take a closer look at the Governor's, Bewley's and BLOC's plans by evaluating geographic splits, core retention, and continuity of representation (incumbency).

6. In **Section IV**, I provide my Appendices.

7. In forming my opinions, I have considered all materials cited in this report and the appendices, including the various proposals submitted by the other parties and supported by their experts.

8. I reserve the right to further supplement my report and opinions.

III. REDISTRICTING PERFORMANCE

A. Overall Plan Comparison

9. Comparisons of the six proposals are in **Tables III.1** (Assembly) and **III.2** (Senate) below. The tables largely rely on the other parties' self-reported plan characteristics. For incumbent pairings (which many parties did not report), I rely on incumbent pairings reports included in Appendix 3.

Table III.1 Proposed Assembly Plans Characteristics

	Proposed Assembly Plans			
	Population Deviation	Reported Overall Core Retention	Reported County/Municipal Splits	Incumbent Pairings
LEGISLATURE	0.76%	84.2%	53 / 52	3
GOVERNOR	1.88%	85.8%	53 / 174	2
BEWLEY	1.86%	83.8%	55 / 79	8
BLOC	1.32%	84.2%	53 / 104	5
MATH	0.74%	61.0%	40 / 70	18
HUNTER	1.82%	73.2%	50 / 114	9

Sources: Legislature Bryan Rep. 6, 15, 18, 23; Governor Clelland Rep. 6-9, 13-14; Bewley Amos Rep. 7-8, 16; BLOC Mayer Rep. 1, 22; Math Duchin Rep. 18-19; Hunter Ansolabehere Rep. 4 & App'x 1; Legislature Bryan Response App'x 2 (BLOC Assembly Splits) & App'x 3 (Incumbent Pairings Reports)

Table III.2 Proposed Senate Plans Characteristics

	Proposed Senate Plans				
	Population Deviation	Reported Overall Core Retention	Reported Disenfranchised	Reported County/Municipal Splits	Incumbent Pairings
LEGISLATURE	0.57%	92.2%	138,732	42 / 31	0
GOVERNOR	1.19%	92.2%	139,677	45 / 118	1
BEWLEY	1.61%	90.5%	135,560	48 / 52	3
BLOC	0.96%	89.6%	179,629	42 / 73	2
MATH	0.50%	74.3%	422,492	28 / 31	5
HUNTER	0.95%	80.4%	240,723	42 / 79	6

Sources: Legislature Bryan Rep. 6, 15, 18, 22; Governor Clelland Rep. 6-9, 13-14; Bewley Amos Rep. 7-8, 16; BLOC Mayer Rep. 1, 22; Math Duchin Rep. 16-17; Hunter Ansolabehere Rep. 4, 22 & App'x 1; Legislature Bryan Response App'x 2 (BLOC Senate Splits) & App'x 3 (Incumbent Pairings Reports)

B. Application of Redistricting Criteria to Reapportion Legislative Districts in a "Least Changes" Manner

10. I have taken a closer look at the Governor, BLOC, and Bewley plans because they have overall core retention scores that are similar to the Legislature's plan. In my initial report, I discussed the Legislature's adherence to a "least changes" strategy from existing Act 43. To determine whether the other plans also adhere to a "least changes" strategy, I have performed a geographic splits analysis, a core retention analysis (CRA) and a continuity of representation (incumbency) analysis.

1. Geographic Splits Analysis

11. As I explained in my initial report, traditional redistricting principles and Wisconsin-specific redistricting principles strongly agree that splitting administrative geography should be minimized in a successful redistricting plan. An increase in the number of splits is also indicative of changes made to existing districts.

12. A high-level comparison of the other plans' county and ward splits are below: Within the Governor's Assembly plan – there are 53 county splits and 14 ward splits. Within the Governor's Senate plan – there are 45 county splits and 6 ward splits. Within the BLOC Assembly plan – there are 53 county splits and 3 ward splits. Within the BLOC Senate plan, there are 42 county splits and 2 ward splits. Within the Bewley Assembly plan, there are 55 county splits and within the Bewley Senate plan there are 48 county splits. I did not measure ward splits in the Bewley plan, because the Bewley plan did not redistrict based on 2020 ward lines.

13. Shown in **Table III.1** and **III.2**, the Legislature's plan also has the fewest municipal splits. Municipal splits for the other parties' Assembly plans are listed in Appendix 2.

2. Core Retention Analysis

14. As I explained in my initial report, a proposed plan with high core retention scores is indicative of a plan that makes minimum changes to Wisconsin's existing districts. Under the methodology I employ to measure core retention, core retention is evaluated by assessing the number of persons in an existing district who remain in that district. (Others, including Senator Bewley's expert, by comparison, sometimes evaluate core retention by assessing how few new people are in a new district, Amos Exhibit 3.) In my initial report (paragraph 70) I also documented my observation that the PMC plan did not maintain consistent numbering of their new districts with existing districts – making an accurate and equitable comparison with the enacted Legislature's plan impossible. As with the discontinuity of

numbering in the PMC plan, I noted discontinuities in the numbering of the new proposed plans as well. For example, in Bewley's District 97 (see Appendix 1L) only 220 of the original 56,950 residents are retained in the new District 97 – while the largest number (24,647) are "retained" in new District 84. Giving Bewley's plan every benefit of the doubt – I assign District 97 43.6% retention instead of 0%. Therefore, to ensure consistency in our analysis, and to give every other plan the greatest benefit, I utilize this "greatest share" approach for all of the plans.[1]

15. Other parties' core retention analyses consider only the total populations of districts in comparisons across plans. Here, I have taken a closer look at the Governor, BLOC, and Bewley core retention by presenting district-by-district comparisons in the Milwaukee area districts and by also analyzing the core retention of racial groups.

16. I include all of my Core Retention Analysis charts and tables in **Appendix 1**.

17. I begin with an analysis of the Governor's new plan. **Table III.3** shows the Governor's core retention of all Wisconsinites across all districts, as well as core retention of Black and Hispanic Wisconsinites statewide:

Table III.3 Governor's Proposed Assembly Districts
Total, Black and Hispanic Core Retention

	Total Population	Black Alone Population	Hispanic Population
Number Retained	5,078,313	321,130	390,038
Percent Retained	86.2%	77.2%	87.2%
Number Displaced	815,405	94,849	57,252
Grand Total	5,893,718	415,979	447,290

18. **Table III.4** shows the Governor's core retention in Milwaukee-area districts, which include AD 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 82, 83, and 84:

Table III.4 Governor's Proposed Milwaukee-Area Assembly Districts
Total, Black and Hispanic Core Retention

	Total Population	Black Alone Population	Hispanic Population
Number Retained	893,630	181,789	133,787
Percent Retained	73.7%	70.0%	82.4%
Number Displaced	319,111	77,822	28,660
Grand Total	1,212,741	259,611	162,447

[1] There is only one small fractional impact to one District 14 in the enacted Legislative plan where this has any impact at all.

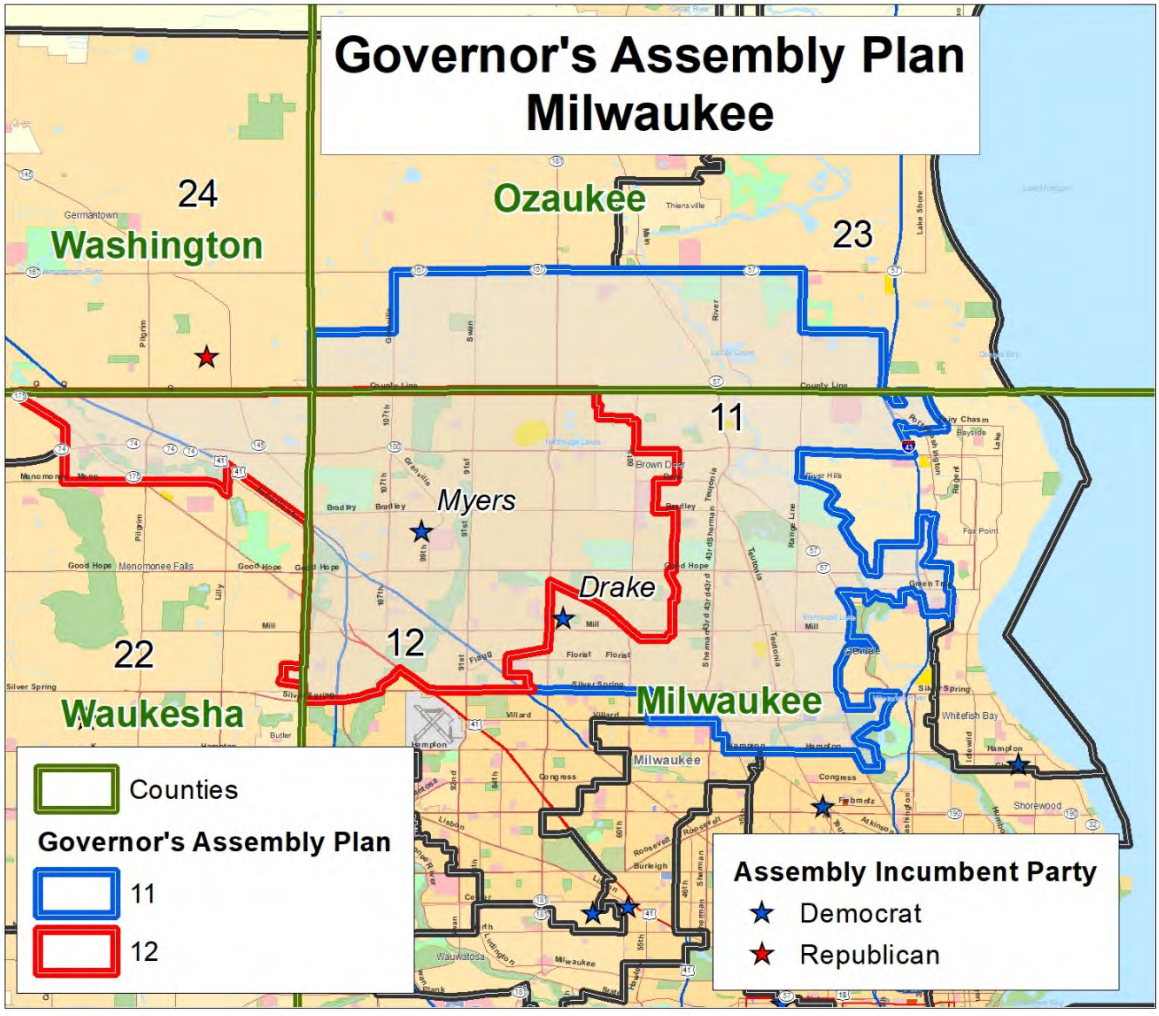
19. **Table III.5** shows the Governor's core retention in Milwaukee's predominantly Black Senate Districts 4 and 6:

Table III.5 Governor's Proposed Milwaukee-Area Black SD4 and SD6 Core Retention

	Total Population	Black Alone Population	Hispanic Population
Number Retained	266,269	168,653	17,188
Percent Retained	81.9%	81.6%	85.7%
Number Displaced	59,008	38,085	2,862
Grand Total	325,277	206,738	20,050

20. **Figure III.1** shows one reason why the new Governor's core retention in Milwaukee is so poor. The Governor redraws the northern districts in Milwaukee to reach into Ozaukee and Waukesha counties, even though the existing districts stop at the county line.

Figure III.1 New Governor's Plan Milwaukee Districts



21. Here I assess core retention of BLOC's plan. In Table III.6, I show the BLOC plan would have retained 84.3% of Wisconsinites in their existing districts statewide, but only 76.1% of Black Wisconsinites.

