

WARD & BOUNDARY COMMISSION MEETING
Tuesday, September 18, 2018
City Hall Council Chambers
1:00 p.m.

PRESENT: Chairman Roy Nutter, Damien Davis City Engineer, Heather Carl Deputy Clerk, Commission Members: Sarah Barnes, Cindy O'Brien, Roger Banks, Alice Meehan, William Ryan, and Alan Donaldson.

The meeting was called to order by Chairman Roy Nutter at 1:02 p.m.

APPROVAL OF MINUTES:

Motion by Commissioner Ryan, second by Commissioner Meehan to approve the meeting minutes of April 11, 2017 and September 11, 2018.

PUBLIC PORTION:

Chairman Roy Nutter declared the Public Portion open.

There being no appearances Chairman Nutter declared the Public Portion closed.

UNFINISHED BUSINESS:

A. Discussion and development of next steps for Commission

Chair Nutter and Commissioners received an updated Ordinance amending Section 7.05 of the City Charter providing for Wards and Adjustment of Ward Boundaries. **Ex. A** Chair Nutter explained, by consensus, to write a letter to Council asking for an extension to October 31st to complete the report. Commissioner Banks will prepare the extension letter for Chair Nutter to review.

NEW BUSINESS:

A. Report from Damien Davis regarding compilation of census data and registered voter data by current Wards.

Damien Davis, City Engineer, stated that he received the Voter Registration List from the County Clerk, Carye Blaney. He is going through and cleaning up some of the fields that was sent by her. He also mentioned that he is looking into a software that allows you to upload 10,000 registered voters at one time. He mentioned that he will be meeting with Carye Blaney on Thursday, September 20th and will have more of an idea what he is looking at.

Chair Nutter asked Commissioner Meehan if she had ever worked with the Census Data through WVU.

Commissioner Banks handed out some information about on Research Summary: Municipal Ward Deviation Threshold (**Ex. B.**) and Auto Redistrict (**Ex. C**) and explained. Chair Nutter requested that Commissioners review the information received for next week's meeting.

There being no other comments, Chair moved to next agenda item.

B. Schedule of next meeting

Meetings will continue every Tuesday at 1:00 p.m. as the report is due to be presented to Council on October 31, 2018.

ADJOURNMENT: There being no further business, meeting adjourned at 1:21 p.m. by unanimous consent.

Prepared by:

Heather Carl

Date Approved: 9/25/2018


Chair

AN ORDINANCE AMENDING SECTION 7.05 OF THE CITY CHARTER PROVIDING FOR WARDS AND ADJUSTMENT OF WARD BOUNDARIES

WHEREAS, West Virginia Code § 8-4-8 provides that whenever the governing body of a municipality shall deem it expedient to amend the charter of the City, it shall propose the amendment by ordinance; and

WHEREAS, City Council finds and determines that it would be in the best interest of the City to amend its Charter as it relates to apportionment of ward boundaries;

NOW, THEREFORE, the City of Morgantown hereby ordains that the City Charter is amended as follows:

SECTION 7.05. WARDS, ADJUSTMENT OF WARD BOUNDARIES.

(a) Number of Wards. The territory included in the City shall be, and is hereby divided into seven wards and the number of wards shall not be increased or decreased.

(b) Ward Boundary Commission. The Council shall appoint seven qualified voters, one from each of the seven wards of the City as they exist at the time of such appointment, who shall comprise a Ward Boundary Commission. The voters chosen shall not be employed by the City in any other capacity. The appointment shall be made not later than 30 days after the commencement of each Council's term of office.

(c) Report. ~~On or before September 30th of each even-numbered year, the Commission shall file with the City Clerk a report containing a recommended plan and a map for adjustment of ward boundaries, or recommending that no adjustment be made, to comply all in accordance with the specifications set forth in subsection (d), which report shall be made between November 15 and November 30 of each even-numbered year.~~

(d) Specifications. Except as otherwise provided in Section 10.05, the ward boundaries shall be adjusted from time to time in accordance with the following specifications:

(1) Each ward shall be formed of contiguous territory, and its boundary lines shall follow the precinct lines and the center lines of streets wherever practicable.

