

# AuditEngine

## 2020 Election Ballot Image Audit of Fulton County GA

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nonpartisan organization  
<http://citizenoversight.org>

# Executive Summary

This document summarizes results of an audit of the November 2020 election in Fulton County, Georgia by reviewing the ballot images and other data. This audit was performed using the "AuditEngine" platform developed by Citizens' Oversight Projects, also known as "Citizens Oversight" or "COPS".

This audit was conducted to demonstrate the capabilities of AuditEngine and the approach of ballot image audits in general, and to provide information about the reliability of the 2020 General Election.

The primary audience for this report includes election officials in Fulton County and the state of Georgia, but we anticipate the general public will also be interested in these readily accessible results.

AuditEngine is an election auditing platform which performs "Ballot Image Auditing". Modern voting machine ballot scanners capture relatively high-resolution digital images of each ballot in polling places or central count operations. AuditEngine processes these ballot images to create an independent tabulation, and then it compares its evaluation of each ballot with the official cast vote record (CVR), which provides ballot-by-ballot detail of the official evaluation by the voting system.

AuditEngine can provide detailed reports which detail discrepancies between the official records and our independent tabulation. Comparing results from two systems like this can expose errors in each system which would be very hard to find otherwise. While election systems are usually accurate, various factors can introduce problems by mistake or on purpose<sup>1</sup>. Software updates, changes in the election definition, or malicious activity may change the outcome.

Most voters have doubts. Only 13% of Republicans and 4% of Democrats in 2018 were "very confident that election systems are secure from hacking and other technological threats."<sup>2</sup> The 2020 Election was more secure than recent elections because of the use of paper ballots in more districts but improvement is still possible.

## **AuditEngine's analysis of the 2022 General Election in Fulton County, GA found:**

- Among the ballots processed in the audit, there was no evidence of significant inconsistencies that would cast any contest into doubt. However, only 28% of the ballots were audited and 72% were not, since the ballots images were not available.

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<sup>1</sup> Norden, Lawrence "Voting System Failures: A Database Solution"

[https://www.eac.gov/sites/default/files/document\\_library/files/Norden-2010-Voting\\_Machine\\_Failures\\_Online.pdf](https://www.eac.gov/sites/default/files/document_library/files/Norden-2010-Voting_Machine_Failures_Online.pdf)

<sup>2</sup> Pew Research: <https://www.pewresearch.org/politics/2018/10/29/election-security/>

- 528,777 ballots were cast in the official election results. The ballot image audit processes ballots based on the sheets involved. In this election, all ballots had only one sheet, so we expected to review 528,777 images. This is called "Machine Count 1" or MC1.
- Unfortunately, 380,458 images of ballot sheets were deleted and unavailable, and so the result cannot be checked in these cases. AuditEngine works best with the images that can be exactly correlated with ballot-level cast-vote records, the official result.
- Machine Count 2 (MC2) was requested by the Trump campaign, conducted after the full hand-count audit was completed. Although we had all the images for MC2, we did not have the cast vote records (CVR) for those ballots, and so we elected to process the 148,580 images of ballot sheets that were available, (28% of ballots cast) in MC1. We could process the images from MC2 but the comparison would be limited to aggregated totals, which is not as revealing as when we compare ballot-by-ballot. It is handy to have the CVR to provide the ballot style of the BMD ballots as AuditEngine does not utilize the QR Codes.
- AuditEngine processed only those images that were available, which were almost all hand-marked paper ballots. 3,923 ballot summary sheets printed by BMDs (Ballot Marking Devices) were also processed by AuditEngine by reading the printed text using OCR (Optical Character Recognition), and not relying on the QR code. This entire set, despite being only about 28% of the ballots cast, were the ones with the highest likelihood that voter intent might be misinterpreted by the county's voting system because this set includes the hand-marked ballots.
- AuditEngine's reading of printed text rather than QR barcodes is an extremely important feature when considering the recently exposed "flaw" in the Georgia voting system, as reported by J. Alex Halderman, a computer science professor at the University of Michigan. As an expert for plaintiffs in an election security lawsuit, Halderman gained access to Georgia voting equipment for 12 weeks and produced a 25,000-word secret report.

Halderman found that malicious software could be installed on voting touchscreens so that votes are changed in QR codes printed on paper ballots, which are then scanned to record votes, according to court documents. QR codes aren't readable by the human eye, and voters have no way to know whether they match the printed text of their choices<sup>3</sup>.