Table III.6 BLOC's Proposed Assembly Districts
Total, Black and Hispanic Core Retention

	Total	Black Alone	Hispanic
	Population	Population	Population
Number Retained	4,966,450	316,522	385,216
Percent Retained	84.3%	76.1%	86.1%
Number Displaced	927,268	99,457	62,074
Grand Total	5,893,718	415,979	447,290

22. **Table III.7** shows the BLOC's core retention in Milwaukee-area districts, which include AD 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 82, 83, and 84:

Table III.7 BLOC's Proposed Milwaukee-Area Assembly Districts
Total, Black and Hispanic Core Retention

	Total	Black Alone	Hispanic
	Population	Population	Population
Number Retained	840,920	175,304	131,611
Percent Retained	69.3%	67.5%	81.0%
Number Displaced	371,821	84,307	30,836
Grand Total	1,212,741	259,611	162,447

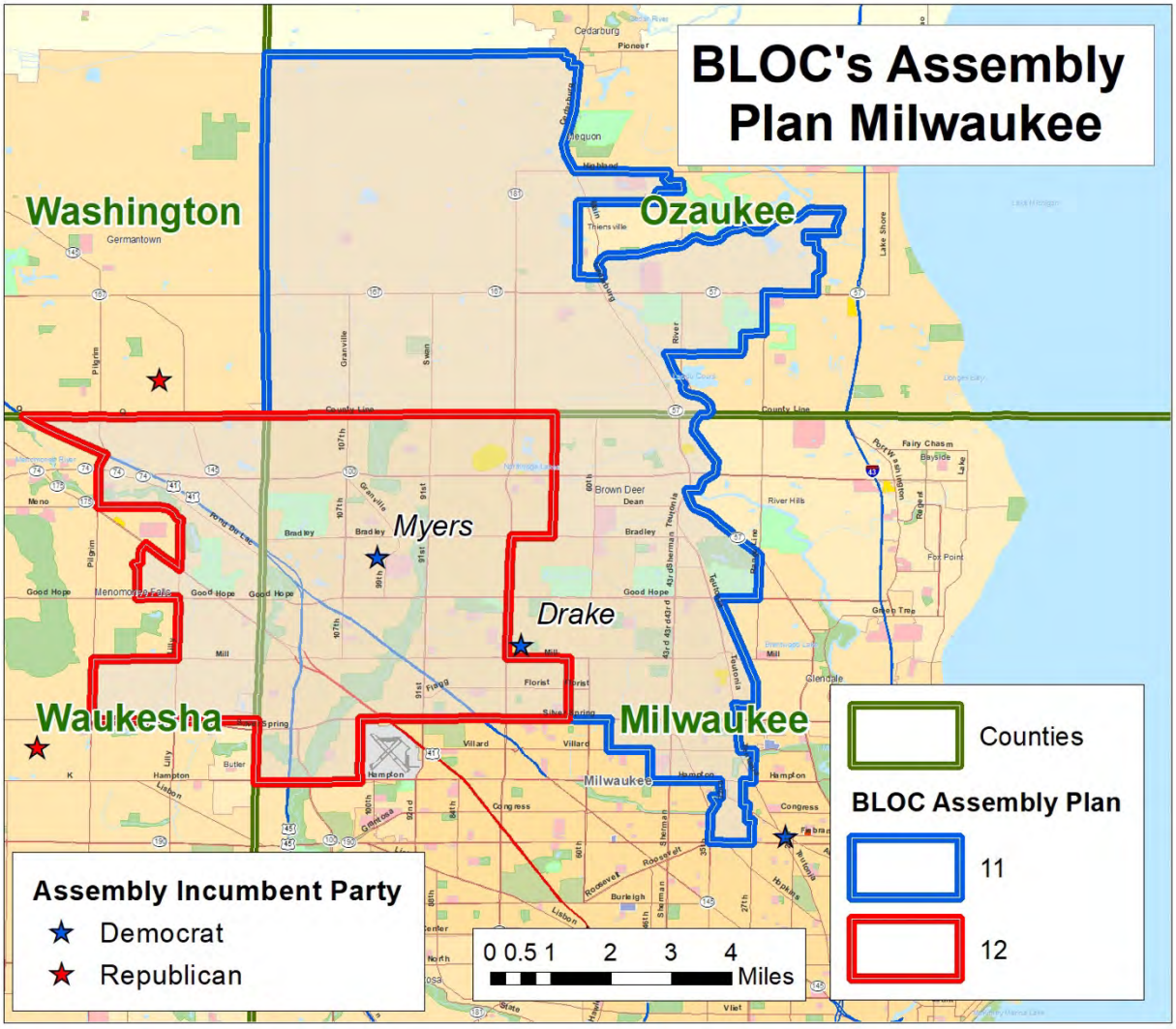
23. **Table III.8** shows the BLOC plan's core retention in Milwaukee's predominantly Black Senate Districts 4 and 6:

Table III.8 BLOC's Proposed Milwaukee-Area Black SD4 and SD6 Core Retention

	Total	Black Alone	Hispanic
	Population	Population	Population
Number Retained	236,051	161,463	14,658
Percent Retained	72.6%	78.1%	73.1%
Number Displaced	89,226	45,275	5,392
Grand Total	325,277	206,738	20,050

24. **Figure III.2** shows one reason why the BLOC plan's core retention in the Milwaukee area is so poor. As with the Governor's plan, the BLOC plan redraws the northern Milwaukee districts to reach into Ozaukee and Waukesha counties, even though the existing districts stopped at the county line.

Figure III.2 BLOC's Assembly Plan Milwaukee Districts



25. Finally, I evaluate the Bewley plan's core retention. Senator Bewley's plan does not have a block assignment file that allows me to do the same core retention analysis as I was able to do for the Governor and BLOC plans. I have therefore used Senator Bewley's Expert Exhibit 3 (reporting individuals displaced by district) to determine core retention by district, but I cannot determine core retention of Black or Hispanic individuals.

26. In **Table III.9**, I show the Bewley plan would have retained 84.3% of Wisconsinites in their existing districts:

Table III.9 Bewley's Proposed Assembly Districts Total Core Retention

	Total Population
Number Retained	4,968,707
Percent Retained	84.3%
Number Displaced	925,011
Grand Total	5,893,718

27. **Table III.10** shows Bewley's core retention in Milwaukee-area districts, which include AD 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 82, 83, and 84:

Table III.10 Bewley's Proposed Milwaukee-Area Assembly Districts Total Core Retention

	Total Population
Number Retained	966,518
Percent Retained	79.7%
Number Displaced	246,223
Grand Total	1,212,741

28. **Table III.11** shows the Bewley plan's core retention in Milwaukee's predominantly Black Senate Districts 4 and 6:

Table III.11 Bewley's Proposed Milwaukee-Area Black SD4 and SD6 Core Retention

	Total Population
Number Retained	313,406
Percent Retained	96.4%
Number Displaced	11,871
Grand Total	325,277

29. **Figure III.3** illustrates one of the major changes Bewley plan makes in Milwaukee. Senator Bewley extends Milwaukee Assembly Districts 11 and 12 beyond the Milwaukee County line to reach into Waukesha county, even though these districts previously ended at the county line. (Noted below, one consequence of this redraw is that the Bewley plan pairs the two Milwaukee incumbents from these predominantly Black Assembly Districts.) Figure III.4 shows Bewley's districts relative to the existing Act 43 boundaries.

Figure III.3 Bewley's Plan AD11 and AD12 with Wisconsin Counties

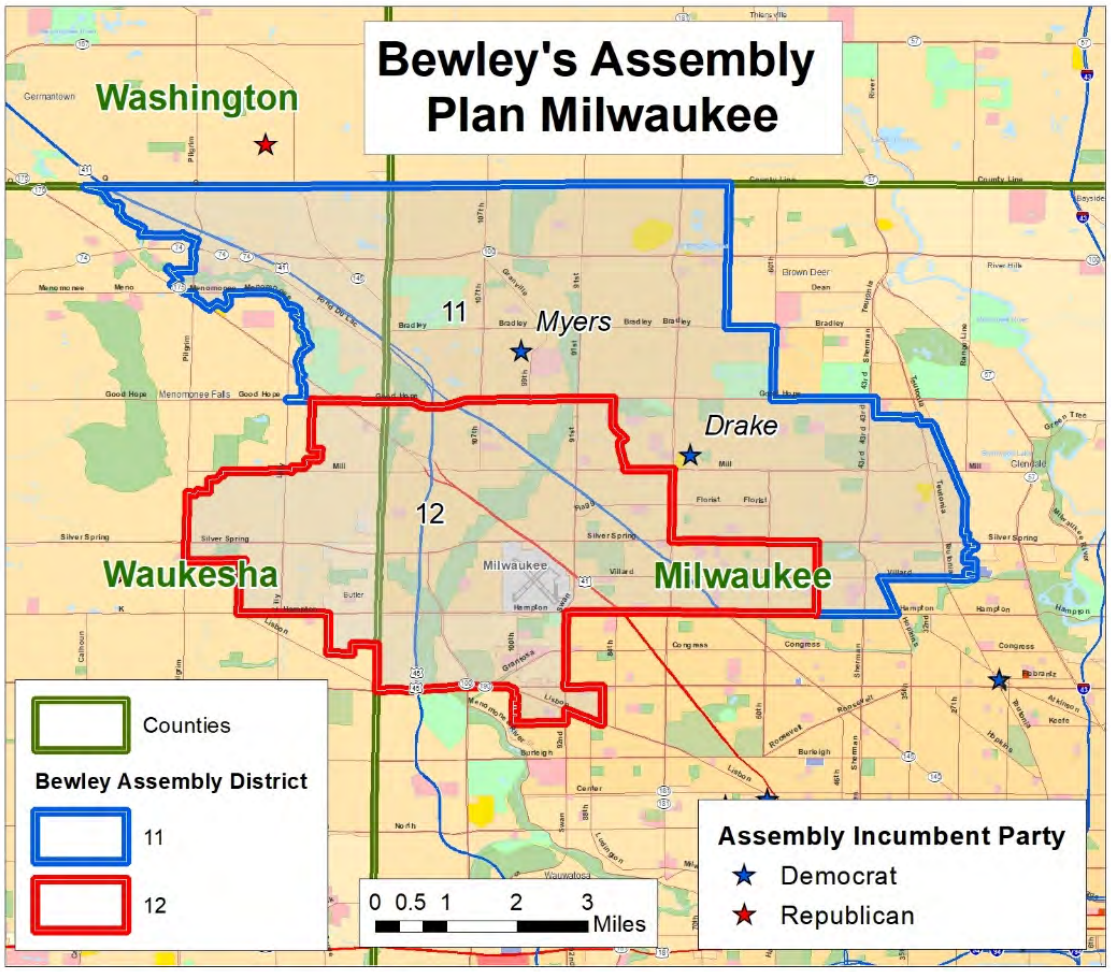
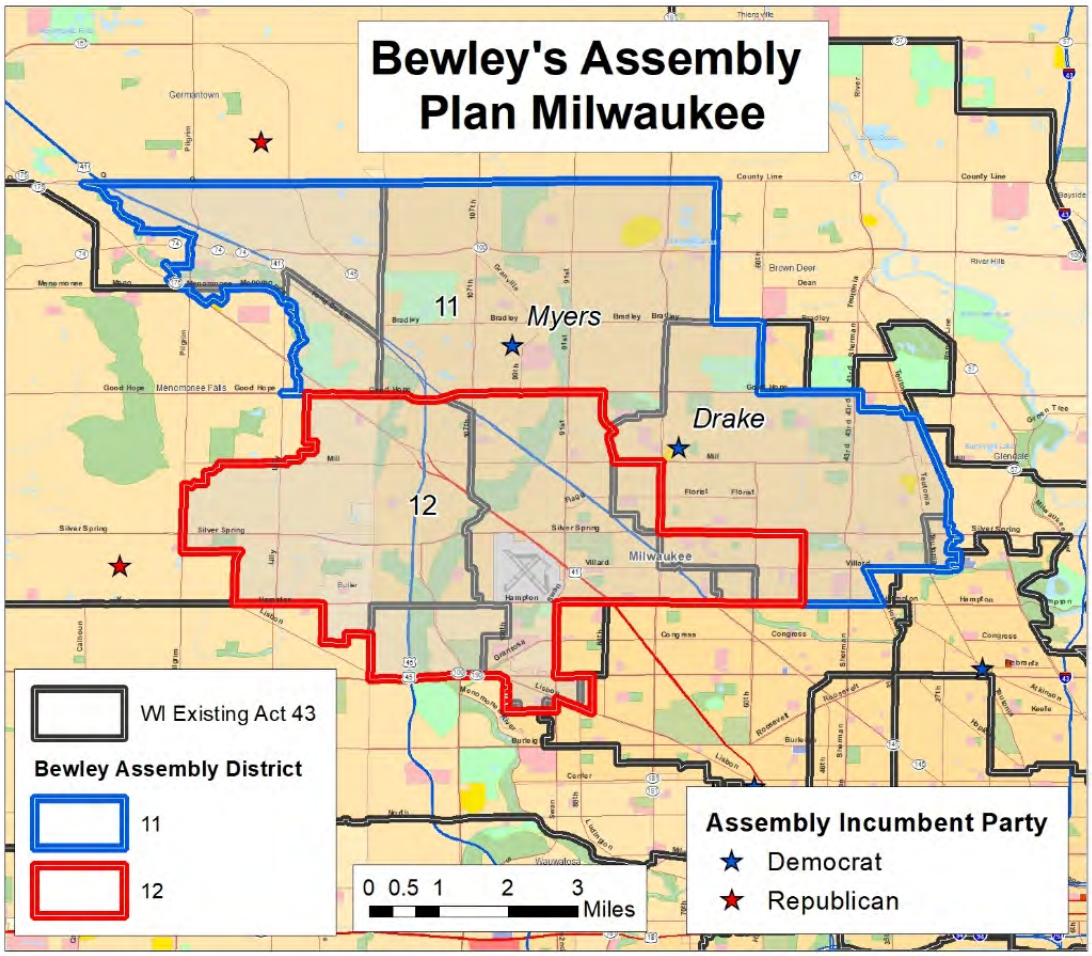


Figure III.4 Bewley's Plan AD11 and AD12 with WI Existing Act 43 Boundaries



3. Incumbency Analysis

30. My last analysis was to examine the degree to which the Governor, BLOC, and Bewley proposed Bewley plans paired incumbents. The Governor's Plan has 3 incumbent pairings. The plan has 1 pair of incumbents in Senate District 8 and 2 pairs of incumbents in Assembly Districts 24 and 83. Each pair are Republicans.

