APPENDIX A

Defendants' Proposed Remedial Plan

Precinct Boundaries

District
1
2
3
4
5

RE
Total Pop: 18,363
Total CVAP: 7,305
Total HCVAP: 3,905

MA
Total Pop: 18,579
Total CVAP: 13,074
Total HCVAP: 1,581

DE

BL

KC

MC
Total Pop: 17,917
Total CVAP: 12,981
Total HCVAP: 1,377

TD
Total Pop: 18,422
Total CVAP: 12,583
Total HCVAP: 2,559

Total Pop: 17,786
Total CVAP: 9,061
Total HCVAP: 3,212

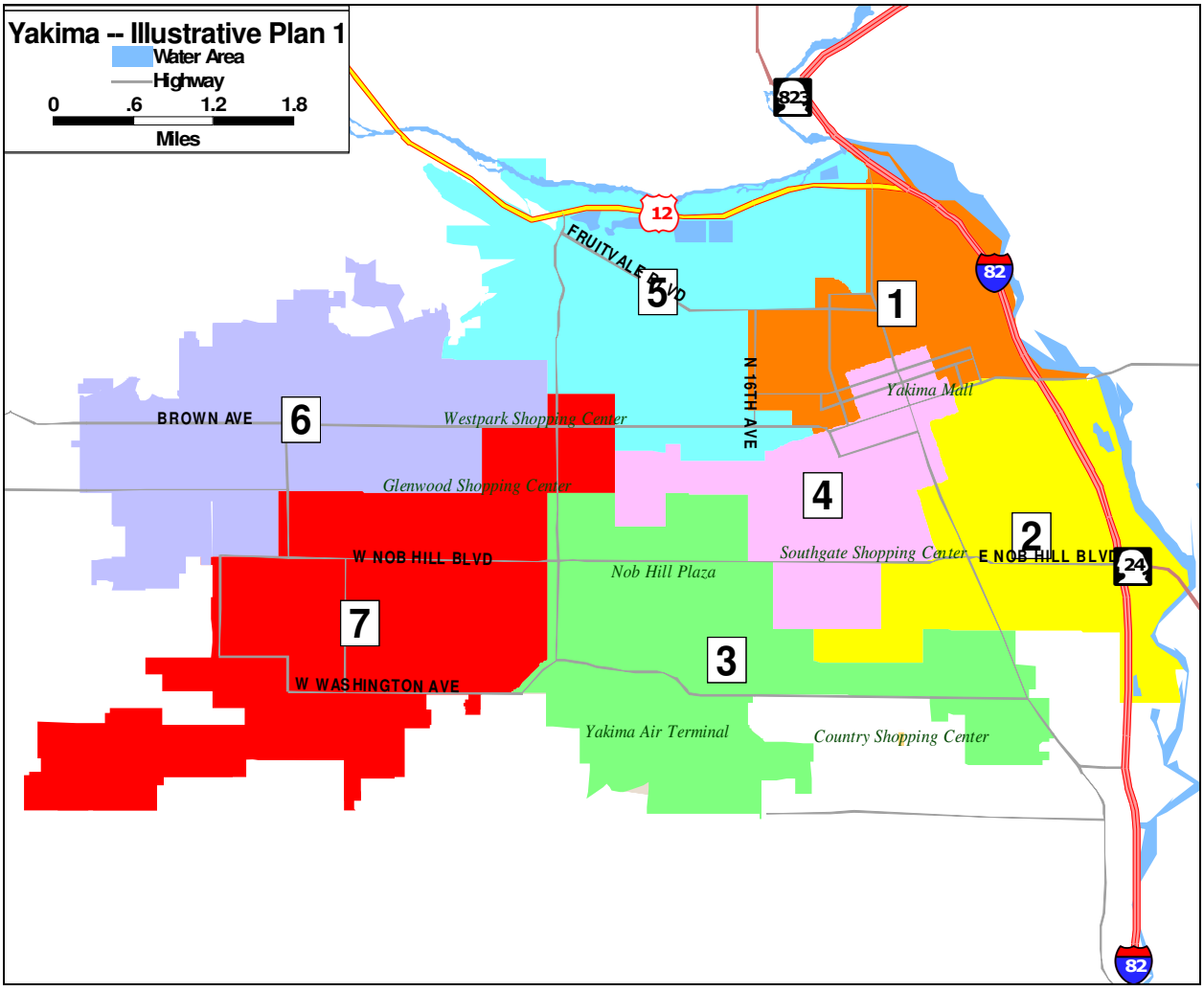
0 0.25 0.5 1 1.5 2 Miles

Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community

APPENDIX B

2.45 square miles. The remaining districts range in geographic size from 4.19 square miles (District 6) to 5.71 square miles (District 7).