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<sup>3</sup> "Secret report finds flaw in Georgia voting system, but state in the dark"

<https://www.ajc.com/politics/secret-report-on-georgia-voting-system-finds-flaws-but-state-shows-no-interest/YKFEET2WE5BBPJ7TYVOYMBTIKQ/>

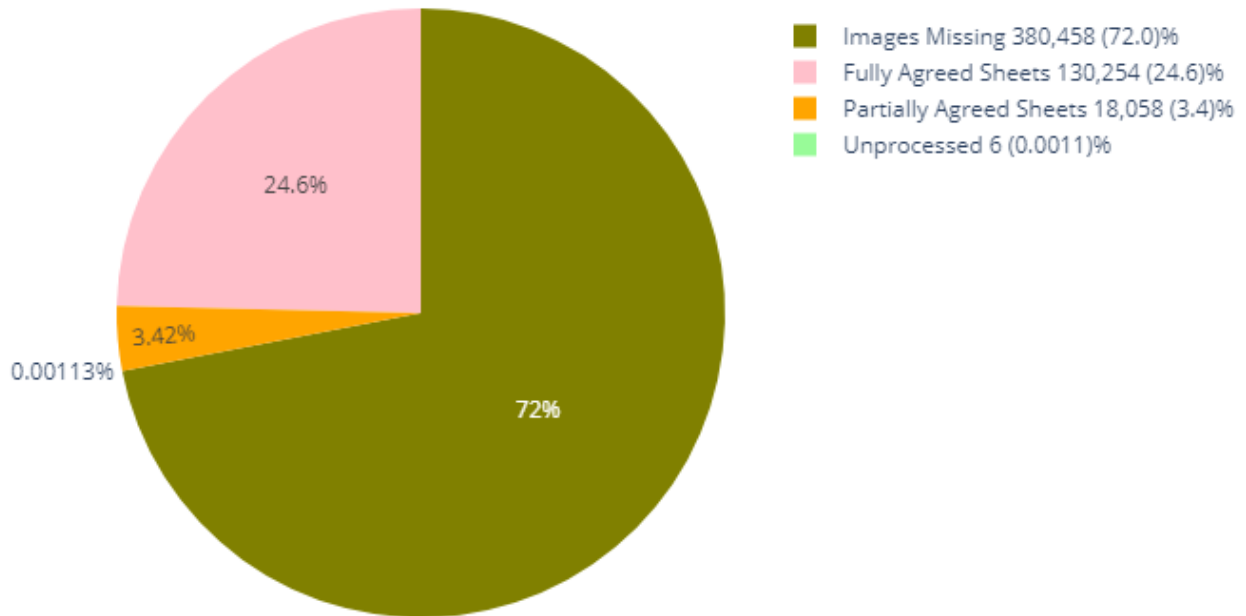
- Cast vote records for all ballots cast in MC1 were saved and available for AuditEngine, detailed to the individual ballot level. We did not have CVR records for MC2.
- When the voting system and AuditEngine disagree on voter intent, the correct interpretation becomes clear by looking at the disputed ballot image. By “correct interpretation” we mean the human eye determination, which is the deciding interpretation under Georgia voter intent law.<sup>4</sup>
- The first pie graph below shows the total ballot sheets in the election, the number of images analyzed by AuditEngine.
- 2,797,303 votes were on 148,318 ballot sheets (including blank votes and unprocessed sheets).
- The **Fully Agreed** sheets (130,254, or 24.6% of all ballots cast) were completely agreed between AuditEngine and the voting system and had no variations, such as write-ins, overvotes, or gray-flags.

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<sup>4</sup> O.C.G.A. 21-2-438 (2010) "(c) Notwithstanding any other provisions of this chapter to the contrary and in accordance with the rules and regulations of the State Election Board promulgated pursuant to paragraph (7) of Code Section 21-2-31, if the elector has marked his or her ballot in such a manner that he or she has indicated clearly and without question the candidate for whom he or she desires to cast his or her vote, his or her ballot shall be counted and such candidate shall receive his or her vote, notwithstanding the fact that the elector in indicating his or her choice may have marked his or her ballot in a manner other than as prescribed by this chapter."

## High\_Level\_Reconciliation by sheets (Total: 528,776)

Fulton County Georgia, 2020 General Election -- Audit Engine (c) Citizens' Oversight -- 2022-09-20 08:37:44



- **Partially Agreed Sheets:** 18,058 sheets (3.4%) had 312,845 contests (11.2%) that were non-variant and agreed, while 29,256 contests (1.0%) on those same sheets were classified as "variant contests" and were "pulled" from the partially agreed records and individually classified in separate records for each contest, for further reporting categorization.
- **Total of Nonvariant Contests:** Thus, a total of 2,768,047 votes (aka, ballot-contests, 99%) on these ballots were interpreted the same and non-variant in every respect by AuditEngine and the voting system, and there was no additional scrutiny required due to write-ins, overvotes, or disagreements.
- **Contest Variants:** The "Contest Variants" (29,256 votes, 1.0%) were further categorized by AuditEngine. These are the individual contests ("votes") which had either write-ins, overvotes, gray-flags, or were "disagreed". A contest is "disagreed" when AuditEngine and the voting system did not interpret the vote exactly the same. There were 61 contests in the election, and these variants are spread over all contests.
- **Normal Disagreed:** Of those, 2,018 were classified as "disagreed", while the rest were write-ins and overvotes or gray only. These will require additional scrutiny in close

elections.