Table III.10 Governor's Plan
Paired Senate Incumbents

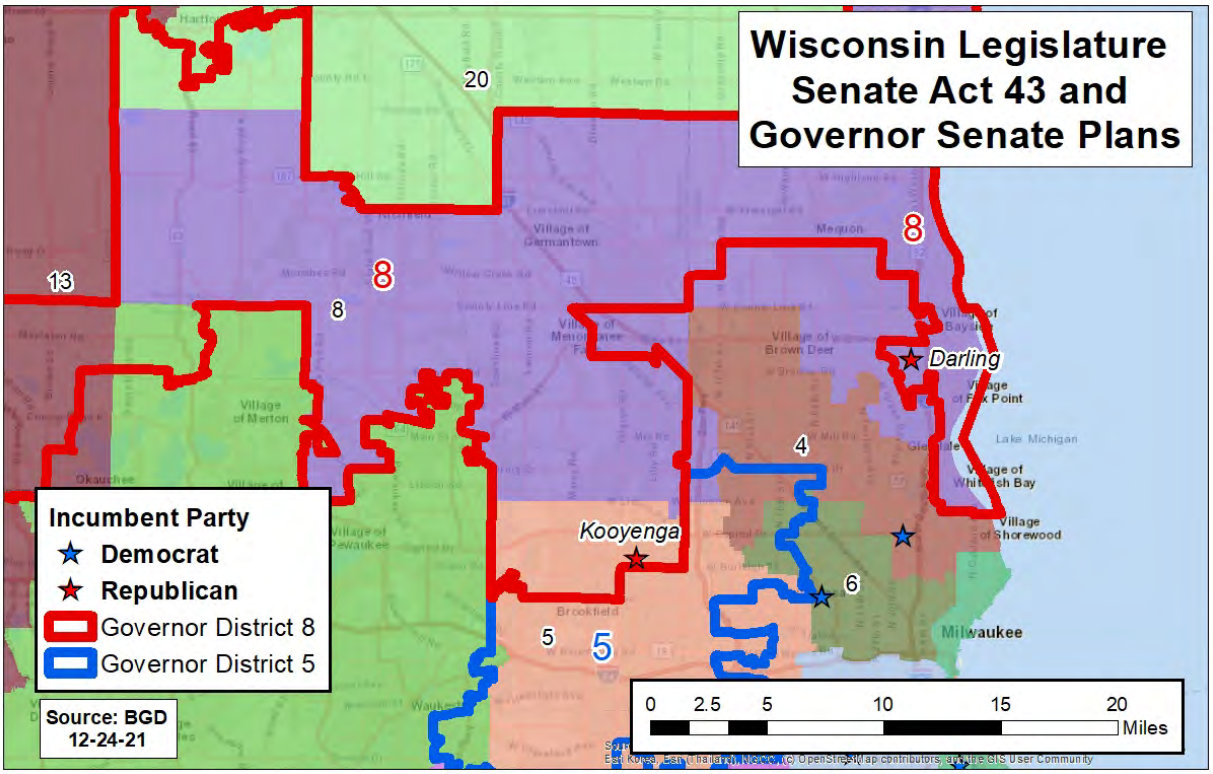
District 8
Current 5: Sen. Dale P. Kooyenga (R)
Current 8: Sen. Alberta Darling (R)

Table III.11 Governor's Plan
Paired Assembly Incumbents

District 24	District 83
Current 24: Rep. Daniel R. Knodl (R)	Current 83 Rep. Chuck C. Wichgers (R)
Current 38: Rep. Barbara Dittrich (R)	Current 33 Rep. Cody J. Horlacher (R)

31. **Figure III.5** shows how the Governor's plan would redraw SD5 and SD8 to pair Senators Darling and Kooyenga.

Figure III.5 Governor's Plan SD5 and SD8



32. The BLOC Plan has 7 incumbent pairings. There are two paired incumbents in Senate Districts 8 and 20. The incumbents are all Republicans and include Senate Majority Leader Devin LeMahieu. There are 5 pairs of incumbents in Assembly Districts 13, 31, 39, 60, and 82. Three of the 5 districts are represented by Republicans. One district has a pair of incumbent Democrats and the other district is split with one Republican and one Democrat.

Table III.12 BLOC's Plan
Paired Senate Incumbents

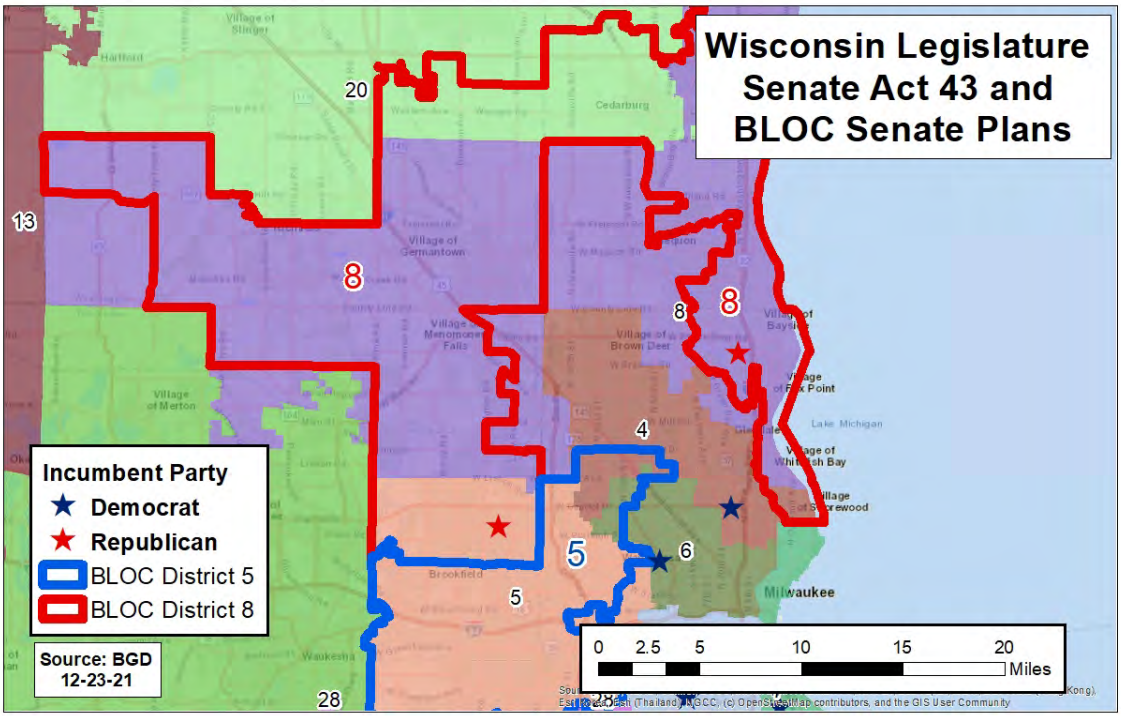
District 8	District 20
Current 5: Sen. Dale P. Kooyenga (R) Current 8: Sen. Alberta Darling (R)	Current 9: Sen. Devin LeMahieu (R) Current 20: Sen. Duey Stroebel (R)

Table III.13 BLOC's Plan
Paired Assembly Incumbents

District 13	District 31	District 39
Current 13 Rep. Sara J. Rodriguez (D) Current 14 Rep. Robyn Vining (D)	Current 31 Rep. Amy Loudenbeck (R) Current 45 Rep. Mark E. Spreitzer (D)	Current 39 Rep. Mark L. Born (R) Current 38 Rep. Barbara Dittrich (R)
District 60	**District 82**	
Current 26 Rep. Terry A. Katsma (R) Current 60 Rep. Robert A. Brooks (R)	Current 83 Rep. Chuck C. Wichgers (R) Current 82 Rep. Ken P. Skowronski (R)	

33. **Figure III.6** shows how BLOC's plan would redraw SD 8 and SD 5 to pair Senators Darling and Kooyenga.

Figure III.6 BLOC's Plan SD5 and SD8



34. The Bewley Plan has 11 incumbent pairings. There are 3 paired incumbents in Senate Districts 14, 22 and 30. Two of the 3 districts have one Republican and one Democrat. The remaining district has 2 Republicans. There are 8 pairs of incumbents in Assembly Districts 11, 41, 69, 76, 83, 84, 93 and 99. Six of the eight districts are represented by Republicans. The other two districts pair Democratic incumbents, including pairing incumbents in Milwaukee's predominantly Black Districts 11 and 12 (shown in **Figure III.3 and Figure III.4** above).

Table III.14 Bewley Plan
Paired Senate Incumbents

District 14	**District 22**	**District 30**
Current 14: Sen. Joan A. Ballweg (R)	Current 21: Sen. Van Wanggaard (R)	Current 30: Sen. Eric Wimberger (R)
Current 27: Sen. Jon Erpenbach (D)	Current 22: Sen. Robert Wirch (D)	Current 2: Sen. Robert L. Cowles (R)

Table III.15 Bewley Plan
Paired Assembly Incumbents

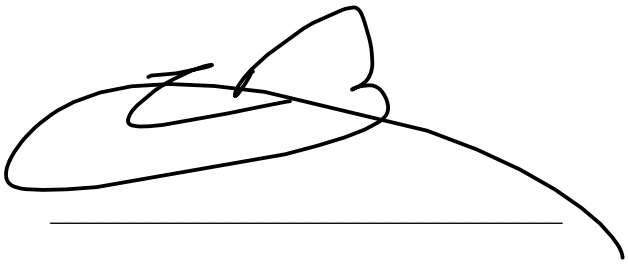
District 11	**District 41**	**District 69**
Current 12: Rep. LaKeshia Myers (D)	Current 41: Rep. Alex A. Dallman (R)	Current 69: Rep. Donna M. Rozar (R)
Current 11: Rep. Dora E. Drake (D)	Current 53: Rep. Michael K. Schraa (R)	Current 86: Rep. John S. Spiros (R)
District 76	**District 83**	**District 84**
Current 76: Rep. Francesca Hong (D)	Current 83: Rep Chuck C. Wichgers (R)	Current 84: Rep. Mike Kuglitsch (R)
Current 77: Rep. Sheila Stubbs (D)	Current 33: Rep. Cody J. Horlacher (R)	Current 97: Rep. Scott E. Allen (R)
District 93	**District 99**	
Current 93: Rep. Warren L. Petryk (R)	Current 99: Rep. Cindi S. Duchow (R)	
Current 29: Rep. Clint P. Moses (R)	Current 98: Rep. Adam Neylon (R)	

CONCLUSION

35. For the reasons stated in this report and illustrated in the appendices, as well as my initial report, I conclude that the Legislature's SB 621 Assembly and Senate plans achieve population equality while making minimum changes, measured by a variety of metrics, to reapportion Wisconsin's legislative districts as compared to other parties' proposals.