Figure 10 **Yakima City Council Illustrative Plan 1**



52. The table in **Figure 11** below provides Census 2010 summary population statistics by district for *Illustrative Plan 2*, with an accompanying map

APPENDIX C

UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF WASHINGTON

ROGELIO MONTES and MATEO ARTEAGA, Plaintiffs, vs. CITY OF YAKIMA, MICAH CAWLEY, in his official capacity as Mayor of Yakima, and MAUREEN ADKISON, SARA BRISTOL, KATHY COFFEY, RICK ENSEY, DAVE ETTL, and BILL LOVER, in their official capacity as members of the Yakima City Council, Defendants.	NO. CV-12-3108-TOR SUPPLEMENTAL EXPERT REPORT OF PETER MORRISON, Ph.D.

SUMMARY AND CONCLUSIONS

1. This Supplemental Report expands on my Expert Report that was produced to the Plaintiffs on March 22, 2013. Although not discovered until after the production of my Expert Report, my findings herein have a critical bearing on this case. I discovered that Plaintiffs' expert demographer, William Cooper, has used a statistical technique that is methodologically unsound.

2. I have scrutinized the methodology that he used to arrive at various citizen voting-age population ("CVAP") estimates in each of his two Illustrative Plans. His arithmetic calculations are fatally flawed. This is most critical for the districts labeled as District 1 in each of his Illustrative Plans: His conclusion that Latinos constitute over 50% of the CVAP in District 1 of each Illustrative Plan is undermined by his incorrect methodology.

3. The correct methodology results, in fact, in a different and *lower* Latino CVAP percentage for each District 1 (see Table 1). For Illustrative Plan 1, Latinos are **48.31%** of the CVAP in District 1

(**not 50.25%** as Mr. Cooper claims). For Illustrative Plan 2, Latinos are **47.95%** of the CVAP in District 1 (**not 50.13%**). In short, it is *non-Latinos* who constitute the majority of eligible voters in each version of Mr. Cooper's District 1.

Table 1—Percentage Latino CVAP of District 1 in Each of Mr. Cooper's Illustrative Plans, With Dr. Morrison's Correct Estimates

	Illustrative Plan 1		Illustrative Plan 2	
	Demonstration District 1		Demonstration District 1	
Citizen Voting-age Population	Correctly estimated	Cooper's estimate	Correctly estimated	Cooper's estimate
Total CVAP	4,590.7	4,414.1	4,753.9	4,546.6
Latino CVAP	2,217.9	2,217.9	2,279.4	2,279.4
% Latino CVAP	48.31%	50.25%	47.95%	50.13%

Sources: "Correctly estimated": Morrison's calculations. "Cooper's estimate": data furnished in Stafford's 2/21/13 letter to Safarli (doc. ID# 68142-0004/LEGAL25881082.1)

THE ERROR IN MR. COOPER'S CALCULATION

4. As seen in Table 1, Mr. Cooper has correctly estimated the absolute number of the Latino CVAP in each version of District 1. However, the absolute numbers of the non-Latino CVAP are wrong. That error, in turn, throws off his total CVAP numbers and distorts the Latino CVAP percentage shown in Table 1. Herein lies the logical flaw in Mr. Cooper's estimates.

5. What follows is a straightforward, step-by-step illustration of why Mr. Cooper's calculations are wrong. Before examining the illustration, however, it is bears explaining that Mr. Cooper's hypothetical districts (including both versions of District 1) are composed of smaller geographic units. These units fall into two categories: individual census blocks and block groups. The latter, in turn, are composed of the former. Both versions of Mr. Cooper's District 1 contain entire block groups, as well as parts of other block groups. In other words, District 1 from Illustrative Plan 1 contains 100% of some block groups and only a fraction of other block groups.