(2) Each ward shall contain as nearly as practicable the same total population, determined by the most recently published United States Census Bureau American Community Survey five-year estimate and registered voter data; or, if such publication is unavailable, by the last decennial census and registered voter data. ~~number of qualified voters, determined from the registration for the last statewide general election.~~ This specification shall not be construed to require the adjustment of precinct boundaries or to require the sacrifice of compactness of wards for the sake of achieving equality of numbers of ~~registered voters~~ residents among the seven wards of the City. The report shall include a map and description of the boundaries of each of the wards.

(e) Action on Report. ~~At its next regular meeting following Within 15 days after the date of the filing of the report mentioned in subsection (c), or at an earlier special meeting called to consider the report, the Council shall approve or disapprove the same or postpone consideration of the report to a future date. Council shall approve or disapprove the report prior to its first regular~~

meeting in December. If the report is disapproved, the Council shall state the reasons therefor on the minutes of the Council meetings. If the report is approved, the Council shall ~~within 15 days after such approval,~~ introduce a proposed ordinance providing for the ward boundaries in accordance with the specifications contained in the report at or before its first regular meeting in December; provided that, if the report recommends no changes, Council need not introduce an ordinance following its approval. The procedure for the enactment of the ordinance shall be the same as for any ordinances provided for under Section 2.13 with the additional requirements of Section 2.13(b)(3).

(f) Enactment of Ordinances. If (1) the report of the Commission is disapproved, or (2) if the Commission fails to file the report as and when required by subsection (e), the Council shall, ~~within 15 days after such disapproval or of such failure to file the report, nevertheless~~ introduce an ordinance adjusting the ward boundaries consistent with specifications of subsection (d) at or before its first regular meeting in December unless the Council shall, within 15 days after the filing of the report, or of the failure to file the report, make a finding of fact, entered upon the minutes of the Council meetings, that no ward boundary adjustments are necessary. The procedure for the enactment of such ordinance shall be the same as for any ordinances provided for under Section 2.13 with the additional requirements of Section 2.13(b)(3).

(g) Effect of Enactment. The new ward boundaries as of the date of the enactment of an ordinance providing therefor shall supersede previous ward boundaries for all the purposes of the next regular City election including nominations, unless such ordinance is enacted after December 31 of the year preceding the election. The new ward boundaries shall supersede previous ward boundaries for all other purposes as of the date of which all Councilmembers elected at that regular City election take office.

(h) Terms of Members of the Commission. The terms of office of the members of the Commission shall expire at the same time as the expiration of the terms of the Council which appointed them. A new Commission shall thereafter be appointed as provided by subsection (b).

This ordinance shall become effective upon adoption, subject to the statutory requirements imposed by West Virginia Code section 8-4-8.

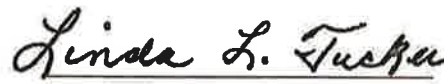
FIRST READING: May 2, 2017

ADOPTED: July 18, 2017

FILED: July 19, 2017

RECORDED: July 19, 2017


Mayor


City Clerk

Research Summary: Municipal Ward Deviation Threshold

Research indicates the accepted standard municipal ward total deviation is 10%, the sum of deviations of largest and smallest Wards (disregarding + or -). This deviation percentage has been confirmed with numerous credible sources, including state and federal government departments and organizations, case law, state municipal attorneys' associations, municipal associations, and state fiscal and revenue offices.

Many of these examples refer to the U.S. Supreme Court case, *Reynolds v. Sims* (1964). This ruling has been generally interpreted as requiring ward deviations less than 10%. And while *Reynolds v. Sims* rules mathematical precision is not required, it is this 10% variance which has become the threshold.

Case law further indicates that being less than 10% is no guarantee of population equality with regard to the Voting Rights Act. And being over 10% can result in courts requesting justification for deviations above this threshold. If such justifications are rejected, court ordered boundary adjustments have been implemented.