* * *

Submitted: December 30, 2021



Thomas M. Bryan

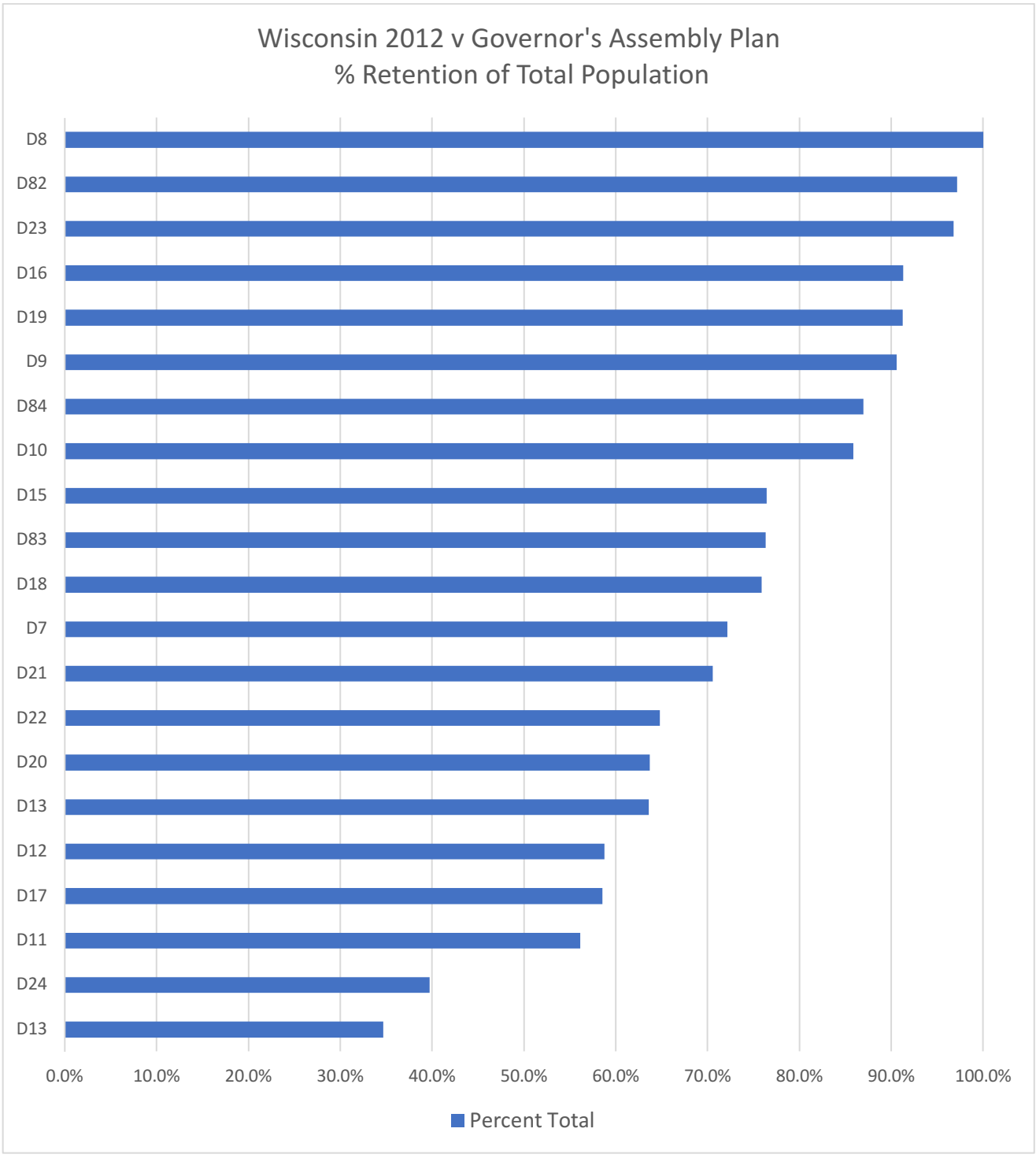
APPENDICES

TABLE OF CONTENTS

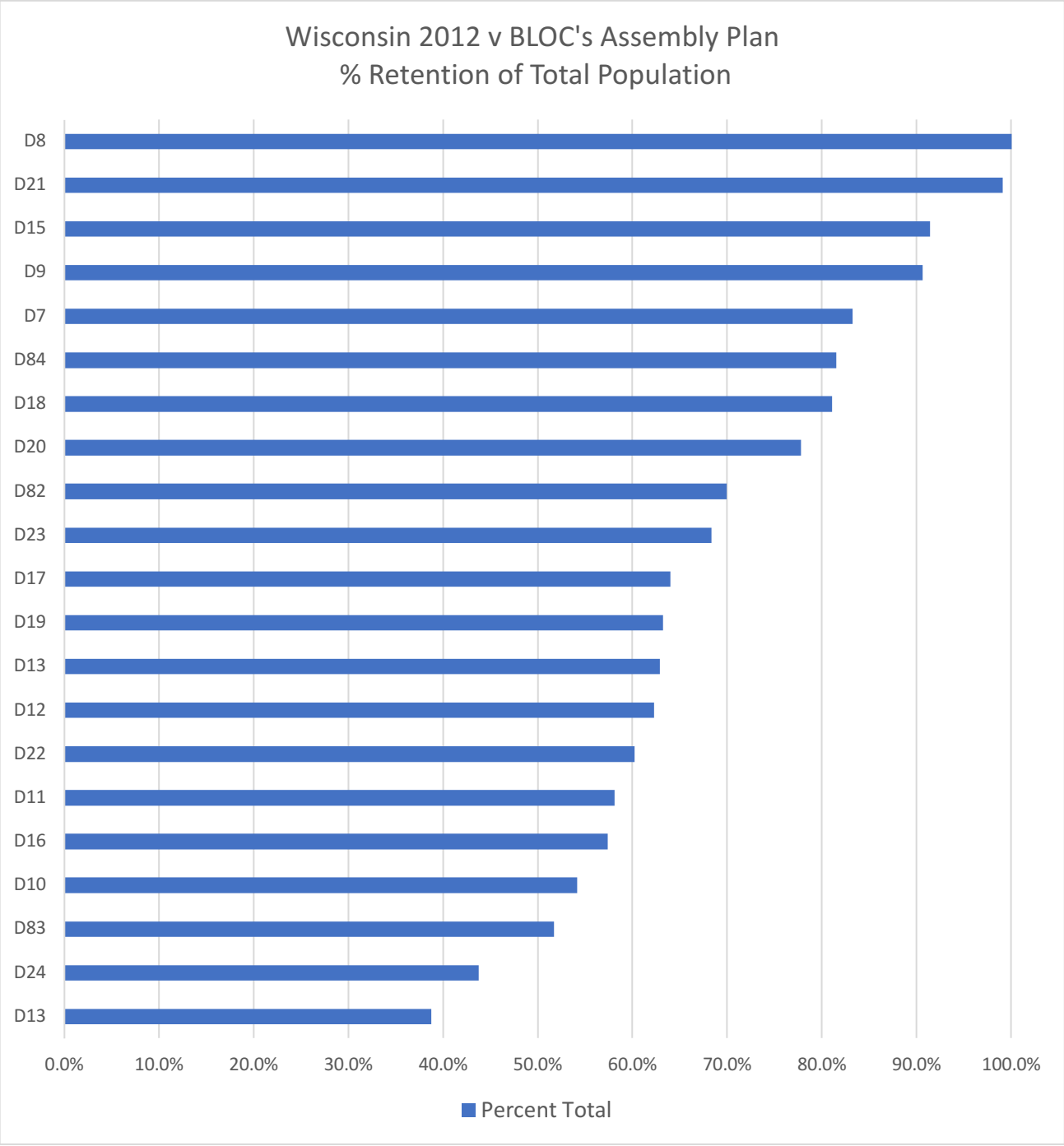
Appendix 1
Core Retention Analyses

- 1A – Governor Assembly Chart (Milwaukee-Area)
- 1B – BLOC Assembly Chart (Milwaukee-Area)
- 1C – Bewley Assembly Chart (Milwaukee-Area)
- 1D – Governor Assembly Tables (Milwaukee-Area)
- 1E – BLOC Assembly Tables (Milwaukee-Area)
- 1F – Bewley Assembly Tables (Milwaukee-Area)
- 1G – Governor SD4 and SD6 Table
- 1H – BLOC SD4 and SD6 Table
- 1I – Bewley SD4 and SD6 Table
- 1J – Governor Raw Assembly Tables (all districts)
- 1K – BLOC Raw Assembly Tables (all districts)
- 1L – Bewley Raw Assembly Tables (all districts)
- 1M – Governor Raw Senate Tables (all districts)
- 1N – BLOC Raw Senate Tables (all districts)
- 1O – Bewley Raw Senate Tables (all districts)

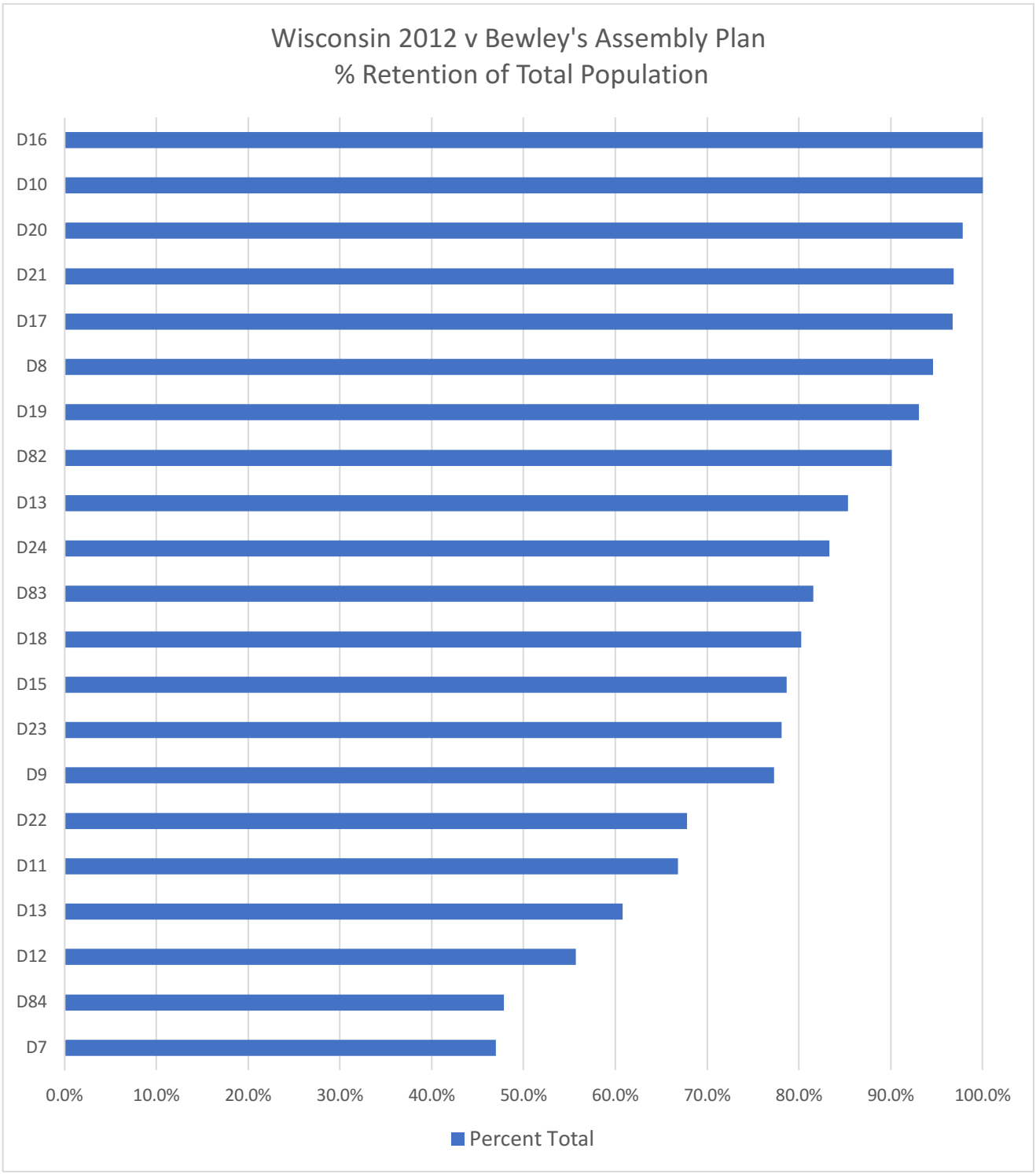
Appendix 1A Core Retention Analysis Governor Assembly Chart (Milwaukee-Area)



Appendix 1B Core Retention Analysis
BLOC Assembly Chart (Milwaukee-Area)



Appendix 1C Core Retention Analysis
Bewley Assembly Chart (Milwaukee-Area)



Appendix 1D Core Retention Analysis
Governor Plan Assembly Tables

(Total, Black and Hispanic Populations) Milwaukee-Area Districts

Base District	Governor's District	Total Population	Black Population	Hispanic Population	Total Percentage	Black Percentage	Hispanic Percentage
7	7	42,804	3,334	11,942	72.1%	69.4%	74.4%
	9	7,545	756	2,396	12.7%	15.7%	14.9%
	18	4,332	514	790	7.3%	10.7%	4.9%
	20	4,674	202	917	7.9%	4.2%	5.7%
7 Total		**59,355**	**4,806**	**16,045**			
8	8	53,999	5,135	38,111	100.0%	100.0%	100.0%
	19	0	0	0	0.0%	0.0%	0.0%
8 Total		**53,999**	**5,135**	**38,111**			
9	8	5,425	875	3,533	9.5%	20.1%	10.1%
	9	51,914	3,482	31,319	90.5%	79.9%	89.9%
9 Total		**57,339**	**4,357**	**34,852**			
10	10	45,181	26,073	2,678	85.8%	81.6%	84.6%
	11	6,482	5,208	344	12.3%	16.3%	10.9%
	16	965	670	144	1.8%	2.1%	4.5%
10 Total		**52,628**	**31,951**	**3,166**			
11	10	3,669	767	175	6.8%	2.1%	6.8%
	11	30,461	21,360	1,447	56.1%	58.8%	55.9%
	12	10,903	6,834	557	20.1%	18.8%	21.5%
	14	4,505	3,493	204	8.3%	9.6%	7.9%
	17	4,737	3,859	204	8.7%	10.6%	7.9%
11 Total		**54,275**	**36,313**	**2,587**			
12	12	33,062	21,198	2,279	58.7%	59.8%	66.3%
	14	23,243	14,232	1,160	41.3%	40.2%	33.7%
12 Total		**56,305**	**35,430**	**3,439**			
13	13	39,267	1,336	1,910	63.6%	47.0%	44.8%
	15	4,134	142	386	6.7%	5.0%	9.1%
	17	5,839	383	289	9.5%	13.5%	6.8%
	18	12,539	980	1,678	20.3%	34.5%	39.4%
	98	0	0	0	0.0%	0.0%	0.0%
13 Total		**61,779**	**2,841**	**4,263**			
14	13	20,848	1,471	964	34.7%	43.9%	40.1%
	14	7,648	905	421	12.7%	27.0%	17.5%
	17	11,766	488	398	19.6%	14.6%	16.6%
	22	19,874	487	620	33.0%	14.5%	25.8%
14 Total		**60,136**	**3,351**	**2,403**			
15	7	9,281	841	1,483	16.2%	27.4%	26.2%
	15	43,662	2,164	4,034	76.4%	70.5%	71.2%
	84	4,202	66	147	7.4%	2.1%	2.6%
15 Total		**57,145**	**3,071**	**5,664**			