- **Closest Contests:** Contests were individually considered. The 2 most discrepant contests had disagreements between 0.75% to 0.50% of the margin of victory:
  - **State House District 47**
    - Margin of victory: 191 votes (2.08%)
    - 1 vote "Disagreed" (0.52% of margin)
    - 16 contest variants (8.38% of margin)
  - **County Commission District 2**
    - Margin of victory: 1,871 votes (7.65%)
    - 13 votes "Disagreed" (0.69% of margin)
    - 52 contest variants (2.78% of margin)

The **Presidential Contest** was of particular interest in this election:

- County Margin of Victory: 86,309 (58.63%)
- Statewide Margin of Victory: 11,779 votes (about 0.23%)
- 82 votes disagreed (0.10% of county, 0.70% of statewide margin)
- 927 contest variants (1.07% of county, 8% of statewide margin)

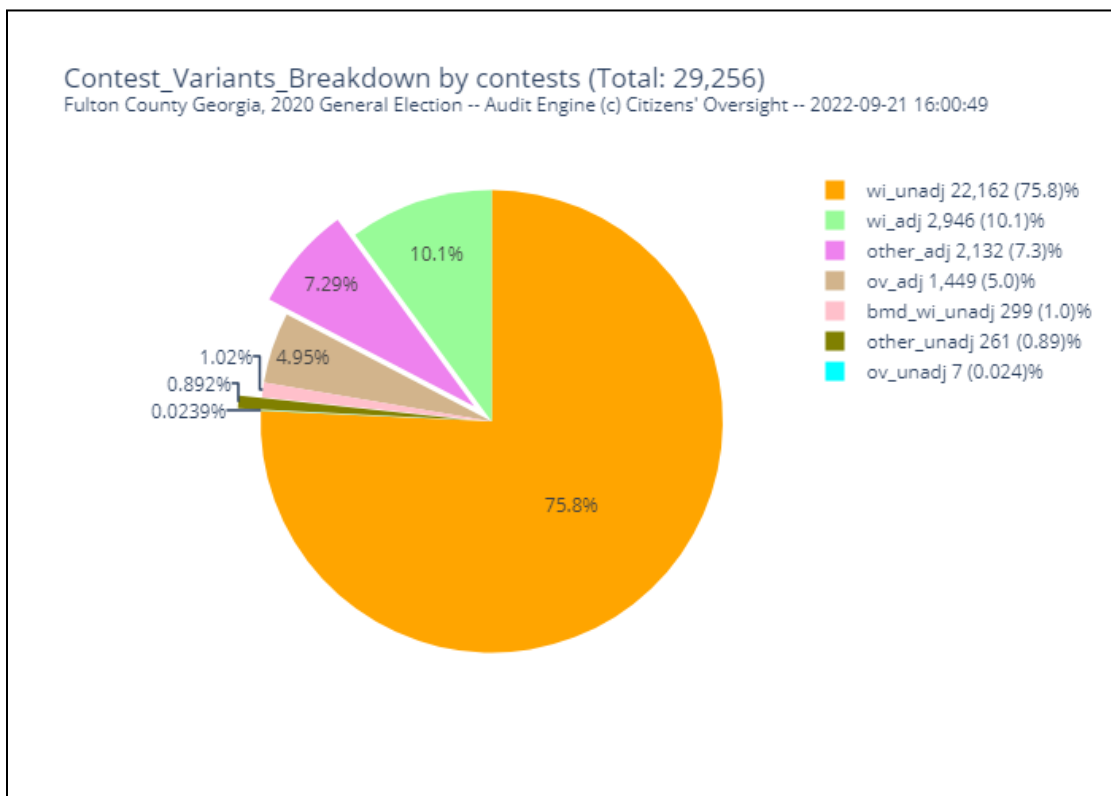
**Across all contests:**

- **Most Variant:** 100% was the highest level of variant votes in any contest, as % of the margin of victory in the contest ("Surveyor" had no listed candidates in this contest, so that all votes cast in this contest were write-ins, and yet there were no "qualified write-in candidates" listed in the CVR either). But in only 7 cases (0.06%) did we disagree that a write-in vote was cast, and 37 were flagged as gray.
- **AuditEngine's Correct Evaluations when Voting System required adjudication:** 1,394 votes were correctly interpreted by AuditEngine while the Dominion voting system initially misinterpreted those votes, and these were corrected by Fulton County staff during adjudication to match the AuditEngine evaluation.
- Approximately 100 votes were correctly interpreted by AuditEngine while the Dominion voting system initially misinterpreted those votes, and these were NOT corrected by Fulton County staff during adjudication.
- Approximately 100 votes were very difficult to interpret and were not interpreted correctly by AuditEngine nor by the voting system but were corrected or confirmed by Fulton County staff during adjudication.