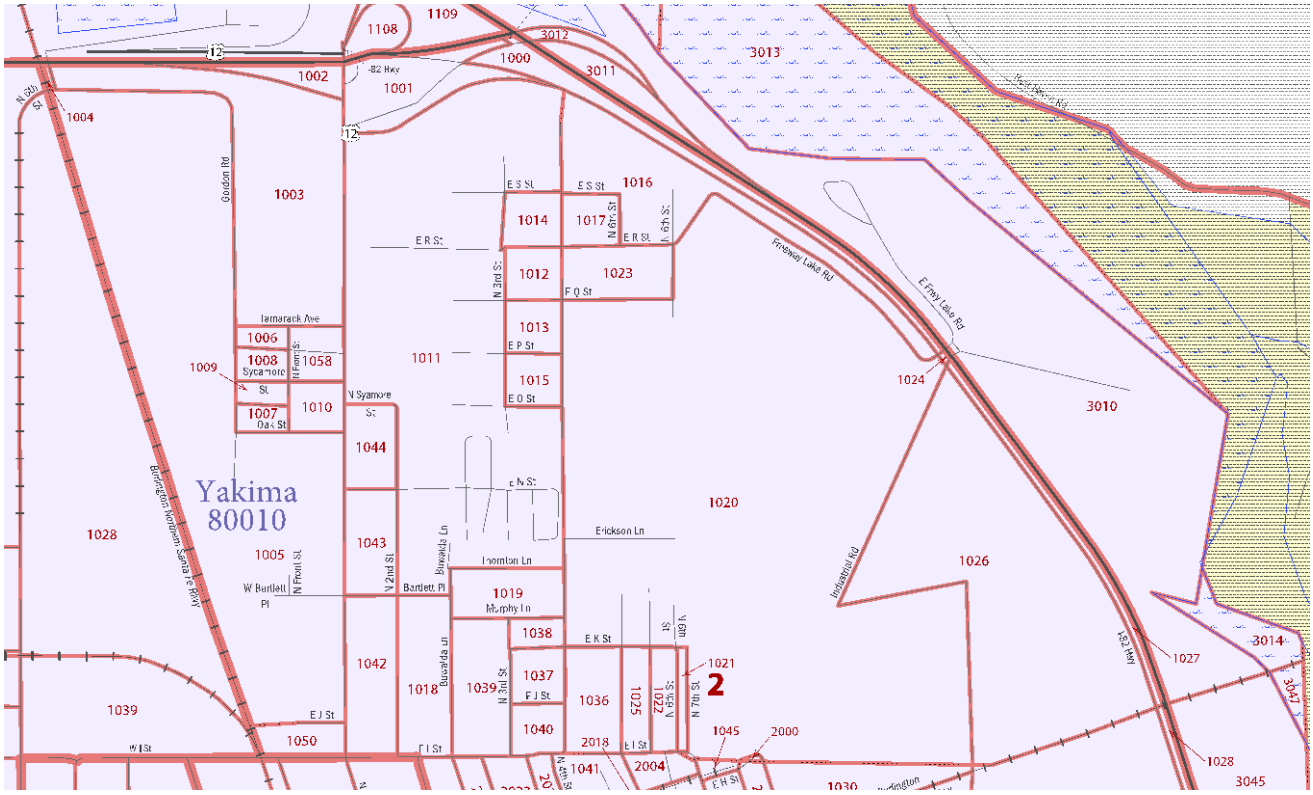
6. Table 2 lists all of the block groups that are either wholly or partially included in Mr. Cooper's District 1 from Illustrative Plan 1:

Table 2–Block Groups Wholly or Partially Included in
Mr. Cooper's District 1 (Illustrative Plan 1)

Block Group ID
530770001001
530770001002
530770002001
530770002002
530770002003
530770003001
530770006001
530770006002
530770006003
530770007001
530770016023

7. For this particular illustration of Mr. Cooper's unsound methodology, I focus on the portion of block group 530770002001 ("BG 2001"), which has 39 of its 58 individual census blocks within Mr. Cooper's District 1 from Illustrative Plan 1. Figure 1 is a picture of the *entire* BG 2001, including the 39 individual census blocks within and the 19 blocks outside of District 1.

Figure 1 – Individual Census Blocks Comprising BG 2001



Step 1. Mr. Cooper and I each start with the 2010 Census Bureau's complete count[1] of the voting-age population ("VAP") of every individual census block in the City of Yakima. This information is contained in a file called PL94-191. It includes redistricting data based on the Census Bureau's full enumeration of Latino and non-Latino persons 18 years old and older. Individual census blocks therefore contain data about the ethnicity and age of their residents, but do not include data about the number of citizens.

Step 2. As explained above, BG 2001 (used here for the purpose of illustration) is composed of 58 individual census blocks, shown in Figure 1.

Step 3. For BG 2001 as a whole, the Census PL94-191 complete counts of VAP are:

Total VAP:	1,748
Latino VAP:	1,028
Non-Latino VAP:	720

Note that "Total VAP" above equals the sum of "Latino VAP" plus "Non-Latino VAP"—as it should.