16	10	4,694	4,432	92	8.7%	13.8%	2.4%
	16	49,045	27,673	3,720	91.3%	86.2%	97.6%
16 Total		**53,739**	**32,105**	**3,812**			
17	14	20,864	11,399	1,058	37.7%	29.9%	37.1%
	17	32,383	24,850	1,676	58.5%	65.3%	58.8%
	18	2,096	1,820	118	3.8%	4.8%	4.1%
17 Total		**55,343**	**38,069**	**2,852**			
18	8	0	0	0	0.0%	0.0%	0.0%
	16	7,985	3,894	761	15.1%	11.8%	18.1%
	17	4,809	1,478	342	9.1%	4.5%	8.2%
	18	40,193	27,498	3,091	75.9%	83.7%	73.7%
18 Total		**52,987**	**32,870**	**4,194**			
19	8	0	0	0	0.0%	0.0%	0.0%
	10	4,079	478	278	6.6%	11.4%	6.0%
	16	1,383	92	88	2.2%	2.2%	1.9%
	19	56,594	3,626	4,292	91.2%	86.4%	92.1%
	20	0	0	0	0.0%	0.0%	0.0%
19 Total		**62,056**	**4,196**	**4,658**			
20	19	2,422	100	417	4.3%	3.9%	4.5%
	20	36,186	1,499	6,136	63.7%	57.9%	65.6%
	21	18,204	990	2,798	32.0%	38.2%	29.9%
20 Total		**56,812**	**2,589**	**9,351**			
21	20	17,396	668	1,678	29.4%	27.1%	26.7%
	21	41,704	1,799	4,597	70.6%	72.9%	73.3%
21 Total		**59,100**	**2,467**	**6,275**			
22	12	3,535	1,309	250	5.8%	28.0%	13.4%
	14	3,024	1,691	196	5.0%	36.2%	10.5%
	22	39,348	1,507	1,120	64.8%	32.2%	59.9%
	24	14,843	166	303	24.4%	3.6%	16.2%
	99	0	0	0	0.0%	0.0%	0.0%
22 Total		**60,750**	**4,673**	**1,869**			
23	11	591	40	29	1.0%	2.2%	1.3%
	19	0	0	0	0.0%	0.0%	0.0%
	23	58,793	1,716	2,119	96.8%	95.8%	97.2%
	24	1,377	36	33	2.3%	2.0%	1.5%
23 Total		**60,761**	**1,792**	**2,181**			
24	10	1,692	168	79	2.8%	2.2%	3.1%
	11	22,422	4,801	1,060	36.9%	62.3%	41.9%
	12	12,008	1,774	591	19.8%	23.0%	23.3%
	23	506	29	29	0.8%	0.4%	1.1%
	24	24,109	930	773	39.7%	12.1%	30.5%
24 Total		**60,737**	**7,702**	**2,532**			
82	20	1,703	129	290	2.9%	4.6%	6.1%
	82	57,493	2,669	4,440	97.1%	95.4%	93.9%
82 Total		**59,196**	**2,798**	**4,730**			
83	62	8,898	62	351	15.1%	10.7%	14.5%
	82	1,782	16	52	3.0%	2.7%	2.2%

	83	44,827	482	1,852	76.3%	82.8%	76.6%
	84	3,263	22	162	5.6%	3.8%	6.7%
	97	0	0	0	0.0%	0.0%	0.0%
83 Total		**58,770**	**582**	**2,417**			
84	7	7,772	526	1,759	13.1%	20.9%	25.0%
	84	51,757	1,987	5,287	86.9%	79.1%	75.0%
84 Total		**59,529**	**2,513**	**7,046**			

Appendix 1E Core Retention Analysis
BLOC Plan Assembly Tables

(Total, Black and Hispanic Populations) Milwaukee-Area Districts

Base District	BLOC District	Total Population	Black Population	Hispanic Population	Total Percentage	Black Percentage	Hispanic Percentage
7	7	49,384	3,729	12,926	83.2%	77.6%	80.6%
	9	7,622	854	2,841	12.8%	17.8%	17.7%
	18	2,349	223	278	4.0%	4.6%	1.7%
7 Total		**59,355**	**4,806**	**16,045**			
8	8	53,999	5,135	38,111	100.0%	100.0%	100.0%
	19	0	0	0	0.0%	0.0%	0.0%
8 Total		**53,999**	**5,135**	**38,111**			
9	8	5,363	288	3,098	9.4%	6.6%	8.9%
	9	51,976	4,069	31,754	90.6%	93.4%	91.1%
9 Total		**57,339**	**4,357**	**34,852**			
10	10	28,481	22,355	1,792	54.1%	70.0%	56.6%
	11	2,526	2,265	87	4.8%	7.1%	2.7%
	16	7,762	6,618	533	14.7%	20.7%	16.8%
	23	13,859	713	754	26.3%	2.2%	23.8%
10 Total		**52,628**	**31,951**	**3,166**			
11	10	6,276	1,595	304	11.6%	4.4%	11.8%
	11	31,537	23,160	1,558	58.1%	63.8%	60.2%
	12	8,508	5,307	381	15.7%	14.6%	14.7%
	14	7,954	6,251	344	14.7%	17.2%	13.3%
11 Total		**54,275**	**36,313**	**2,587**			
12	12	35,057	22,191	2,429	62.3%	62.6%	70.6%
	14	21,248	13,239	1,010	37.7%	37.4%	29.4%
12 Total		**56,305**	**35,430**	**3,439**			
13	13	38,847	1,389	1,660	62.9%	48.9%	38.9%
	15	4,923	175	629	8.0%	6.2%	14.8%
	17	12,546	775	806	20.3%	27.3%	18.9%
	18	5,463	502	1,168	8.8%	17.7%	27.4%
13 Total		**61,779**	**2,841**	**4,263**			
14	13	21,010	1,169	817	34.9%	34.9%	34.0%
	14	11,070	1,335	642	18.4%	39.8%	26.7%
	17	4,772	279	183	7.9%	8.3%	7.6%
	22	23,284	568	761	38.7%	17.0%	31.7%
14 Total		**60,136**	**3,351**	**2,403**			
15	15	52,244	2,673	4,878	91.4%	87.0%	86.1%
	18	4,520	398	769	7.9%	13.0%	13.6%
	84	381	0	17	0.7%	0.0%	0.3%
15 Total		**57,145**	**3,071**	**5,664**			
16	10	11,899	7,145	956	22.1%	22.3%	25.1%
	16	30,840	22,273	1,912	57.4%	69.4%	50.2%

	18	3,373	2,011	149	6.3%	6.3%	3.9%
	19	7,627	676	795	14.2%	2.1%	20.9%
16 Total		**53,739**	**32,105**	**3,812**			
17	14	18,877	10,633	1,000	34.1%	27.9%	35.1%
	17	35,423	26,602	1,794	64.0%	69.9%	62.9%
	18	1,043	834	58	1.9%	2.2%	2.0%
17 Total		**55,343**	**38,069**	**2,852**			
18	9	0	0	0	0.0%	0.0%	0.0%
	16	3,318	2,130	328	6.3%	6.5%	7.8%
	17	6,732	3,507	377	12.7%	10.7%	9.0%
	18	42,937	27,233	3,489	81.0%	82.9%	83.2%
18 Total		**52,987**	**32,870**	**4,194**			
19	8	0	0	0	0.0%	0.0%	0.0%
	10	5,465	613	349	8.8%	14.6%	7.5%
	16	17,367	1,772	1,253	28.0%	42.2%	26.9%
	19	39,224	1,811	3,056	63.2%	43.2%	65.6%
	20	0	0	0	0.0%	0.0%	0.0%
19 Total		**62,056**	**4,196**	**4,658**			
20	19	12,627	515	2,177	22.2%	19.9%	23.3%
	20	44,185	2,074	7,174	77.8%	80.1%	76.7%
20 Total		**56,812**	**2,589**	**9,351**			
21	21	58,547	2,456	6,220	99.1%	99.6%	99.1%
	82	553	11	55	0.9%	0.4%	0.9%
21 Total		**59,100**	**2,467**	**6,275**			
22	12	13,264	3,530	619	21.8%	75.5%	33.1%
	22	36,562	930	968	60.2%	19.9%	51.8%
	24	3,072	147	127	5.1%	3.1%	6.8%
	98	5,942	54	135	9.8%	1.2%	7.2%
	99	1,910	12	20	3.1%	0.3%	1.1%
22 Total		**60,750**	**4,673**	**1,869**			
23	11	4,269	138	155	7.0%	7.7%	7.1%
	19	0	0	0	0.0%	0.0%	0.0%
	23	41,504	1,436	1,603	68.3%	80.1%	73.5%
	24	12,079	181	363	19.9%	10.1%	16.6%
	60	2,909	37	60	4.8%	2.1%	2.8%
23 Total		**60,761**	**1,792**	**2,181**			
24	10	7,081	973	363	11.7%	12.6%	14.3%
	11	20,822	5,373	1,022	34.3%	69.8%	40.4%
	12	2,496	125	125	4.1%	1.6%	4.9%
	23	3,762	165	139	6.2%	2.1%	5.5%
	24	26,576	1,066	883	43.8%	13.8%	34.9%
24 Total		**60,737**	**7,702**	**2,532**			
82	7	1,689	78	242	2.9%	2.8%	5.1%
	20	15,050	598	1,649	25.4%	21.4%	34.9%
	21	1,045	15	83	1.8%	0.5%	1.8%
	82	41,412	2,107	2,756	70.0%	75.3%	58.3%
82 Total		**59,196**	**2,798**	**4,730**			

83	82	17,432	126	616	29.7%	21.6%	25.5%
	83	30,386	209	1,041	51.7%	35.9%	43.1%
	84	10,952	247	760	18.6%	42.4%	31.4%
	97	0	0	0	0.0%	0.0%	0.0%
83 Total		**58,770**	**582**	**2,417**			
84	7	8,335	481	1,805	14.0%	19.1%	25.6%
	15	2,679	194	395	4.5%	7.7%	5.6%
	84	48,515	1,838	4,846	81.5%	73.1%	68.8%
84 Total		**59,529**	**2,513**	**7,046**			

Appendix 1F Core Retention Analysis
Bewley Plan Assembly Tables

(Total Population) Milwaukee-Area Districts

Base District	Bewley District	Total Population	Total Percentage
7	7	27,878	47.0%
	9	11,628	19.6%
	13	5,007	8.4%
	15	8,995	15.2%
	18	4,343	7.3%
	20	1,504	2.5%
7 Total		**59,355**	
8	8	51,068	94.6%
	9	2,931	5.4%
8 Total		**53,999**	
9	7	4,828	8.4%
	8	8,224	14.3%
	9	44,287	77.2%
9 Total		**57,339**	
10	10	52,628	100.0%
10 Total		**52,628**	
11	10	3,355	6.2%
	11	36,256	66.8%
	12	9,297	17.1%
	24	5,367	9.9%
11 Total		**54,275**	
12	11	20,267	36.0%
	12	31,348	55.7%
	17	4,690	8.3%
12 Total		**56,305**	
13	13	37,558	60.8%
	14	9,651	15.6%
	15	4,263	6.9%
	18	6,772	11.0%
	98	3,535	5.7%
13 Total		**61,779**	
14	12	2,074	3.4%
	13	4,420	7.4%
	14	51,308	85.3%
	17	2,334	3.9%
14 Total		**60,136**	
15	13	9,873	17.3%
	15	44,932	78.6%

	84	2,340	4.1%
15 Total		**57,145**	
16	16	53,739	100.0%
16 Total		**53,739**	
17	12	1,814	3.3%
	17	53,529	96.7%
17 Total		**55,343**	
18	16	7,379	13.9%
	17	3,090	5.8%
	18	42,518	80.2%
18 Total		**52,987**	
19	10	1,220	2.0%
	16	1,383	2.2%
	19	57,730	93.0%
	20	1,723	2.8%
19 Total		**62,056**	
20	19	1,248	2.2%
	20	55,564	97.8%
20 Total		**56,812**	
21	21	57,223	96.8%
	82	1,877	3.2%
21 Total		**59,100**	
22	12	15,032	24.7%
	22	41,193	67.8%
	58	2,823	4.6%
	97	1,702	2.8%
22 Total		**60,750**	
23	10	1,131	1.9%
	23	47,432	78.1%
	24	1,175	1.9%
	60	11,023	18.1%
23 Total		**60,761**	
24	11	5,195	8.6%
	22	4,942	8.1%
	24	50,600	83.3%
24 Total		**60,737**	
82	7	1,689	2.9%
	21	2,098	3.5%
	82	53,318	90.1%
	83	2,091	3.5%
82 Total		**59,196**	
83	32	990	1.7%
	62	4,252	7.2%
	82	1,478	2.5%
	83	47,917	81.5%

	84	4,133	7.0%
83 Total		**58,770**	
84	7	28,492	47.9%
	82	1,858	3.1%
	83	1,930	3.2%
	84	27,249	45.8%
84 Total		**59,529**	

Appendix 1G Core Retention Analysis
Governor Plan SD 4 and SD 6 Table

(Total, Black and Hispanic Populations)

Base District	Governor District	Total Population	Black Population	Hispanic Population	Total Percentage	Black Percentage	Hispanic Percentage
4	4	129,758	81,440	7,480	79.5%	78.5%	81.4%
	5	27,748	17,725	1,364	17.0%	17.1%	14.8%
	6	5,702	4,529	348	3.5%	4.4%	3.8%
4 Total		**163,208**	**103,694**	**9,192**			
6	3	0	0	0	0.0%	0.0%	0.0%
	4	4,694	4,432	92	2.9%	4.3%	0.8%
	5	20,864	11,399	1,058	12.9%	11.1%	9.7%
	6	136,511	87,213	9,708	84.2%	84.6%	89.4%
6 Total		**162,069**	**103,044**	**10,858**			

Appendix 1H Core Retention Analysis
BLOC Plan SD 4 and SD 6 Table

(Total, Black and Hispanic Populations)

Base District	BLOC District	Total Population	Black Population	Hispanic Population	Total Percentage	Black Percentage	Hispanic Percentage
4	4	112,385	6,551	76,873	68.9%	71.3%	74.1%
	5	29,202	1,354	19,490	17.9%	14.7%	18.8%
	6	7,762	533	6,618	4.8%	5.8%	6.4%
	8	13,859	754	713	8.5%	8.2%	0.7%
4 Total		**163,208**	**9,192**	**103,694**			
6	3	0	0	0	0.0%	0.0%	0.0%
	4	11,899	956	7,145	7.3%	8.8%	6.9%
	5	18,877	1,000	10,633	11.6%	9.2%	10.3%
	6	123,666	8,107	84,590	76.3%	74.7%	82.1%
	7	7,627	795	676	4.7%	7.3%	0.7%
6 Total		**162,069**	**10,858**	**103,044**			