The most common reasons for discrepancy were:

- where the voter circled or checkmarked the oval, but did not darken the middle of the oval, and the election system did not look outside the oval.
- where the voter hesitated and slightly marked one oval and then definitely marked the other one
- where the voter scratched out one oval with a very large mark while marking the desired option with a correct but smaller mark.

The second pie chart shows the major categories of votes with write-ins or overvotes, with the "other" category including the disagreed votes where there were no write-ins or overvotes.



There were a number of interesting quirks in this audit that we discuss further:

- **DeKalb Ballots:** 5 Ballots were discovered from DeKalb County mixed into the ballots processed for Fulton County.
- **Primary Election Ballots:** 5 Ballots from the primary election were found but these were not processed by the voting system even though they were counted as ballots cast.
- **Multiple Cards Issue:** We detected 1 case of multiple "Cards" in a single Cast Vote Record that was perhaps due to a jam that occurred where the CVR record was initially

recorded, and then the next card was used instead, and then the first card reappeared 20 ballots later.

- **Repeated Ballot Images:** There were 262 ballot images that were repeated in the archives, but were not mistakes nor used in the canvass as separate ballots. This was due to how the ballot image archives were generated. This did not affect the outcome.
- **Rescanned Ballots:** Although we looked carefully for them, we disagreed with other investigators in that we did not find re-scanned ballots. We did note that when investigating the Multiple Cards issue, we noticed that some of the rationale for rescans were incorrectly evaluated by those investigators. However, we do not have evidence that there were no rescanned ballots.

## About Fulton County

Fulton County, and all counties in Georgia, use the most recent release of the Dominion Voting System (Dominion). We were able to compare the results between AuditEngine and the voting system down to each contest on each individual ballot, because these systems can provide the ballot-level "Cast Vote Record" (CVR) file, which is the digital record of voter intent for every contest on that ballot. In addition, this county used the Dominion adjudication system, and any ballots that were adjudicated and changed had both the 'original' and 'modified' CVR records.

This table provides the overall profile for a ballot image audit of this election:

| <b>Election Name</b>        | <b>Fulton County Georgia, 2020 General Election</b> |
|-----------------------------|---|
| Population in 2020          | 1,066,710   |
| Eligible voters             | 527,430 (active voters, 60 days pre-election)       |
| Ballots Cast:               | 528,777   |
| Outcome Bias <sup>5</sup> : | Deep Blue, Biden 72.6% to Trump 26.2%               |
| Voting System:              | Dominion  |
| BMD Ballots Cast            | 381,626   |
| Sheets                      | One sheet for each voter in all precincts.          |
| Ballot images               | 148,580   |
| Repeated Ballot Images      | 262   |

<sup>5</sup> The outcome bias is how the county voted in the presidential contest, and whether those who voted were evenly split, or "Red" (Republican) or "Blue" (Democratic) outcome.



|                       |                     |
|-----------------------|---------------------|
| Missing Ballot Images | 380,459             |
| BMD Images            | 3,923               |
| Missing CVR records   | 5 (primary ballots) |

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# 1. Background

To reduce the size and complexity of audit reports, background information has been moved to a companion document:

## **"Auditing Elections Using Ballot Images and AuditEngine -- General Background"**

<https://docs.google.com/document/d/18A1K8mXXHnhisLqBQigx0ibboz39FAh9hOSykcR-jT4/edit?usp=sharing>

Please fully read and study this document before attempting to digest the rest of this report, particularly with respect to the terminology defined.

### **A note on writing style**

Throughout this document, we will use "programmer" style quotes, which always frame the terms and do not include punctuation. Also, as a matter of style, numbers are always shown in numerical form, commas will always be included in conjunctive lists, and all quotes are straight.

## 2. Details of this audit

Regarding some of the issues mentioned in the general description above, we can refine this description as follows:

1. Fulton County was able to provide only about 28% of the ballot images, including 148,318 early voted ballots, which were almost all hand-marked paper ballots, and 3,922 BMD (Ballot Marking Device) ballots out of 381,626 BMD ballots. There were 380,458 missing ballot images.
  - a. In Georgia, all counties use the same Dominion voting system and all produce ballot images and detailed cast-vote records that may include "modified" adjudication records.
  - b. Dominion voting systems do not have the option to delete ballot images in voter-facing scanners used in the polling locations nor in the central count scanners, and federal law requires that election records are kept for 22 months, including electronic and digital records. Nevertheless, in the recent 2020 General Election some counties deleted the ballot images. Frequently this occurred when they overwrote the ballot image data of the General Election with data from the runoff election that occurred in January 2021.