Step 4. As explained above, Mr. Cooper's District 1 in Illustrative Plan 1 includes 39 of BG 2001's 58 individual census blocks. The Census Bureau's PL94-191 complete counts of VAP in these 39 individual census blocks within District 1 are:

Total VAP:	1,277 (of all 1,748 shown in Step 3 above)
Latino VAP:	875 (of all 1,028 shown in Step 3 above)
Non-Latino VAP:	402 (of all 720 shown in Step 3 above)

Step 5. From these complete counts of VAP, it follows that BG 2001's 39 census blocks within District 1 contain:

73.05% (i.e., 1,277 of 1,748) of the Total VAP in BG 2001

85.12% (i.e., 875 of 1,028) of the Latino VAP in BG 2001

55.83% (i.e., 402 of 720) of the non-Latino VAP in BG 2001

[1] Demographers regard these as "complete counts" of each population (as distinct from estimates based on a sample of each population).

Step 6. We now have a correct and accurate allocation of the total VAP—both Latino and non-Latino—of BG 2001's 39 census blocks within District 1. The "Total VAP" in Step 4 above (1,277) equals the sum of the "Latino VAP" (875) plus the "Non-Latino VAP" (402)—as it should.

Step 7. Next, Mr. Cooper allocates citizenship data according to the percentages from Step 5. Citizenship data is not available in the PL94-141 complete count. Instead, citizenship data is available in the American Community Survey ("ACS"). However, the smallest geographical unit of ACS data is the block group, whereas PL94-191's smallest geographical unit is the individual census block. Additionally, the ACS is a sample of persons, rather than a complete count like the PL94-191. The ACS estimates of CVAP for BG 2001 are:

Total CVAP:	1,160
Latino CVAP:	430
Non-Latino CVAP:	730

Again, note that "Total CVAP" above equals the sum of "Latino CVAP" plus "Non-Latino CVAP"—as it should.

Step 8. As explained in Step 7, the ACS sample-based data (unlike the PL94-191 complete-count data) do not show citizenship data for the individual census blocks. Accordingly, Mr. Cooper and I each needed to calculate the corresponding citizenship estimates for BG 2001's 39 individual census blocks within his District 1. We each drew on the fractions calculated in Step 5 above, but used different allocation methods.

Step 9. The correct methodology, which I used, requires that one start with the total CVAP based on the ACS data (z), followed by an estimation of the Latino CVAP (x). Mr. Cooper, in contrast, first apportioned the Latino (x_i) and non-Latino CVAP (y_i), then summed the two to estimate the total CVAP (z_i) (i.e., $x_i + y_i = z_i$). In other words, Mr. Cooper has used two smaller—and therefore less certain—population figures to calculate the total population figure. This is wrong, especially when the total population figure has already been provided (in this case through the ACS data). The consequence of Mr. Cooper's methodology is that this derived sum (z_i) frequently does not approximate the *actual* total, and in some cases significantly differs from the actual apportioned

CVAP total—a technical impossibility. Mr. Cooper's methodology is not consistent with standard demographic practice when using sample data.[2]

Step 10. Therefore, the correct way to allocate the Latino CVAP to the 39 individual census blocks of BG 2001 within in District 1 is:

a. For Total CVAP: Assume that District 1 includes 73.05% (from Step 5 above) of the 1,160 total CVAP in BG 2001. Multiplying 1,160 by 0.7305 gives me 847 as the number of total CVAP contained in BG 2001's 39 individual census blocks within District 1. This is the figure referred to as *z* in Step 9. In accordance with standard demographic practice when using sample data, one would always use the total population (*z*) as a starting point to derive a rate or ratio, rather than estimate this value from two smaller, less certain populations (i.e., x_i and y_i in Mr. Cooper's calculations).

b. For Latino CVAP: Assume that District 1 includes 85.12% (from Step 5 above) of the 430 Latino CVAP in BG 2001. Multiplying 430 by 0.8512 gives me 366 as the number of Latino CVAP contained in BG 2001's 39 individual census blocks within District 1. This is the figure referred to as *x* in Step 9.