Appendix 1I Core Retention Analysis
Bewley Plan SD 4 and SD 6 Table

(Total Population)

Base District	Bewley District	Total Population	Total Percentage
4	4	153,151	93.8%
	6	4,690	2.9%
	8	5,367	3.3%
4 Total		**163,208**	
6	4	1,814	1.0%
	6	160,255	98.9%
6 Total		**162,069**	

Appendix 1J Core Retention Analysis
Governor Plan Assembly Raw Tables

(Total, Black and Hispanic Populations)

Row Labels	Sum of PERSONS	Sum of BLACK	Sum of HISPANIC
1	**59834**	**474**	**2148**
1	59834	474	2148
2	**62564**	**955**	**2104**
2	56308	920	1938
4	0	0	0
25	5874	33	164
88	382	2	2
3	**61906**	**933**	**2802**
3	53077	653	2136
5	14	0	5
57	6684	276	642
59	2131	4	19
4	**58716**	**2242**	**3101**
2	0	0	0
4	58716	2242	3101
90	0	0	0
5	**67428**	**778**	**2065**
3	6745	104	201
4	946	8	31
5	59711	665	1831
56	26	1	2
6	**57409**	**416**	**1783**
6	57401	416	1782
40	8	0	1
7	**59355**	**4806**	**16045**
7	42804	3334	11942
9	7545	756	2396
18	4332	514	790
20	4674	202	917
8	**53999**	**5135**	**38111**
8	53999	5135	38111
19	0	0	0
9	**57339**	**4357**	**34852**
8	5425	875	3533
9	51914	3482	31319
10	**52628**	**31951**	**3166**
10	45181	26073	2678
11	6482	5208	344
16	965	670	144
11	**54275**	**36313**	**2587**
10	3669	767	175

11	30461	21360	1447
12	10903	6834	557
14	4505	3493	204
17	4737	3859	204
12	**56305**	**35430**	**3439**
12	33062	21198	2279
14	23243	14232	1160
13	**61779**	**2841**	**4263**
13	39267	1336	1910
15	4134	142	386
17	5839	383	289
18	12539	980	1678
98	0	0	0
14	**60136**	**3351**	**2403**
13	20848	1471	964
14	7648	905	421
17	11766	488	398
22	19874	487	620
15	**57145**	**3071**	**5664**
7	9281	841	1483
15	43662	2164	4034
84	4202	66	147
16	**53739**	**32105**	**3812**
10	4694	4432	92
16	49045	27673	3720
17	**55343**	**38069**	**2852**
14	20864	11399	1058
17	32383	24850	1676
18	2096	1820	118
18	**52987**	**32870**	**4194**
8	0	0	0
16	7985	3894	761
17	4809	1478	342
18	40193	27498	3091
19	**62056**	**4196**	**4658**
8	0	0	0
10	4079	478	278
16	1383	92	88
19	56594	3626	4292
20	0	0	0
20	**56812**	**2589**	**9351**
19	2422	100	417
20	36186	1499	6136
21	18204	990	2798
21	**59100**	**2467**	**6275**
20	17396	668	1678
21	41704	1799	4597
22	**60750**	**4673**	**1869**

12	3535	1309	250
14	3024	1691	196
22	39348	1507	1120
24	14843	166	303
99	0	0	0
23	**60761**	**1792**	**2181**
11	591	40	29
19	0	0	0
23	58793	1716	2119
24	1377	36	33
24	**60737**	**7702**	**2532**
10	1692	168	79
11	22422	4801	1060
12	12008	1774	591
23	506	29	29
24	24109	930	773
25	**57986**	**1159**	**3747**
3	0	0	0
25	53719	1126	3403
59	4267	33	344
26	**58710**	**1736**	**5325**
26	58710	1736	5325
27	**59294**	**1070**	**3393**
27	59294	1070	3393
28	**59274**	**466**	**1314**
28	59274	466	1314
29	**61746**	**941**	**1632**
29	56660	864	1506
67	5086	77	126
30	**62735**	**1040**	**1971**
29	3203	28	70
30	59532	1012	1901
93	0	0	0
31	**59952**	**1734**	**6012**
31	59354	1725	5987
44	598	9	25
45	0	0	0
32	**59397**	**662**	**7284**
32	59397	662	7284
33	**58490**	**638**	**3724**
33	43373	499	3089
83	15109	139	632
97	8	0	3
34	**60803**	**392**	**1012**
34	56245	382	946
36	4558	10	66
35	**56431**	**476**	**1228**
6	895	4	47

34	3448	17	26
35	52088	455	1155
36	**57713**	**256**	**1344**
35	2778	24	51
36	54935	232	1293
89	0	0	0
37	**61182**	**1164**	**4113**
33	7689	52	206
37	21048	461	903
38	27759	537	2835
42	4686	114	169
38	**61646**	**884**	**3027**
24	13099	126	378
33	2512	14	73
38	30291	568	1942
97	7039	88	256
99	8705	88	378
39	**58192**	**854**	**3803**
24	0	0	0
33	5689	34	161
38	1631	13	55
39	50339	807	3559
59	533	0	28
40	**57138**	**743**	**2146**
6	1286	3	43
40	54846	732	2071
41	1006	8	32
41	**57743**	**1276**	**3749**
41	54018	1246	3652
42	3715	30	97
72	0	0	0
81	10	0	0
42	**58322**	**1209**	**1971**
39	8255	154	342
41	2417	8	54
42	47650	1047	1575
43	**59492**	**1256**	**4005**
43	59492	1256	4005
44	**58574**	**2990**	**4450**
44	58574	2990	4450
45	**57664**	**5973**	**8102**
45	57664	5973	8102
51	0	0	0
46	**65092**	**4082**	**3256**
37	23057	1825	1209
46	42035	2257	2047
47	0	0	0
47	**63646**	**5522**	**8208**

37	6	0	3
46	2346	44	144
47	59823	5339	7861
48	1471	139	200
48	**63754**	**8446**	**6198**
37	9954	1116	1376
46	14616	1414	972
48	35842	5775	3664
79	3342	141	186
49	**57941**	**918**	**1335**
49	55173	903	1286
50	2768	15	49
50	**58713**	**1075**	**2055**
50	53268	1032	1904
70	4522	37	139
81	0	0	0
96	923	6	12
51	**56878**	**437**	**2535**
49	4429	16	237
50	3435	16	45
51	48083	403	2233
81	931	2	20
52	**59848**	**2599**	**4260**
52	59848	2599	4260
53	0	0	0
53	**58579**	**3206**	**2620**
39	974	23	34
41	2347	27	60
53	52546	3027	2452
54	2712	129	74
54	**57411**	**2765**	**2564**
53	6	5	1
54	57405	2760	2563
55	**61992**	**1517**	**3206**
55	52316	1262	2471
56	6902	59	376
57	2774	196	359
56	**64544**	**1227**	**2701**
40	4977	17	54
53	6918	43	83
56	52649	1167	2564
57	**57937**	**2532**	**5184**
55	7517	277	703
57	50420	2255	4481
58	**59054**	**1042**	**2198**
58	59054	1042	2198
59	**58158**	**962**	**2295**
24	4973	59	240

26	956	1	35
39	0	0	0
59	52229	902	2020
60	**59358**	**870**	**1972**
60	59358	870	1972
61	**59972**	**1199**	**4193**
61	59972	1199	4193
62	**58422**	**4341**	**5933**
62	51032	3109	4879
64	0	0	0
66	7390	1232	1054
63	**59808**	**3617**	**4639**
63	59808	3617	4639
64	**57845**	**5973**	**8051**
64	55728	5817	7658
65	2117	156	393
65	**57248**	**8118**	**13577**
65	57248	8118	13577
66	**56026**	**16016**	**15388**
64	4282	743	1007
66	51744	15273	14381
67	**60513**	**692**	**1055**
67	43932	296	661
68	14731	382	368
75	1850	14	26
68	**61896**	**1216**	**1408**
67	8480	648	306
68	45140	543	917
69	8276	25	185
93	0	0	0
69	**57134**	**565**	**3343**
69	51611	541	2807
70	1193	8	19
86	1439	6	36
87	2891	10	481
70	**58276**	**859**	**2488**
70	50298	797	2278
71	1634	8	50
72	1874	35	98
86	2961	12	46
94	1509	7	16
71	**57866**	**1175**	**2162**
70	0	0	0
71	57866	1175	2162
72	**57669**	**694**	**2872**
70	0	0	0
72	57669	694	2872
73	**58507**	**961**	**974**

73	58507	961	974
75	0	0	0
74	**59010**	**366**	**1051**
74	59010	366	1051
75	**58751**	**1032**	**1509**
73	566	4	5
75	58185	1028	1504
76	**71685**	**4039**	**4483**
48	22534	1869	1524
76	49151	2170	2959
77	**62992**	**4774**	**6797**
47	0	0	0
76	10676	303	629
77	52316	4471	6168
79	0	0	0
78	**67142**	**5160**	**5340**
77	7787	311	382
78	59355	4849	4958
79	0	0	0
79	**69732**	**2011**	**3459**
37	5689	260	321
42	3575	111	170
46	0	0	0
48	6	1	1
79	54803	1542	2738
80	5659	97	229
80	**65830**	**1494**	**2357**
45	1466	13	52
51	10913	100	206
79	23	0	0
80	53428	1381	2099
81	**59943**	**1346**	**2944**
79	1871	6	30
81	58072	1340	2914
82	**59196**	**2798**	**4730**
20	1703	129	290
82	57493	2669	4440
83	**58770**	**582**	**2417**
62	8898	62	351
82	1782	16	52
83	44827	482	1852
84	3263	22	162
97	0	0	0
84	**59529**	**2513**	**7046**
7	7772	526	1759
84	51757	1987	5287
85	**58671**	**1273**	**2094**
35	8	0	4

85	47185	1204	1811
86	11478	69	279
86	**60462**	**585**	**1368**
35	4216	27	71
85	12337	244	445
86	43909	314	852
87	**57051**	**329**	**1324**
67	840	1	3
86	0	0	0
87	56211	328	1321
88	**62894**	**2035**	**7485**
2	2732	39	92
88	45832	1117	6148
90	14330	879	1245
89	**60143**	**658**	**1561**
89	59204	575	1516
90	939	83	45
90	**57912**	**5076**	**12843**
4	0	0	0
88	13803	1045	4572
90	44109	4031	8271
91	**59397**	**1410**	**1973**
91	59397	1410	1973
92	**59334**	**766**	**4866**
92	59334	766	4866
93	**60667**	**543**	**1490**
67	1212	12	22
68	49	0	2
93	59406	531	1466
94	**62080**	**790**	**1231**
94	53228	725	1083
95	5826	34	99
96	3026	31	49
95	**58704**	**2292**	**1820**
94	4284	63	78
95	52642	2202	1690
96	1778	27	52
96	**58372**	**671**	**1405**
70	3937	91	172
95	1144	6	50
96	53291	574	1183
97	**56590**	**2175**	**7530**
15	9256	291	1106
84	0	0	0
97	47334	1884	6424
98	**61407**	**1725**	**4155**
15	2391	135	183
98	59016	1590	3972

99	**57780**	**475**	**1733**
24	858	1	14
83	3	0	0
97	5519	19	132
99	51400	455	1587
(blank)			
(blank)			
Grand Total	**5893718**	**415979**	**447290**

Appendix 1K Core Retention Analysis
BLOC Plan Assembly Raw Tables

(Total, Black and Hispanic Populations)

Row Labels	Sum of PERSONS	Sum of BLACK	Sum of HISPANIC
1	**59834**	**474**	**2148**
1	59834	474	2148
2	**62564**	**955**	**2104**
2	51217	838	1775
5	10631	114	319
25	694	3	9
88	22	0	1
1	0	0	0
4	0	0	0
3	**61906**	**933**	**2802**
3	56972	892	2480
2	4912	41	315
5	22	0	7
4	**58716**	**2242**	**3101**
4	58716	2242	3101
90	0	0	0
2	0	0	0
5	**67428**	**778**	**2065**
5	49272	610	1665
6	15439	113	315
3	2717	55	85
56	0	0	0
4	0	0	0
6	**57409**	**416**	**1783**
6	41948	303	1308
36	8900	53	201
40	6561	60	274
7	**59355**	**4806**	**16045**
7	49384	3729	12926
9	7622	854	2841
18	2349	223	278
8	**53999**	**5135**	**38111**
8	53999	5135	38111
19	0	0	0
9	**57339**	**4357**	**34852**
9	51976	4069	31754
8	5363	288	3098
10	**52628**	**31951**	**3166**
10	28481	22355	1792
23	13859	713	754
16	7762	6618	533

11	2526	2265	87
11	**54275**	**36313**	**2587**
11	31537	23160	1558
12	8508	5307	381
14	7954	6251	344
10	6276	1595	304
12	**56305**	**35430**	**3439**
12	35057	22191	2429
14	21248	13239	1010
13	**61779**	**2841**	**4263**
13	38847	1389	1660
17	12546	775	806
18	5463	502	1168
15	4923	175	629
14	**60136**	**3351**	**2403**
22	23284	568	761
13	21010	1169	817
14	11070	1335	642
17	4772	279	183
15	**57145**	**3071**	**5664**
15	52244	2673	4878
18	4520	398	769
84	381	0	17
16	**53739**	**32105**	**3812**
16	30840	22273	1912
10	11899	7145	956
19	7627	676	795
18	3373	2011	149
17	**55343**	**38069**	**2852**
17	35423	26602	1794
14	18877	10633	1000
18	1043	834	58
18	**52987**	**32870**	**4194**
18	42937	27233	3489
17	6732	3507	377
16	3318	2130	328
9	0	0	0
19	**62056**	**4196**	**4658**
19	39224	1811	3056
16	17367	1772	1253
10	5465	613	349
20	0	0	0
8	0	0	0
20	**56812**	**2589**	**9351**
20	44185	2074	7174
19	12627	515	2177
21	**59100**	**2467**	**6275**
21	58547	2456	6220