Fulton County was one of these counties, and as a result, was unable to produce all the original images in the election. We do not believe this was intentional, because the changes in the election law occurred after the election.

2. Due to the recent changes in Georgia law, ballot images are recognized as public records that are not exempted from release to the public<sup>6</sup>. We had difficulty getting ballot images for this election and Fulton County proposed that it was necessary to pay \$1,450 to get the files. This is in contrast with other counties that provided their ballot images and CVR records at no charge. We eventually were able to get 148,318 unique ballot images of handmarked paper ballots and 3,622 BMD ballots from the archive provided by VoterGA.

It is our position that all election data should be provided to the public at no charge, and placed on public posting services so there is no incremental overhead for election officials to provide the data to any members of the public.

### 3. Setup and Mapping Comments

3. The ballot images were not published by Fulton County for access by the public. We were able to obtain the ballot images from the archive created by VoterGA and we thank VoterGA for their kind assistance.
4. For this audit, we used computer-assisted manual mapping as we did not have access to the Ballot Style Masters to allow automated mapping. There were 451 styles out of a total of 666 styles that were used in this election. Georgia does not rotate ballot options and this can reduce the number of styles slightly.

### 4. Discrepancy Report

5. **Vote Evaluation Method:** Georgia is a voter-intent state. This means that the intent of the voter is to determine the vote rather than based on how the machine would read it. For example, if a voter fills in an oval, then crosses it out, and writes "No" next to it, and fills in another oval, then the second oval would be interpreted as the intent of the

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<sup>6</sup> GA Code Section Code Section 50-18-71 (k), as amended on March 25, 2021: "Scanned ballot images created by a voting system authorized by Chapter 2 of Title 21 shall be public records subject to disclosure under this article."

voter<sup>7</sup>.

6. **Comparison.** After the vote is extracted and evaluated by AuditEngine, it is compared with the cast vote record. This is the most sophisticated stage in the process, and our reporting methodology is more precise and detailed than other ballot image auditing solutions.
7. This process was performed for Fulton County because we were provided with the complete detailed CVR for machine count 1 (MC1), even though we did not have all the ballot images.
8. The detailed discrepancy report as prepared for this election by AuditEngine is extensive and provides images of the ballots of concern. It is not intended nor recommended that this report is printed out on paper. Instead, it is best to review it in a browser so the hot links will operate and so that specific patterns can be searched for. Here, we will summarize the important points from this report.

If there is any discrepancy between this narrative report and the machine produced report linked below, the machine produced report may have been slightly updated and should be considered the official audit result. Here is the link to the report.

[https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US\\_GA\\_Fulton\\_20201103/reports/Discrepancy\\_Report.html](https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US_GA_Fulton_20201103/reports/Discrepancy_Report.html)

## 4.1 Discrepancy Report -- High Level Reconciliation

9. **Contest Variant Definition:** A contest variant is a contest on one ballot where AuditEngine disagreed with the voting system evaluation of that contest, or where there were write-ins, overvotes, or "gray" marks. Undervotes are not considered a variant unless they are considered "disagreed" or are flagged as "gray".
10. **Agreed Undervotes:** If undervotes are disagreed, then we do treat it as a contest variant. We do not routinely treat all agreed undervotes as contest variants. If this were done, it would result in a vast number of contest variants, one for every contest that

