



COOPERATIVE
STRATEGIES

COMPLETE FINANCIAL & DEMOGRAPHIC PLANNING FOR EDUCATION

HOWARD COUNTY PUBLIC SCHOOL SYSTEM
DATA VALIDATION PROCESS

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I. INTRODUCTION

Cooperative Strategies was tasked with verifying the accuracy of the Final Attendance Area Committee (AAC) recommendations. These recommendations were developed using the HCPSS redistricting tool which is written in MS FoxPro and is planned for replacement.

CS collected database tables that function as inputs for the tool and used Microsoft Access queries to attempt to replicate the same numbers as the HCPSS redistricting tool produced in the Final AAC School Moves Reports.

All validation and comparison tables can be found in the appendix of this report.

II. PRIMARY DATA ANALYZED

Database Table: SCHOOLS.DBF – School Projections Table

This table is an output table of the HCPSS enrollment projections, it contains projected enrollment by geographic population [GEOPOP#] for each school by year [#]. This table also includes adjustment numbers for out of district transfers by year [OODADJ#].

At the middle school and the high school level, the geographic population [GEOPOP#] plus the out of district adjustment number [OODADJ#] yields the school projection for that year.

At the elementary level, Kindergarten is calculated separately, so there are four total fields that compose the projection for each school. $GEOPOP\# + OOADJ\# + KGEOPOP\# + KOODADJ\#$.

One important attribute of this table is that enrollment values are non-integers, meaning that they have decimal points. This is due to the housing development component of the enrollment projection methodology.

Database Table: PPROJ17.DBF – Polygon Projection Table

This is the Planning Polygon GIS table but also has the projection data from the SCHOOLS.DBF. This table also has the baseline school assignments by planning polygon [fields ES_HOME, MS_HOME, and HS_HOME]. There are 700 records in this table.

Database Table: AACONN_4.DBF – AAC Final Plan

The table contains the recommend school assignment by planning polygon per the Final AAC Recommendation [ES_HOME, MS_HOME, and HS_HOME]

GIS Shapefile: bst_st16.SHP

This is the geocoded student file from the fall of 2016. This is individual student data that is used to attribute Free and Reduced-Priced Meal [FARM] data to the Planning Polys to calculate free and reduced lunch percentages to the proposed changes.

FARM.DBF

This is a database table the contains FARM eligibility by student that in joined to the bst_st16.SHP. file.

III. SECONDARY DATA ANALYZED

Database Table: AACONN_5.DBF – AAC Alternative Plan

The table contains the recommend school assignment by planning polygon per the AAC Alternative Recommendation [ES_HOME, MS_HOME, and HS_HOME]

Database Table: FS17_COM.DBF – Feasibility Study

The table contains the recommend school assignment by planning polygon Feasibility Study [ES_HOME, MS_HOME, and HS_HOME]

IV. PRIMARY DATA VERIFICATION PROCESS

AAC Recommendation Projected Enrollment

1. The data from the Summary of Final AAC Recommendation Plan Moves Reports was entered into a Microsoft Excel Spreadsheet Before Redistricting: Projected Enrollment and After Redistricting: Projected Enrollment.
2. All the database tables were imported into a Microsoft Access 2016 database. This database functioned as a workspace where the tables could be related and simple queries could be run.
3. A series of group by and sum queries were run using the PPROJ17 to calculate school totals to compare to the Before Redistricting: Projected Enrollment from the AAC Recommendation Reports.
 - a. All Middle School and High Schools matched 100%

- b. 18 of Elementary Schools did not match, the majority were only 1 student different and the maximum was 5.
 - i. These differences between the AAC Reported numbers (Before Redistricting) and the data from the Planning Polygon Projection are known as “adjustment factors”
- 4. Digging deeper into the Elementary mismatch, it was determined that when Redistricting tool propagated the non-integer data from the SCHOOLS.DBF to the Planning Polygons PPPROJ17, some of the decimal places were rounded to become integers. This is a known limitation of the tool.
- 5. It was verified that all the discrepancies in the After Redistricting: Projected enrollment were identical to the Before Redistricting: Projected Enrollment and that once the same adjustment factor was applied, the totals matched SCHOOLS.DBF.