Sources:

"Deviation" is the technical term utilized to describe the degree to which a plan fails to apportion population evenly among districts. Although districts should ideally be as even as possible, other constraints often make this impossible. Thus, for local governments, a deviation less than 10% has been held to be presumptively valid. *Voinovich v. Quilter*, 507 U.S. 146 (1993); see also *Abate v Mundt*, 403 U.S. 182 (1971)."

"As a general matter, though, if the difference in population between the largest and the smallest districts within a plan totals less than 10% of the district population needed to create a plan of equally populated districts, the state likely would be considered to be substantially equal. However, if this range is 10% or more, the state likely would be required to show that the plan advances a rational governmental policy and that the population disparities among the districts are within constitutional limits. See, for example, *Brown v. Thomson*, 462 U.S. 835 (1983)."

Georgia Municipal Redistricting Guide, Georgia Municipal Association; "All About Redistricting", Loyola Law School; "Enduring Principles of Redistricting", South Carolina Revenue and Fiscal Affairs Office; State of Wisconsin Legislative Reference Bureau; Information Bulletin 02-1; Federal Judicial Center, Redistricting Litigation; Federal Register, Vol. 26, No. 27; "Redistricting, Greenville, TX," website; "What is Redistricting," Maryland General Assembly, "How to Redistrict," Burlington, VT

Appendix C-How to Measure Equal Population

Example of a district plan: The following illustrations are based on a hypothetical city of 35,000 people with seven single member election districts.

<u>Election District</u>	<u>District Population</u>	<u>District % Deviation</u>
A	4,750	-5.0
B	5,000	0.0
C	5,250	+5.0
D	4,900	-2.0
E	4,800	-4.0
F	5,175	+3.5
G	5,125	+2.5
7	35,000	-

Definitions:

Ideal District Population = $\frac{\text{Total Population}}{\text{Number of Districts}}$

Example:

$\frac{35,000 \text{ (Total Population)}}{7 \text{ (number of Districts)}} = 5,000 \text{ (Ideal District Population)}$

Deviation (a percentage) = $\frac{\text{Actual District Population} - \text{Ideal District Population}}{\text{Ideal District Population}}$

Example:

$5,250 \text{ (Actual)} - 5,000 \text{ (Ideal)} = \frac{250}{5,000 \text{ (Ideal)}} = +5\% \text{ Deviation}$

Total Deviation = Sum of Deviations of Largest and Smallest Districts (disregarding + or -)

Example:

Largest District (+5% deviation) +
Smallest District (-5% deviation)
=10% Total Deviation

Average Deviation (a percentage) = $\frac{\text{Sum of Deviations (disregarding + or -)}}{\text{Number of Districts}}$

Example:

$\frac{(5.0+0.0+5.0+2.0+4.0+3.5+2.5)}{7} = \frac{22}{7} = 3.14\% \text{ Average Deviation}$

Deviation Range: Range is expressed as “+5 to -5%”

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Auto-Redistrict

"One vote, one bit."

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About

Auto-Redistrict is a free and open source computer program that automatically creates fair and compact electoral districts. Simply open a shapefile, load in census and election data (if not already included in the shapefile), and hit "Go".

Auto-Redistrict uses a genetic algorithm to design districts that meet multiple criteria, namely:

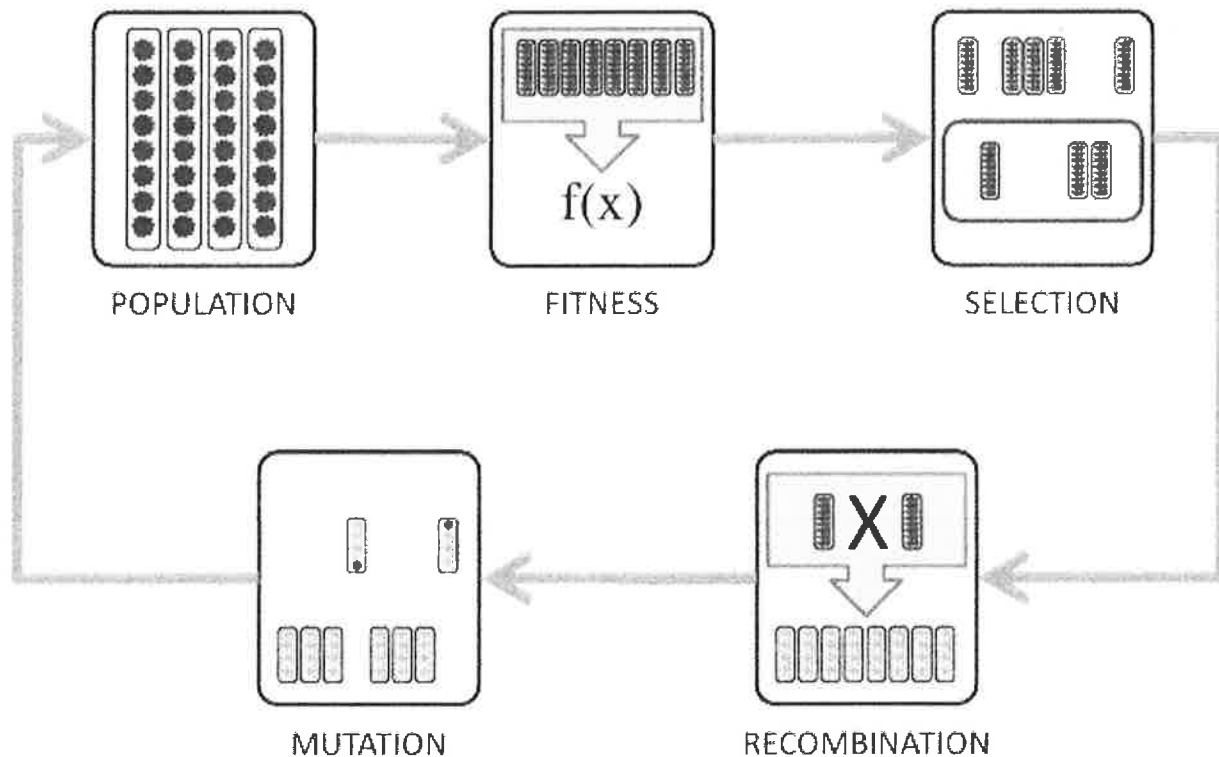
- Geometry
 - Equal population
 - Contiguous
 - Compact
 - Minimal county / municipality splits
- Equality
 - Competitive
 - Proportional
 - Minimal partisan gerrymandering (maximal "partisan symmetry")
 - Minimal racial gerrymandering (maximal voting power equality)

So essentially the goal of the software is to eliminate gerrymandering by fully automating the redistricting process. It replaces the manual drawing process with automated search and analysis.

How it works

To find the number one best map, one would have to search through and evaluate every possible map. This is not computationally feasible. So instead, a heuristic search algorithm is used to evaluate only those maps that are probably good.

Genetic Algorithms: The How's



1. **Initialize.** First, the population of potential maps is initialized. It could either start off totally random, or you could use the current electoral district shapes to start it off.
2. **Evaluate.** Then the fitness of each map is evaluated on each of the criteria (in our case, compactness, equal population, competitiveness, proportional representation, etc.)
3. **Select.** The best scoring maps are selected for reproduction,
4. **Recombine.** and randomly recombined to form new maps, that are hybrids of the best maps.
5. **Mutate.** Finally these maps are "mutated" slightly so that other potential maps that are similar to them are explored.
6. **(Repeat).** This is the new population of potential maps. The process repeats from step 2.