82	553	11	55
22	**60750**	**4673**	**1869**
22	36562	930	968
12	13264	3530	619
98	5942	54	135
24	3072	147	127
99	1910	12	20
23	**60761**	**1792**	**2181**
23	41504	1436	1603
24	12079	181	363
11	4269	138	155
60	2909	37	60
19	0	0	0
24	**60737**	**7702**	**2532**
24	26576	1066	883
11	20822	5373	1022
10	7081	973	363
23	3762	165	139
12	2496	125	125
25	**57986**	**1159**	**3747**
25	57986	1159	3747
1	0	0	0
27	0	0	0
2	0	0	0
3	0	0	0
26	**58710**	**1736**	**5325**
26	42638	1611	4731
60	15437	111	567
27	635	14	27
27	**59294**	**1070**	**3393**
27	42105	445	1509
26	16716	625	1870
25	473	0	14
28	**59274**	**466**	**1314**
28	58724	459	1300
75	550	7	14
29	**61746**	**941**	**1632**
29	56089	888	1492
93	3139	36	70
75	1951	11	45
30	567	6	25
30	**62735**	**1040**	**1971**
30	59056	1010	1884
29	3679	30	87
93	0	0	0
31	**59952**	**1734**	**6012**
31	26933	1161	2930
32	20682	304	2355

33	3902	30	232
44	3896	92	164
45	2638	133	197
43	1901	14	134
32	**59397**	**662**	**7284**
32	39194	446	5759
83	10580	85	379
61	5523	90	701
33	2491	24	367
63	1609	17	78
33	**58490**	**638**	**3724**
33	49318	553	3365
83	9170	85	359
43	2	0	0
34	**60803**	**392**	**1012**
34	59734	389	1000
35	1069	3	12
36	0	0	0
35	**56431**	**476**	**1228**
35	55795	476	1205
86	636	0	23
36	**57713**	**256**	**1344**
36	50878	221	1177
6	2494	2	105
35	2453	24	46
89	1888	9	16
37	**61182**	**1164**	**4113**
37	39801	765	2355
38	14674	347	1580
39	6707	52	178
79	0	0	0
46	0	0	0
38	**61646**	**884**	**3027**
38	29316	559	1937
39	21002	240	823
99	4989	30	119
59	3386	34	76
33	2953	21	72
39	**58192**	**854**	**3803**
39	32079	605	2888
59	11773	103	342
42	9742	93	349
52	4076	52	219
37	522	1	5
40	**57138**	**743**	**2146**
40	48929	373	1789
41	5076	359	257
72	3133	11	100

36	0	0	0
41	**57743**	**1276**	**3749**
41	50427	1058	2545
81	6390	217	1177
53	922	1	27
50	4	0	0
72	0	0	0
42	**58322**	**1209**	**1971**
42	49701	1082	1720
37	3040	95	155
81	2791	19	42
41	2790	13	54
53	0	0	0
43	**59492**	**1256**	**4005**
43	55399	1135	3824
45	3096	101	127
33	842	7	36
44	102	11	13
38	53	2	5
31	0	0	0
44	**58574**	**2990**	**4450**
44	55314	2758	4246
31	3223	230	202
43	37	2	2
45	**57664**	**5973**	**8102**
31	29072	5305	6691
45	28592	668	1411
51	0	0	0
43	0	0	0
46	**65092**	**4082**	**3256**
46	48337	3667	2709
38	15550	411	523
43	1205	4	24
47	0	0	0
37	0	0	0
47	**63646**	**5522**	**8208**
47	54781	5097	7722
80	5517	192	270
48	1835	171	135
46	1373	13	53
77	102	41	17
78	21	0	11
37	15	7	0
38	2	1	0
48	**63754**	**8446**	**6198**
48	45172	6384	4513
46	9631	1050	645
37	7586	914	971

47	1365	98	69
79	0	0	0
49	**57941**	**918**	**1335**
49	57869	918	1335
51	72	0	0
50	**58713**	**1075**	**2055**
50	57230	1065	2039
96	923	6	12
49	560	4	4
81	0	0	0
51	**56878**	**437**	**2535**
51	43525	303	1672
45	11794	126	833
49	1063	6	22
50	496	2	8
52	**59848**	**2599**	**4260**
52	54006	2572	4141
27	5305	24	114
53	537	3	5
53	**58579**	**3206**	**2620**
53	56713	3048	2545
54	1860	158	71
52	6	0	4
55	0	0	0
42	0	0	0
54	**57411**	**2765**	**2564**
54	57299	2754	2553
53	112	11	11
55	**61992**	**1517**	**3206**
55	59421	1492	3142
56	2571	25	64
56	**64544**	**1227**	**2701**
56	56717	1133	2492
40	4072	19	54
57	1926	58	131
53	988	11	18
41	826	6	6
55	15	0	0
57	**57937**	**2532**	**5184**
57	57930	2531	5182
3	7	1	2
55	0	0	0
58	**59054**	**1042**	**2198**
58	58933	1041	2198
60	121	1	0
59	0	0	0
24	0	0	0
22	0	0	0

59	**58158**	**962**	**2295**
59	44559	692	1745
27	11166	253	406
52	1579	4	118
58	854	13	26
60	**59358**	**870**	**1972**
60	41068	653	1524
24	17815	210	433
23	466	6	10
58	9	1	5
61	**59972**	**1199**	**4193**
61	54301	928	3556
65	5644	269	628
64	27	2	9
62	**58422**	**4341**	**5933**
62	58422	4341	5933
64	0	0	0
66	0	0	0
63	0	0	0
63	**59808**	**3617**	**4639**
63	57902	3506	4397
64	1034	70	158
62	872	41	84
64	**57845**	**5973**	**8051**
64	54356	4900	7561
66	3430	1072	482
65	52	1	7
61	7	0	1
65	**57248**	**8118**	**13577**
65	53481	7366	12417
64	3767	752	1160
66	**56026**	**16016**	**15388**
66	56026	16016	15388
67	**60513**	**692**	**1055**
67	59266	684	1037
75	1247	8	18
29	0	0	0
68	**61896**	**1216**	**1408**
68	57390	1177	1280
87	2697	36	91
69	1776	2	36
91	29	1	1
93	4	0	0
67	0	0	0
69	**57134**	**565**	**3343**
69	57131	565	3342
87	3	0	1
70	**58276**	**859**	**2488**

70	57556	854	2476
71	718	5	12
92	2	0	0
96	0	0	0
71	**57866**	**1175**	**2162**
71	56861	1173	2136
72	998	2	26
70	7	0	0
72	**57669**	**694**	**2872**
72	55010	682	2606
71	1922	12	246
41	737	0	20
70	0	0	0
73	**58507**	**961**	**974**
73	57600	957	961
74	700	3	10
75	207	1	3
74	**59010**	**366**	**1051**
74	59010	366	1051
34	0	0	0
75	**58751**	**1032**	**1509**
75	55811	1027	1437
73	2166	5	54
28	774	0	18
76	**71685**	**4039**	**4483**
76	59485	2639	3448
48	12200	1400	1035
77	0	0	0
77	**62992**	**4774**	**6797**
77	59347	4085	5662
47	3645	689	1135
78	**67142**	**5160**	**5340**
78	59299	4910	4947
79	7828	247	391
47	8	3	2
80	7	0	0
79	**69732**	**2011**	**3459**
79	51589	1495	2657
37	8904	321	472
80	8634	124	292
46	369	50	19
78	183	8	7
48	53	13	12
47	0	0	0
80	**65830**	**1494**	**2357**
80	39547	1102	1626
45	13088	241	426
51	12105	112	254

43	1029	30	50
78	47	5	1
79	14	4	0
47	0	0	0
81	**59943**	**1346**	**2944**
81	50437	1229	2715
80	5642	89	121
51	3860	28	108
42	4	0	0
82	**59196**	**2798**	**4730**
82	41412	2107	2756
20	15050	598	1649
7	1689	78	242
21	1045	15	83
83	**58770**	**582**	**2417**
83	30386	209	1041
82	17432	126	616
84	10952	247	760
97	0	0	0
84	**59529**	**2513**	**7046**
84	48515	1838	4846
7	8335	481	1805
15	2679	194	395
85	**58671**	**1273**	**2094**
85	58654	1273	2090
86	17	0	4
86	**60462**	**585**	**1368**
86	59249	567	1340
85	813	12	13
69	400	6	15
87	**57051**	**329**	**1324**
87	57051	329	1324
86	0	0	0
88	**62894**	**2035**	**7485**
88	59149	2000	7323
2	3711	35	161
90	34	0	1
89	**60143**	**658**	**1561**
89	57642	522	1445
90	1933	125	92
4	568	11	24
90	**57912**	**5076**	**12843**
90	57912	5076	12843
4	0	0	0
91	**59397**	**1410**	**1973**
91	59380	1409	1973
93	17	1	0
68	0	0	0

92	**59334**	**766**	**4866**
92	57324	732	4809
70	2010	34	57
93	**60667**	**543**	**1490**
93	56303	518	1393
92	2118	10	28
68	1923	8	34
91	323	7	35
94	**62080**	**790**	**1231**
94	59494	773	1163
96	1925	8	50
95	661	9	18
95	**58704**	**2292**	**1820**
95	58704	2292	1820
94	0	0	0
96	**58372**	**671**	**1405**
96	56858	657	1355
50	1495	11	49
70	19	3	1
97	**56590**	**2175**	**7530**
97	51789	2131	7214
83	4311	25	145
98	490	19	171
84	0	0	0
98	**61407**	**1725**	**4155**
98	53396	1313	3184
97	8011	412	971
99	**57780**	**475**	**1733**
99	52791	457	1613
83	4907	18	115
98	82	0	5
97	0	0	0
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Grand Total	**5893718**	**415979**	**447290**

Appendix 1L Core Retention Analysis
Bewley Plan Assembly Raw Tables
(Total Population)

Row Labels	Sum of Persons
1	**59834**
1	59444
2	390
2	**62564**
2	58373
4	1940
25	2251
3	**61906**
3	59775
25	2131
4	**58716**
4	40828
5	1519
89	2213
90	14156
5	**67428**
4	3192
5	56535
6	7701
6	**57409**
6	48516
35	4296
36	1803
40	2794
7	**59355**
7	27878
9	11628
13	5007
15	8995
18	4343
20	1504
8	**53999**
8	51068
9	2931
9	**57339**
7	4828
8	8224
9	44287
10	**52628**
10	52628
11	**54275**

10	3355
11	36256
12	9297
24	5367
12	**56305**
11	20267
12	31348
17	4690
13	**61779**
13	37558
14	9651
15	4263
18	6772
98	3535
14	**60136**
12	2074
13	4420
14	51308
17	2334
15	**57145**
13	9873
15	44932
84	2340
16	**53739**
16	53739
17	**55343**
12	1814
17	53529
18	**52987**
16	7379
17	3090
18	42518
19	**62056**
10	1220
16	1383
19	57730
20	1723
20	**56812**
19	1248
20	55564
21	**59100**
21	57223
82	1877
22	**60750**
12	15032
22	41193
58	2823
97	1702

23	**60761**
10	1131
23	47432
24	1175
60	11023
24	**60737**
11	5195
22	4942
24	50600
25	**57986**
25	55088
27	2124
58	774
26	**58710**
26	56185
27	2525
27	**59294**
26	4364
27	54479
58	451
28	**59274**
28	58168
75	1106
29	**61746**
28	1585
29	37428
67	2475
93	20258
30	**62735**
29	10200
30	52535
31	**59952**
31	47608
32	10397
43	1947
32	**59397**
31	9760
32	47421
61	1275
63	941
33	**58490**
32	833
33	51383
83	6274
34	**60803**
34	55403
36	5400
35	**56431**

34	3448
35	50082
86	2074
87	827
36	**57713**
6	3520
34	1215
35	2762
36	50216
37	**61182**
37	47483
42	6992
97	6707
38	**61646**
33	4700
37	3906
38	20743
97	32297
39	**58192**
37	594
39	57598
40	**57138**
40	53461
41	3677
41	**57743**
41	43783
53	9177
72	4783
42	**58322**
37	2250
39	831
41	2736
42	48537
53	1917
81	2051
43	**59492**
31	1433
33	737
43	55194
44	1262
80	866
44	**58574**
44	58574
45	**57664**
31	317
45	57347
51	0
46	**65092**

38	23519
46	41573
47	**63646**
38	14850
46	389
47	44489
48	1436
77	595
78	3
80	1884
48	**63754**
46	17234
48	44997
79	1523
49	**57941**
49	53763
50	591
96	3587
50	**58713**
50	50304
51	697
81	883
96	6829
51	**56878**
49	5361
50	158
51	49401
81	1417
96	541
52	**59848**
52	58254
58	1594
53	**58579**
41	7568
52	1747
53	36976
54	12288
54	**57411**
53	4615
54	52796
55	**61992**
55	51186
56	10806
56	**64544**
5	1465
40	2464
53	1769
55	7911