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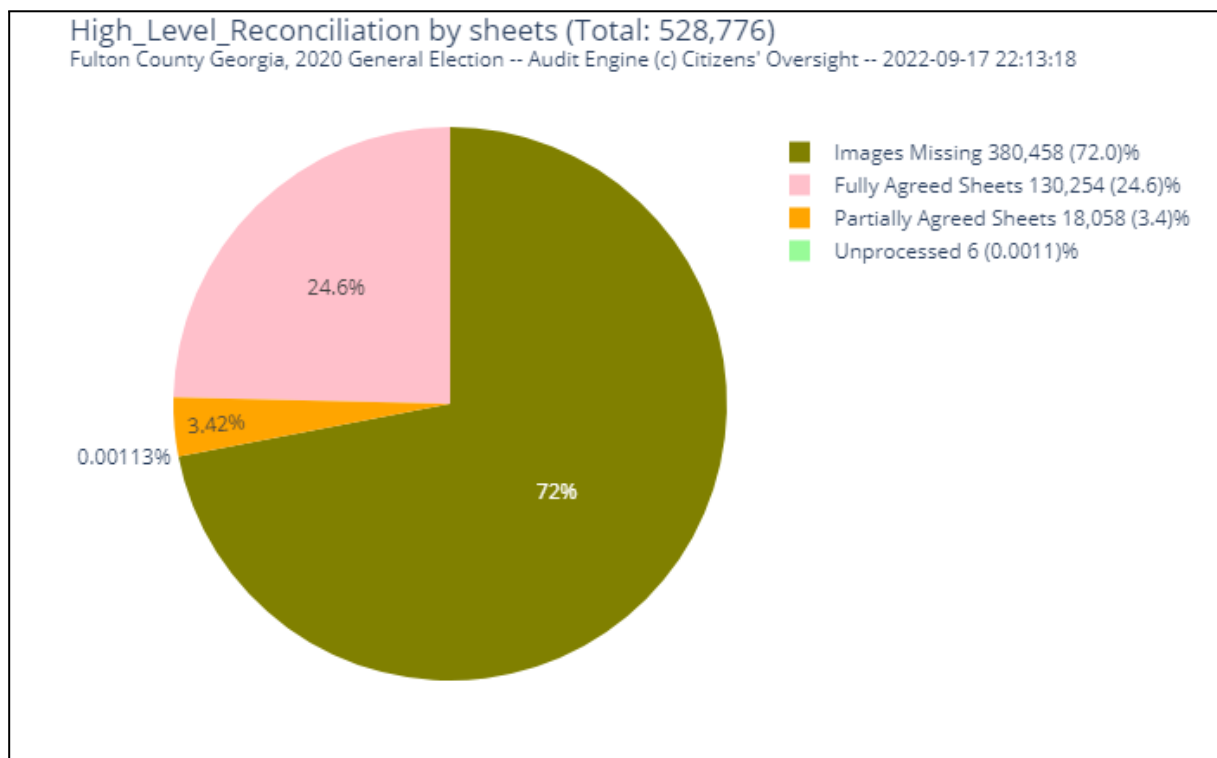
<sup>7</sup> O.C.G.A. 21-2-438 (2010) "(c) Notwithstanding any other provisions of this chapter to the contrary and in accordance with the rules and regulations of the State Election Board promulgated pursuant to paragraph (7) of Code Section 21-2-31, if the elector has marked his or her ballot in such a manner that he or she has indicated clearly and without question the candidate for whom he or she desires to cast his or her vote, his or her ballot shall be counted and such candidate shall receive his or her vote, notwithstanding the fact that the elector in indicating his or her choice may have marked his or her ballot in a manner other than as prescribed by this chapter."

voters skipped. Yet, this can be an important consideration on hand-marked ballots, particularly in "critical contests" where voters might circle the ovals, circle names, or for other reasons. The total number of undervotes in any specific contest is provided in the contest summary in the contest detail report. A planned enhancement for AuditEngine is to treat agreed undervotes as contest variants in "critical contests". Critical Contests can be any contest designated by those running the reports.

When adjudicated by the staff in Fulton County, most adjudicated and confirmed overvotes were converted to undervotes in the Presidential Contest.

### 11. High-Level Reconciliation by Sheets:

The following pie chart shows the High Level Reconciliation by Sheets.



**12. No Images:** 380,458 sheets (72%). This is the biggest portion, and these missing images are a key finding in the audit.

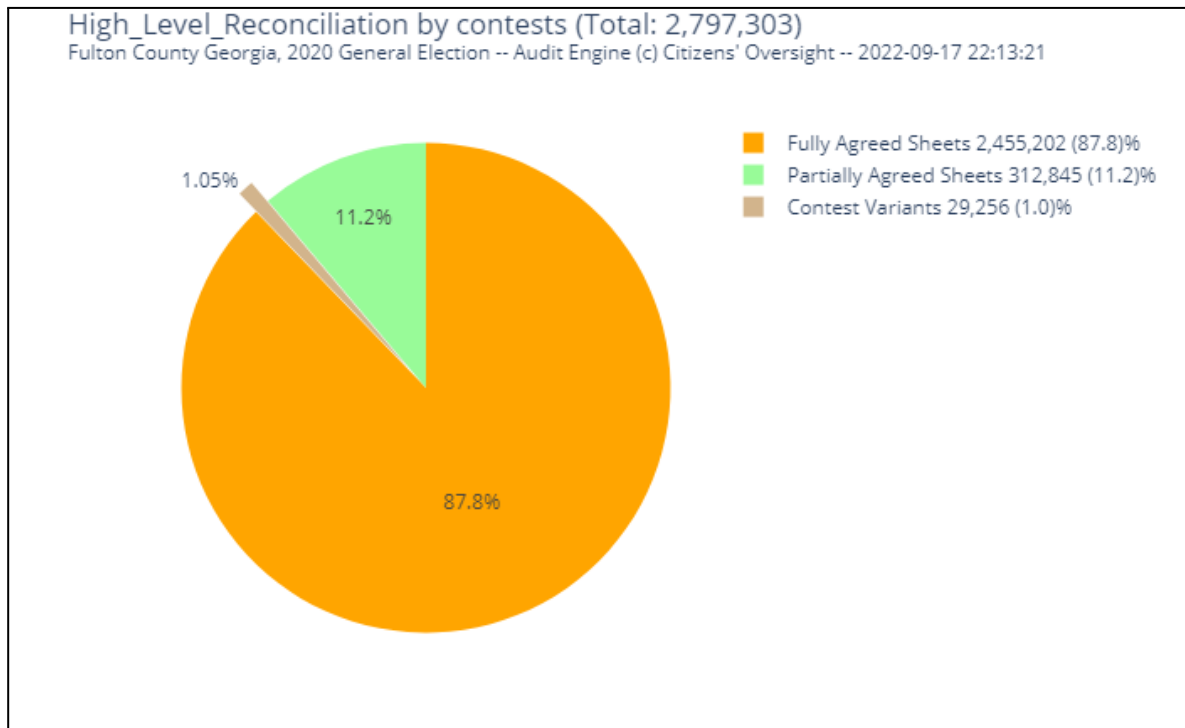
**13. Fully Agreed sheets:** 130,254 sheets (24.6% of all sheets, 87.8% of ballots processed): The AuditEngine evaluation for all contests on these ballot sheets agreed with the CVR from the voting system, and there were no overvotes, write-ins, or gray-flags, although they may have had undervotes. Any sheet with contest variants would be categorized as Partially Agreed, and the variant contests would be "pulled" from those sheet records and included in individual Contest Variant records, one