The Geometric Criteria - Compact and Equal

The geometric criteria are standard criteria that are required by constitutional law. Well, 2 out of 3 of them are. Compactness is not a requirement in the U.S. Constitution, or most state constitutions. But we include it because it helps to fight gerrymandering by limiting the range of acceptable maps, and also it makes for more practical districts. So let me briefly go over how each score is evaluated (measured):

- **Equal population.** To measure population balance, the program calculates the statistical variance of the populations of the districts. Since population selection is a Bernoulli process, the populations will take on a Normal distribution. So the variance of the population is just the square of the standard deviation. We want this score to be **minimized**.
- **Contiguous.** To measure contiguity, or the amount of disconnected population, we count the total population that is not connected to the most populated fully-connected region. We want this score to be **minimized**.
- **Compact.** To measure compactness, we calculate the Isoperimetric Quotient. Basically we divide the area by the square of the length of the perimeter. But we want a grand total, so we add together the reciprocals of this for each district, and then take the reciprocal of that. This gives us a weighted average. We want this score to be **maximized**.
- **Minimal county / municipality splits.** This is essentially a trade-off with compactness. To measure split reduction, we count the number of different districts in each county, and subtract the number of counties. We want this score to be **minimized**.

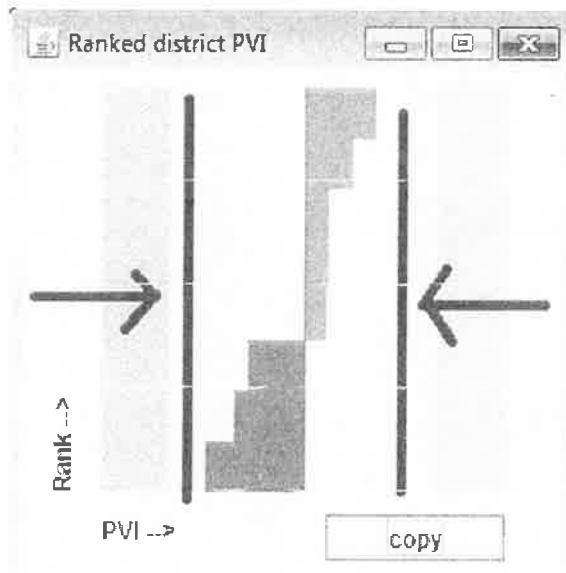
The Fairness Criteria - Proportional and Competitive

As unequivocally demonstrated by Jowei Chen and Jonathan Rodden's paper "Unintentional Gerrymandering: Political Geography and Electoral Bias in Legislatures", party-blind redistricting results in unintentional gerrymandering. To counteract this effect, as well as to undo deliberate gerrymandering, election data must be used in a redistricting process to ensure equal protection to both parties.

To this end, election data is used to calculate measures of fairness which enables a person - or a computer - to make an informed decision about which districting maps best represent the wills of the citizens.

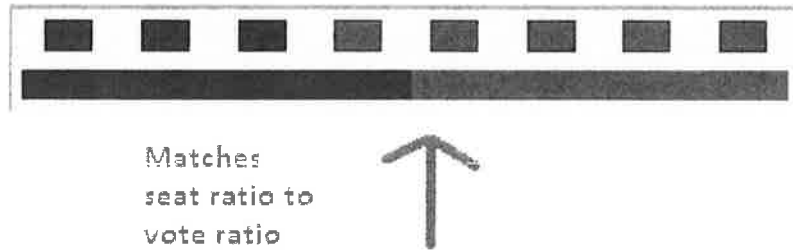
The fairness criteria are designed to measure both how proportional the representation is to the popular vote, and how competitive the elections are. In other words, they measure how closely the "One person, one vote." requirement mandated by the U.S. Constitution is met, and also try to make each vote count as much as possible, by maximizing its ability to determine the elected delegates. Let me briefly go over how each score is evaluated (measured):

- **Competitive.** To measure wasted votes, we count the number of votes above the amount necessary to win, for each district and each party. The more wasted votes an election had, the less competitive it was. We want this score to be **minimized**.