56	49113
57	1822
57	**57937**
57	57937
58	**59054**
22	1720
58	56423
60	911
59	**58158**
39	1858
58	2743
59	52744
60	813
60	**59358**
23	12121
58	545
60	46692
61	**59972**
61	58399
64	0
65	1573
62	**58422**
62	53824
66	4598
63	**59808**
62	1513
63	56665
66	1630
64	**57845**
64	54996
65	2849
65	**57248**
65	57248
66	**56026**
64	2589
66	53437
67	**60513**
67	56467
93	4046
68	**61896**
67	605
68	53245
69	6111
87	1935
69	**57134**
69	50292
86	3951
87	2891

70	**58276**
50	1056
70	55059
71	2161
71	**57866**
40	623
71	57046
72	197
72	**57669**
40	661
41	2020
71	839
72	54149
73	**58507**
73	57962
75	545
74	**59010**
73	1196
74	49294
87	8520
75	**58751**
29	638
75	58113
76	**71685**
48	11638
76	56655
77	3392
77	**62992**
47	11350
76	4733
77	45422
78	1487
78	**67142**
77	7583
78	59559
79	**69732**
37	5415
42	2416
46	1663
48	2408
79	52977
80	4853
80	**65830**
43	991
45	1382
47	3255
51	7477
79	2160

80	50565
81	**59943**
42	2028
51	2330
81	55585
82	**59196**
7	1689
21	2098
82	53318
83	2091
83	**58770**
32	990
62	4252
82	1478
83	47917
84	4133
84	**59529**
7	28492
82	1858
83	1930
84	27249
85	**58671**
35	1148
85	49689
86	7834
86	**60462**
35	1611
69	2199
85	10200
86	46452
87	**57051**
68	0
74	10351
86	947
87	45753
88	**62894**
2	1045
4	3620
88	55470
90	2759
89	**60143**
36	2495
89	57648
90	**57912**
4	10715
88	5461
90	41736
91	**59397**

91	58588
93	809
92	**59334**
92	59334
93	**60667**
29	11653
30	6510
68	6987
91	963
92	321
93	34233
94	**62080**
70	1711
94	57674
95	2695
95	**58704**
94	1778
95	56926
96	**58372**
50	7259
70	2430
96	48683
97	**56590**
33	2374
83	1516
84	24647
97	220
98	17053
99	10780
98	**61407**
22	12837
98	38584
99	9986
99	**57780**
97	18356
99	39424
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Grand Total	**5893718**

Appendix 1M Core Retention Analysis
Governor Plan Senate Raw Tables

(Total, Black and Hispanic Populations)

Row Labels	Sum of PERSONS	Sum of BLACK	Sum of HISPANIC
1	**184304**	**2362**	**7054**
1	169219	2047	6222
2	14	0	5
9	5874	33	164
19	6684	276	642
20	2131	4	19
30	382	2	2
2	**183553**	**3436**	**6949**
1	6745	104	201
2	176774	3331	6745
14	8	0	1
19	26	1	2
30	0	0	0
3	**170693**	**14298**	**89008**
3	161687	13582	87301
6	4332	514	790
7	4674	202	917
4	**163208**	**103694**	**9192**
4	129758	81440	7480
5	27748	17725	1364
6	5702	4529	348
5	**179060**	**9263**	**12330**
3	9281	841	1483
5	115559	6018	7715
6	30144	1851	2365
8	19874	487	620
28	4202	66	147
33	0	0	0
6	**162069**	**103044**	**10858**
3	0	0	0
4	4694	4432	92
5	20864	11399	1058
6	136511	87213	9708
7	**177968**	**9252**	**20284**
3	0	0	0
4	4079	478	278
6	1383	92	88
7	172506	8682	19918
8	**182248**	**14167**	**6582**
4	40248	8092	2009
5	3024	1691	196

7	0	0	0
8	138976	4384	4377
33	0	0	0
9	**175990**	**3965**	**12465**
1	0	0	0
9	171723	3932	12121
20	4267	33	344
10	**183755**	**2447**	**4917**
10	178669	2370	4791
23	5086	77	126
31	0	0	0
11	**177839**	**3034**	**17020**
11	162124	2886	16360
15	598	9	25
28	15109	139	632
33	8	0	3
12	**174947**	**1124**	**3584**
2	895	4	47
12	174052	1120	3537
30	0	0	0
13	**181020**	**2902**	**10943**
8	13099	126	378
11	15890	100	440
13	131068	2386	9294
14	4686	114	169
20	533	0	28
33	15744	176	634
14	**173203**	**3228**	**7866**
2	1286	3	43
13	8255	154	342
14	163652	3071	7481
24	0	0	0
27	10	0	0
15	**175730**	**10219**	**16557**
15	175730	10219	16557
17	0	0	0
16	**192492**	**18050**	**17662**
13	33017	2941	2588
16	156133	14968	14888
27	3342	141	186
17	**173532**	**2430**	**5925**
17	167156	2385	5754
24	4522	37	139
27	931	2	20
32	923	6	12
18	**175838**	**8570**	**9444**
13	974	23	34
14	2347	27	60

18	172517	8520	9350
19	**184473**	**5276**	**11091**
14	4977	17	54
18	6918	43	83
19	172578	5216	10954
20	**176570**	**2874**	**6465**
8	4973	59	240
9	956	1	35
13	0	0	0
20	170641	2814	6190
21	**178202**	**9157**	**14765**
21	170812	7925	13711
22	7390	1232	1054
22	**171119**	**30107**	**37016**
22	171119	30107	37016
23	**179543**	**2473**	**5806**
23	172170	2435	5244
24	1193	8	19
25	1850	14	26
29	4330	16	517
31	0	0	0
24	**173811**	**2728**	**7522**
24	169341	2709	7460
29	2961	12	46
32	1509	7	16
25	**176268**	**2359**	**3534**
25	176268	2359	3534
26	**201819**	**13973**	**16620**
16	22534	1869	1524
26	179285	12104	15096
27	0	0	0
27	**195505**	**4851**	**8760**
13	5689	260	321
14	3575	111	170
15	1466	13	52
16	6	1	1
17	10913	100	206
27	173856	4366	8010
28	**177495**	**5893**	**14193**
3	7772	526	1759
7	1703	129	290
21	8898	62	351
28	159122	5176	11793
33	0	0	0
29	**176184**	**2187**	**4786**
12	4224	27	75
23	840	1	3
29	171120	2159	4708

30	**180949**	**7769**	**21889**
1	2732	39	92
2	0	0	0
30	178217	7730	21797
31	**179398**	**2719**	**8329**
23	1261	12	24
31	178137	2707	8305
32	**179156**	**3753**	**4456**
24	3937	91	172
32	175219	3662	4284
33	**175777**	**4375**	**13418**
5	11647	426	1289
8	858	1	14
28	3	0	0
33	163269	3948	12115
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Grand Total	**5893718**	**415979**	**447290**

Appendix 1N Core Retention Analysis
BLOC Plan Senate Raw Tables

(Total, Black and Hispanic Populations)

Row Labels	Sum of PERSONS	Sum of BLACK	Sum of HISPANIC
1	**184304**	**2362**	**7054**
1	172935	2245	6718
2	10653	114	326
9	694	3	9
30	22	0	1
2	**183553**	**3436**	**6949**
2	165375	3268	6389
12	8900	53	201
14	6561	60	274
1	2717	55	85
30	0	0	0
19	0	0	0
3	**170693**	**14298**	**89008**
3	168344	14075	88730
6	2349	223	278
7	0	0	0
4	**163208**	**103694**	**9192**
4	112385	76873	6551
5	29202	19490	1354
8	13859	713	754
6	7762	6618	533
5	**179060**	**9263**	**12330**
5	128094	6741	8626
6	27301	1954	2926
8	23284	568	761
28	381	0	17
6	**162069**	**103044**	**10858**
6	123666	84590	8107
5	18877	10633	1000
4	11899	7145	956
7	7627	676	795
3	0	0	0
7	**177968**	**9252**	**20284**
7	154583	6856	18627
6	17367	1772	1253
4	5465	613	349
28	553	11	55
3	0	0	0
8	**182248**	**14167**	**6582**
8	123555	3925	4083
4	47932	10139	2284

33	7852	66	155
20	2909	37	60
7	0	0	0
9	**175990**	**3965**	**12465**
9	160553	3854	11898
20	15437	111	567
1	0	0	0
10	**183755**	**2447**	**4917**
10	178115	2393	4788
31	3139	36	70
25	2501	18	59
11	**177839**	**3034**	**17020**
11	142520	2518	15008
28	19750	170	738
15	8437	239	495
21	7132	107	779
12	**174947**	**1124**	**3584**
12	169929	1113	3440
2	2494	2	105
30	1888	9	16
29	636	0	23
13	**181020**	**2902**	**10943**
13	144101	2569	9766
20	15159	137	418
14	9742	93	349
33	4989	30	119
18	4076	52	219
11	2953	21	72
27	0	0	0
16	0	0	0
14	**173203**	**3228**	**7866**
14	156923	2885	6365
27	9181	236	1219
24	3133	11	100
13	3040	95	155
18	922	1	27
17	4	0	0
12	0	0	0
15	**175730**	**10219**	**16557**
15	142540	4675	9623
11	33137	5542	6929
13	53	2	5
17	0	0	0
16	**192492**	**18050**	**17662**
16	162494	16480	15846
13	23153	1333	1494
27	5517	192	270
15	1205	4	24

26	123	41	28
17	**173532**	**2430**	**5925**
17	160815	2298	5080
15	11794	126	833
32	923	6	12
27	0	0	0
18	**175838**	**8570**	**9444**
18	170533	8546	9330
9	5305	24	114
19	0	0	0
14	0	0	0
19	**184473**	**5276**	**11091**
19	178580	5239	11011
14	4898	25	60
18	988	11	18
1	7	1	2
20	**176570**	**2874**	**6465**
20	145544	2401	5498
8	18281	216	443
9	11166	253	406
18	1579	4	118
21	**178202**	**9157**	**14765**
21	171497	8816	13970
22	6705	341	795
22	**171119**	**30107**	**37016**
22	171112	30107	37015
21	7	0	1
23	**179543**	**2473**	**5806**
23	175563	2428	5695
29	2700	36	92
25	1247	8	18
31	33	1	1
10	0	0	0
24	**173811**	**2728**	**7522**
24	173072	2728	7502
14	737	0	20
31	2	0	0
32	0	0	0
25	**176268**	**2359**	**3534**
25	175494	2359	3516
10	774	0	18
12	0	0	0
26	**201819**	**13973**	**16620**
26	178131	11634	14057
16	15853	2092	2172
27	7835	247	391
27	**195505**	**4851**	**8760**
27	155863	4043	7411

17	15965	140	362
15	14117	271	476
13	8904	321	472
16	422	63	31
26	230	13	8
14	4	0	0
28	**177495**	**5893**	**14193**
28	148697	4527	10019
7	16095	613	1732
3	10024	559	2047
5	2679	194	395
33	0	0	0
29	**176184**	**2187**	**4786**
29	175784	2181	4771
23	400	6	15
30	**180949**	**7769**	**21889**
30	176670	7723	21704
1	3711	35	161
2	568	11	24
31	**179398**	**2719**	**8329**
31	175465	2677	8238
24	2010	34	57
23	1923	8	34
32	**179156**	**3753**	**4456**
32	177642	3739	4406
17	1495	11	49
24	19	3	1
33	**175777**	**4375**	**13418**
33	166559	4332	13158
28	9218	43	260
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Grand Total	**5893718**	**415979**	**447290**

Appendix 1O Core Retention Analysis
Bewley Plan Senate Raw Tables
(Total Population)

Row Labels	Sum of Persons
1	**184304**
1	177982
2	1940
9	4382
2	**183553**
2	158291
12	6099
14	2794
30	16369
3	**170693**
3	150844
5	14002
6	4343
7	1504
4	**163208**
4	153151
6	4690
8	5367
5	**179060**
4	2074
5	162005
6	9106
28	2340
33	3535
6	**162069**
4	1814
6	160255
7	**177968**
4	1220
6	1383
7	173488
28	1877
8	**182248**
4	21358
8	145342
20	13846
33	1702
9	**175990**
9	174765

20	1225
10	**183755**
10	159916
23	2475
25	1106
31	20258
11	**177839**
11	167402
15	1947
21	2216
28	6274
12	**174947**
2	3520
12	168526
29	2901
13	**181020**
11	4700
13	130324
14	6992
33	39004
14	**173203**
14	155275
18	11094
24	4783
26	2051
15	**175730**
11	2487
15	172377
17	0
26	866
16	**192492**
13	38369
15	1205
16	148913
26	4005
17	**173532**
17	160275
26	2300
32	10957
18	**175838**
14	7568
18	166676
20	1594
19	**184473**
2	1465
14	2464
18	1769
19	178775

20	**176570**
8	13841
13	1858
20	160871
21	**178202**
21	170401
22	7801
22	**171119**
22	171119
23	**179543**
23	166720
29	8777
31	4046
24	**173811**
14	3304
17	1056
24	169451
25	**176268**
10	638
25	167110
29	8520
26	**201819**
16	22988
26	178831
27	**195505**
13	5415
14	4444
15	2373
16	7326
17	9807
27	166140
28	**177495**
3	30181
7	2098
11	990
21	4252
28	139974
29	**176184**
12	2759
23	2199
25	10351
29	160875
30	**180949**
1	1045
2	14335
12	2495
30	163074
31	**179398**

10	18163
23	6987
31	154248
32	**179156**
17	7259
24	4141
32	167756
33	**175777**
5	828
8	12837
11	2374
28	26163
33	133575
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(blank)	
Grand Total	**5893718**