record per contest variant.

**14. Partially Agreed sheets:** 18,058 sheets (3.4% of all sheets, 12.2% of ballots processed): At least one variant contest was found on these sheets. Each record in the Partially Agreed set is for one entire sheet but with at least one variant contest removed from that record, and a separate record is created for each variant contest in the group "Contest Variants". There were 312,845 contests on these sheets that agreed with no variations. (Sometimes a Partially Agreed sheet record may have all the contests pulled and considered variants, and have none left).

**15. Sheets with Contest Variants:** 18,058 sheets (3.4% of all sheets, 12.2% of ballots processed) had at least one or more contest variants.

**16. High-Level Reconciliation by Contests:** When we view the same data by ballot-contests, for clarity we will leave out all the images that are missing and consider only the sheets we could process. "Fully Agreed Sheets" and "Partially Agreed Sheets" categories are the number of contests remaining in those sheet records after Contest Variants have been removed. Please note that these numbers are for the contests on those sheets that were agreed and had no variations.



**17. Agreed and Non-Variant Ballot Contests:** 2,768,047 non-variant ballot-contests, including 2,455,202 contests on sheets that were "Fully Agreed" and 312,845 contests



on sheets that were "Partially Agreed".

**18. Total Agreed Ballot-Contests:** AuditEngine processed 2,797,303 ballot-contests and 99.0% of these contests on 148,312 sheets had no variations and were fully agreed from both the Fully Agreed and Partially Agreed groups.

**19. Contest Variants:** 29,256 ballot-contests on 18,058 sheets were classified as Contest Variants (1.0%). Contest Variants have either write-ins, overvotes, gray-flags, or are considered "disagreed".

**20. Initial Consistency Screen:** The set of Contest Variants provides an initial consistency screen. If we had processed the entire election and if the tightest margin of victory was greater than twice the number of Contest Variants, then the outcome could be deemed as consistent, because even if all Contest Variants are fully reviewed and altered in favor of a losing candidate, it can not alter the outcome. This is a very conservative threshold because the Contest Variants are spread among all contests.

**21. Presidential Contest:** In GA, the statewide margin of victory in the Presidential contest was only 0.23% and 11,779 votes, which is less than  $29,455 \times 2 = 58,910$ . Therefore, it is necessary to break down the "Contest Variants", and also look at this contest in detail. Plus, we did not process all ballots cast, but only 28% of the ballots, so the screen is not valid for this case, but could be used when all ballots are processed, and if we had done the ballot image audit in all counties.

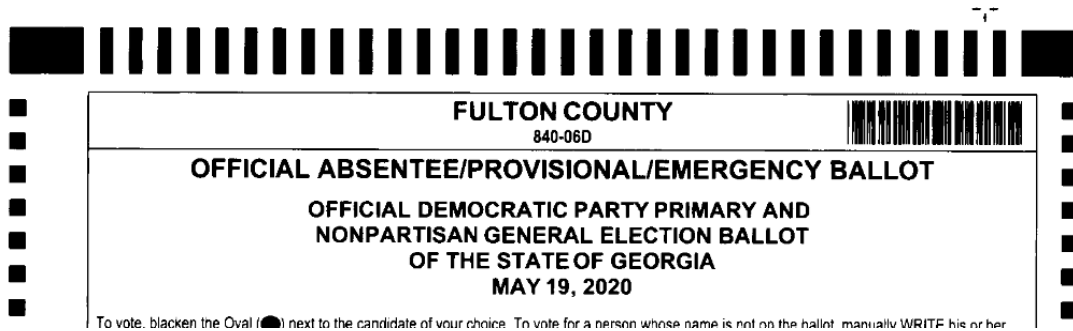
**22. Other County Ballots:** AuditEngine detected 5 ballots from DeKalb County. These were initially detected during mapping. The AuditEngine team was the first group to find these, and we shared this information with other groups studying this election. These ballots were included in the official count and were also sometimes strangely adjudicated, despite having many contests on the ballot that could not apply in Fulton County. This will be reviewed in detail in a later section.