Step 11. Mr. Cooper incorrectly allocated the Latino CVAP in BG 2001's 39 census blocks within District 1, as follows:

a. For Latino CVAP: He followed the correct procedure in Step 10b above, allocating 366 Latino CVAP to BG 2001's 39 census blocks within District 1. In other words, my figure of *x* and Mr. Cooper's x_i figure are the same.

b. For non-Latino CVAP: Based on the total, Latino, and non-Latino CVAP data provided by Mr. Cooper, I conjecture that he assumed that District 1 includes 55.83% (from Step 5 above) of the 730 non-Latino CVAP in BG 2001; and that he then multiplied 730 by 0.5583, which gave him 408 as the non-Latino CVAP allocated to

[2] See, for example, J. S. Siegel and D. A. Swanson, eds., *The Methods and Materials of Demography*, 2nd edition (San Diego, CA: Elsevier Academic Press, 2004).

BG 2001's 39 census blocks within District 1. This 408 figure represents the y_i figure referred to in Step 9.

c. Under the proper methodology, it is unnecessary to calculate the non-Latino CVAP allocated to BG 2001's 39 census blocks within District 1. This is because there already is a larger (and therefore more certain) figure, namely the total CVAP in BG 2001's 39 census blocks within District 1 (z). Because of this existing larger and more certain figure, it is necessary to perform only one additional direct estimate. That direct estimate should be the Latino CVAP (x) because the percentage Latino CVAP within District 1 is the critical figure for purposes of establishing the first *Gingles* factor. With these two direct estimates, one is able to arrive at a residual estimate (i.e., an estimate calculated by adding or subtracting two or more direct estimates). Under the proper methodology, the residual estimate is and should be the non-Latino CVAP (y).

8. Rather than take this approach, Mr. Cooper chooses two smaller and less reliable figures as his direct estimates (i.e., x_i as Latino CVAP and y_i as non-Latino CVAP). He then adds these two to produce an estimate of the total CVAP (z_i). This is a flawed methodology, especially since calculating total CVAP as a sum of two direct estimates ignores the fact that the ACS data *already* provides total CVAP as a single direct estimate.

9. Mr. Cooper's flawed methodology is further exposed by the fact that his estimate for the total CVAP in BG 2001's 39 census blocks within District 1 is *lower* than the direct estimate based on ACS data. In other words, Mr. Cooper's methodology results in an estimated total CVAP of 774—that is, 366 Latinos plus 408 non-Latinos (see Steps 11a and 11b). This 774 total is less than the actual total (847 CVAP) shown in Step 10 above based on the ACS data (i.e., 73.05% of 1,160). For the portion of BG 2001 within District 1, then, Mr. Cooper's method yields an erroneous Latino share (47.3%) rather than the correct share (43.2%), shown in Table 3.

10. The same corrections must be made for the portion of the other block groups included in Mr. Cooper's District 1 of Illustrative Plan 1. These corrections are shown in Table 3 below:

Table 3—Corrected Estimates of Total, Latino, and Non-Latino CVAP in Mr. Cooper's District 1 (Illustrative Plan 1)

Block group	Citizen Voting-age Population (CVAP)			
	Total	Latino	Non-Latino	% Latino
530770001001	181	69	112	38.0%
530770001002	212	92	120	43.3%
530770002001	847	366	481	43.2%
530770002002	395	165	230	41.8%
530770002003	552	298	254	54.0%
530770003001	39	14	25	36.3%
530770006001	320	170	150	53.1%
530770006002	1,005	450	555	44.8%
530770006003	1,021	589	432	57.7%
530770007001	17	5	12	29.1%
530770016023	2	-	2	0.0%
Grand Total	**4,591**	**2,217.91**	**2,372.78**	**48.31%**
	Source: Morrison's calculations using Cooper's data			

11. Cumulatively, Mr. Cooper's method of calculation—allocating Latino CVAP to District 1 (x_i), then allocating non-Latino CVAP to District 1 (y_i), then combining these two estimates for a total CVAP ($x_i + y_i = z_i$)—erroneously underestimates the non-Latino CVAP and subsequently the total CVAP. This, in turn, inflates his measure of Latinos' percentage share of CVAP in District 1.

12. This erroneous inflation bias is apparent in the "Grand Total" row in the Table 3. The correct calculation shows District 1 with 4,591 total CVAP, of whom 2,217.91 (or 48.31%) are Latino. Cooper's allocation method assigns District 1 the correct Latino CVAP of 2,217.91. However, it assigns District 1 an incorrect non-Latino CVAP of only 2,196.17.

13. The fatal flaw exposed here invalidates Mr. Cooper's calculations. His (correct) 2,217.91 Latino CVAP exceeds his (incorrect) 2,196.17 non-Latino CVAP. These two numbers combined make for a total CVAP of only 4,414—which is 177 persons short of the correct 4,591 total CVAP

derived from the ACS. Thus, his 2,217.91 Latino CVAP comprises only 48.31% of all 4,591 CVAP, as shown in Tables 1 and 3 above.