AAC Recommendation Projected Enrollment

- 1. It should be noted that the enrollment projections do not account for any changes in FARM percentage, therefore all farm percentages are calculated on the projection year 0 (current year).
- 2. A series of group by sum queries were made on the PPROJ17 table to develop ES_FARM, KS_FARM, ESPROJ0, and KSPROJ0 county by school.
 - a. $(ES_FARM + KS_FARM) / (ESPROJ0 + KSPROJ0) =$ farm percentage for each school (Before Redistricting)
 - i. These percentages matched the FARM Report for the AAC Recommendation Plan
- 3. A series of group by sum queries were made on the AACON_4 table joined to the PPROJ17 table to develop ES_FARM, KS_FARM, ESPROJ0, and KSPROJ0 county by school.
 - a. $(ES_FARM + KS_FARM) / (ESPROJ0 + KSPROJ0) =$ farm percentage for each school (After Redistricting)
 - i. These percentages matched the FARM Report for the AAC Recommendation Plan
- 4. The same methodology was applied to middle and high schools.
 - i. These percentages matched the FARM Report of the AAC Recommendation.

V. DATA CONVERSION ERROR – FUTURE APARTMENT DISTRIBUTION

During the data review process, it was determined that SCHOOLS.DBF file that serves as the school level enrollment projection input to the redistricting tool showed incorrect student generate rates of 0 students per unit for all future planned apartment development. The cause of this error was likely due to the data conversion process between the Excel based enrollment projection and FoxPro redistricting tool setup process. It should be noted that Excel is still supported by Microsoft and gets software updates, where FoxPro does not. This can lead to compatibility issues.

The error went unnoticed because of the redistricting tool error handling functions. Instead of distributing the difference in the projected enrollment from the future planned apartments to the appropriate planning polygon, the projected students were distributed to all the polygons in the schools impacted by a change. After that error was detected, the SCHOOLS.DBF was corrected to include the appropriate student generation rates for future apartments.

VI. SECONDARY DATA VERIFICATION PROCESS

Due to the data conversion error, the following Scenarios were analyzed and verified for correctness and consistency:

- AAC Final Plan (August 22)
- AAC Alternative Plan (September 27)
- Feasibility Study Plan

All three plans were found to be valid and internally consistent.

An additional level of verification was completed by comparing the AAC Final Plan which was originally published with the erroneous data on August 22 to the same plan using the corrected Planning Polygon Projection Table from September 28.

It was discovered that:

- All middle school and high school outputs had a difference of +/- 2 students
- 23 of the elementary school outputs were identical.
- 14 of the elementary school outputs were +/- 7 students
- Four elementary schools had outputs that were more than 20 students different
 - Bryant Woods: 41 students
 - Ducketts Lane: 36 students
 - ES #42: 36 students
 - Running Brook: 29 students

The largest change due to the correction of the projected data is a Bryant Woods. The original Final AAC Report showed Bryant Woods at 86.8% utilization, the corrected data shows 92% utilization. That is deviation of 5.2%.

VII. CONCLUSION

The input data going into the redistricting tool matches the data coming out of the redistricting tool at the middle school and high school level perfectly. At the elementary level, there are some minor issues associated with the propagation of non-integer based school level projection data being propagated out into the integer based planning polygon data that caused some discrepancies. This is a known issue and can be accounted for with an adjustment factor. HCPSS plans on replacing the Redistricting tool with a modern, vendor supported platform which should eliminate future errors due to rounding. The data conversion error related to future apartment development occurred outside of the redistricting tool. The enrollment projection components which function on the FoxPro platform should be updated along with the FoxPro Redistricting tool