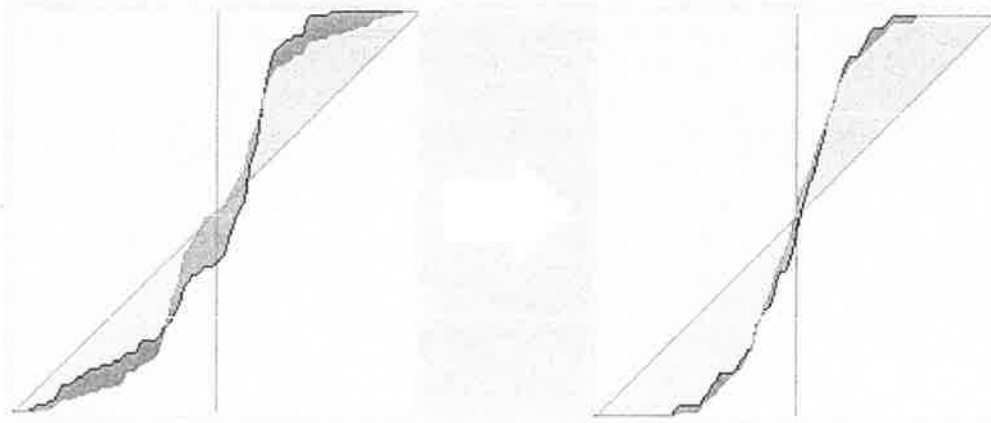


Makes elections more competitive

- Proportional.** To measure proportional representation, we measure the total deviation of the seats-votes curve from the diagonal. We want this score to be minimized. Note: this is how to measure partisan gerrymandering in multi-winner elections (such as ranked choice voting). We want this score to be **minimized**.



- Minimal partisan gerrymandering.** Seats / votes asymmetry is the total absolute deviation from a symmetric seats / votes curve. If you look at the "Seats / votes curve" in the program, it's the total darkened area. This measure was inspired by "Partisan Symmetry" as defined by Grofman and King in these papers: "[Seats, Votes, and Gerrymandering: Estimating Representation and Bias in State Legislative Redistricting](#)" and "[The Future of Partisan Symmetry as a Judicial Test for Partisan Gerrymandering after LULAC v. Perry](#)". Note: this is how one measures partisan gerrymandering for single-winner elections. We want this score to be **minimized**.



- Minimal racial gerrymandering.** We define voting power as the ability to elect a candidate of one's choosing. Another way to state this is the ability to effect the outcome of one or more

elections. For a single district, this can be summarized by taking the margin of victory (in votes) and dividing it by the total votes cast. To total this up by ethnicity, we take the weighted sum of this over all elections. For example, for hispanics, we take the total number of votes in an election, multiply by the fraction of that district that is hispanic, and total that up over all districts. Then we do the same for margin of victory. Then we divide the margin of victory total by the votes cast total, and that gives us an estimate of the average voting power for that ethnicity. We want to minimize how much this varies between ethnicities, so we take the average of this over the entire population, and calculate the mean absolute deviation (M.A.D.) of the ethnicities from this. This gives us a summary of how uneven voting power is distributed among the ethnicities. We want this score to be **minimized**.

Normalization

Each of these scores will have vastly different ranges. For instance, compactness varies from 0 to 1, while population imbalance could be in the tens of thousands. But we want each score to be "weighed" about the same, or, rather, in proportion to where the sliders are set. So we have to get them all on the same scale. We call this "normalizing" the scores.

To normalize a score, we first sort the population according to one criteria, then we replace each score with their "rank" in the sorted list, and divide by the size of the population. We use this as the new, normalized score for that criteria. Another way to say this is that we replace a raw score with its "percentile". We do this one at a time for all criteria.

Then we multiply each score by where its corresponding slider is set, and then again by where the geometry/fairness slider is set (starting from left or right, depending on whether it's a geometry score or a fairness score). We then add these all together, and this gives us a final single-number score for a map.

Selection

The best maps are selected using what's called "Truncation selection". The bottom 50% are discarded. The top 50% are recombined and mutated. After the selected maps are recombined and mutated, the process repeats.

This software is one of a kind!

To my knowledge, while there are some programs out there that automatically redistrict, and some that use heuristic search algorithms such as the genetic algorithm, this is the first, and, so far, only program that also includes fairness criteria, such as proportional representation, competitiveness, and wasted votes.

This is also, to my knowledge, the only automated redistricting program that can design multi-member proportional representation districts.



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