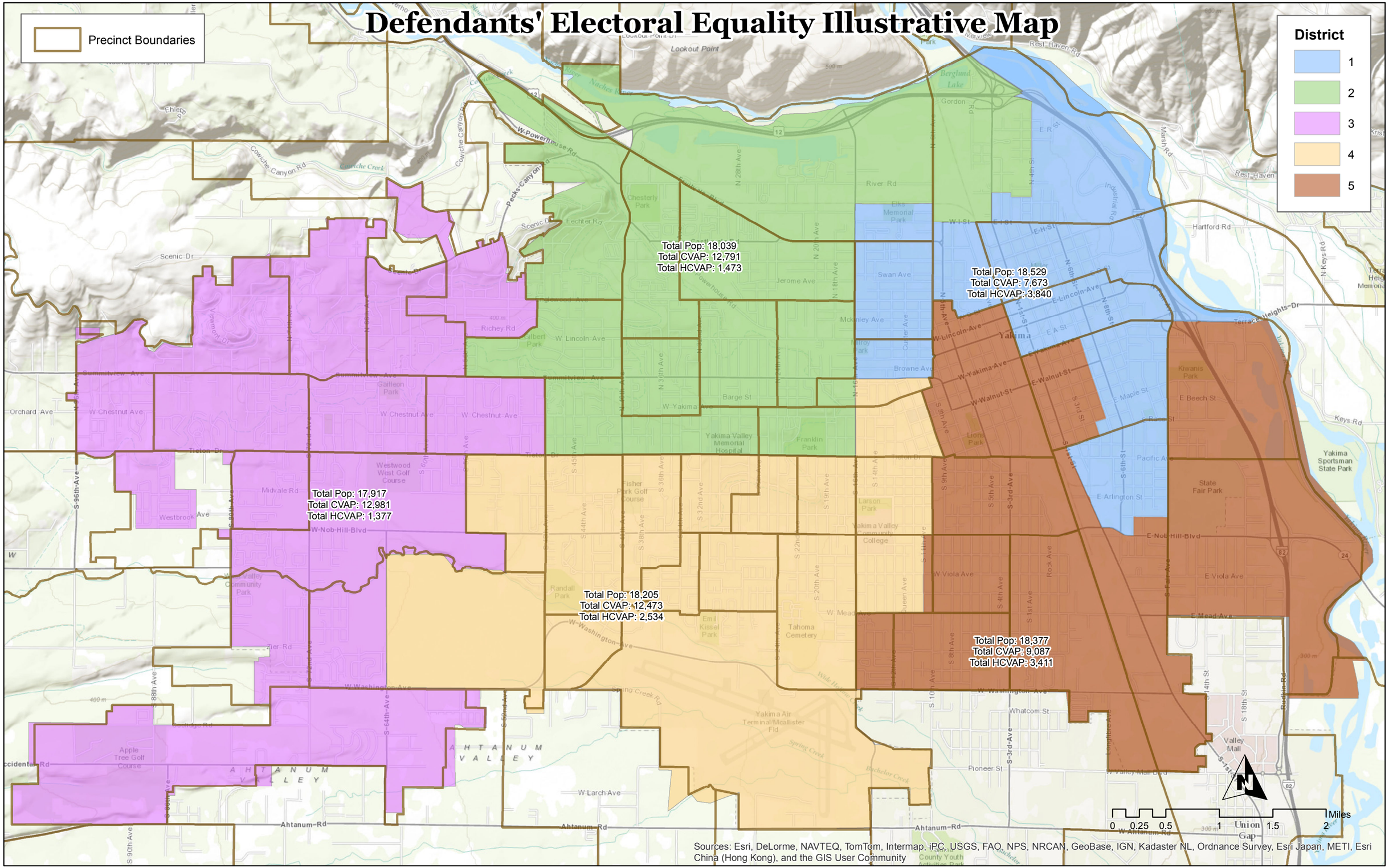
14. Beyond the flawed methodology detailed in this Supplemental Expert Report, I remain convinced that there are likely to be *fewer* Latino citizens in District 1 than the ACS data present, based on the technical limitations set forth in my first report (citizenship that is imputed or misreported or both, a different residence rule, etc.)

April 8, 2013

Peter A. Morrison

APPENDIX D

Defendants' Electoral Equality Illustrative Map



Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community