APPENDIX

VALIDATION AND COMPARISON TABLES

Revised Final AAC Recommendation Comparison

Facility	Final AAC Before Redistricting (+/-)	Final AAC After Redistricting (+/-)	Schools Projection Current Boundaries (+/-)	Planning Polygon Projection - Current Boundaries (+/-)	Planning Polygons based on AAC Final Recommendation (+/-)
Atholton ES	0	0	0	0	0
Bellows Spring ES	0	-4	0	0	-4
Bollman Bridge ES	0	-6	0	0	-6
Bryant Woods ES	0	-41	0	0	-41
Bushy Park ES	0	0	0	0	0
Centennial Lane ES	0	1	0	0	1
Clarksville ES	0	0	0	0	0
Clemens Crossing ES	0	6	0	0	6
Cradlerock ES	0	0	0	0	0
Dayton Oaks ES	0	0	0	0	0
Deep Run ES	0	0	0	0	0
Ducketts Lane ES	0	36	0	0	36
Elkridge ES	0	0	0	0	0
Forest Ridge ES	0	4	0	0	4
Fulton ES	0	-3	0	0	-3
Gorman Crossing ES	0	0	0	0	0
Guilford ES	0	0	0	0	0
Hammond ES	0	0	0	0	0
Hollifield Station ES	0	0	0	0	0
Ilchester ES	0	0	0	0	0
Jeffers Hill ES	0	0	0	0	0
Laurel Woods ES	0	2	0	0	2
Lisbon ES	0	0	0	0	0
Longfellow ES	0	4	0	0	4
Manor Woods ES	0	5	0	0	5
New ES #42	0	-36	0	0	-36
Northfield ES	0	0	0	0	0
Phelps Luck ES	0	0	0	0	0
Pointers Run ES	0	3	0	0	3
Rockburn ES	0	2	0	0	2
Running Brook ES	0	29	0	0	29
St Johns Lane ES	0	0	0	0	0
Stevens Forest ES	0	0	0	0	0
Swansfield ES	0	1	0	0	1
Talbott Springs ES	0	0	0	0	0
Thunder Hill ES	0	0	0	0	0
Triadelphia Ridge ES	0	0	0	0	0
Veterans ES	0	0	0	0	0
Waterloo ES	0	2	0	0	2
Waverly ES	0	-7	0	0	-7
West Friendship ES	0	2	0	0	2
Worthington ES	0	0	0	0	0
Bonnie Branch MS	0	0	0	0	0
Burleigh Manor MS	0	0	0	0	0
Clarksville MS	0	0	0	0	0
Dunloggin MS	0	0	0	0	0
Elkridge Landing MS	0	0	0	0	0
Ellicott Mills MS	0	0	0	0	0
Folly Quarter MS	0	0	0	0	0
Glenwood MS	0	1	0	0	1
Hammond MS	0	0	0	0	0
Harpers Choice MS	0	0	0	0	0
Lake Elkhorn MS	0	0	0	0	0
Lime Kiln MS	0	0	0	0	0
Mayfield Woods MS	0	-2	0	0	-2
Mount View MS	0	-1	0	0	-1
Murray Hill MS	0	0	0	0	0
Oakland Mills MS	0	0	0	0	0
Patapsco MS	0	0	0	0	0
Patuxent Valley MS	0	0	0	0	0
Thomas Viaduct MS	0	2	0	0	2
Wilde Lake MS	0	0	0	0	0
Atholton HS	0	1	0	0	1
Centennial HS	0	0	0	0	0
Glenelg HS	0	0	0	0	0
Hammond HS	0	0	0	0	0
Howard HS	0	0	0	0	0
Long Reach HS	0	2	0	0	2
Marriotts Ridge HS	0	0	0	0	0
Mt Hebron HS	0	0	0	0	0
Oakland Mills HS	0	-1	0	0	-1
Reservoir HS	0	0	0	0	0
River Hill HS	0	0	0	0	0
Wilde Lake HS	0	-2	0	0	-2
Total	0	0	0	0	0