**23. Unprocessed:** These are ballots that could not be processed at all, usually due to corruption of the image or other factors. In Fulton County, 5 hand-marked paper ballot sheets were encountered that could not be aligned. AuditEngine classified these as "Unprocessed". Upon further investigation, we found that these five ballots were from the May 19, 2020 primary election, and the paper size was different. These 5 ballots were not processed by the voting system either, and were not included in the CVR.

These ballots can be reviewed at this link in the report:

[https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US\\_GA\\_Fulton\\_202011](https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US_GA_Fulton_202011)

Here is a sample of the header from one of those ballots, showing that it was from the May 19, 2020 Primary Election.



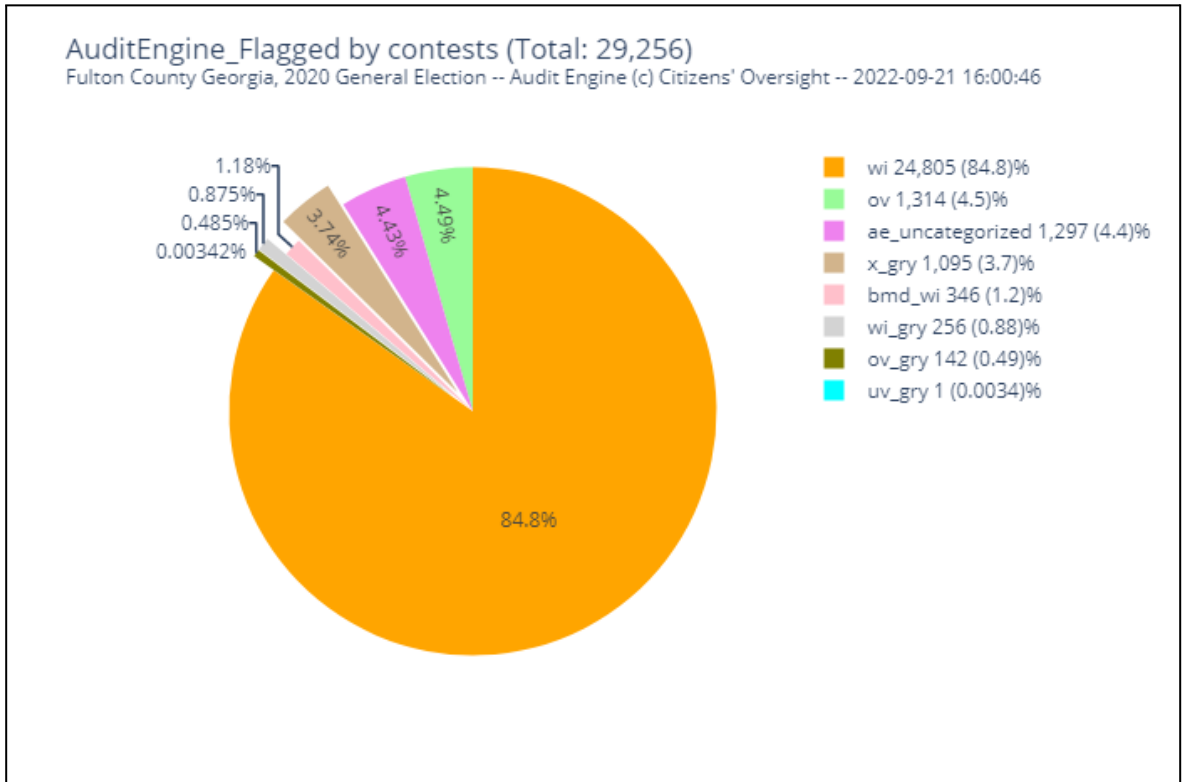
24. There were very few corrupted ballot images largely due to the fact that these were very new machines, and other than these 5 ballots, no other hand-marked ballots were not fully processed by AuditEngine, however, one BMD ballot was not processed.

## 4.2 Discrepancy Report -- AuditEngine Flags of Ambiguous Votes

25. If we had no cast vote records (CVRs or "CVR Files"), then we could not compare the AuditEngine tabulation on a ballot-by-ballot basis, but we can compare with aggregated totals. AuditEngine also provides "gray flags" when it uses heuristics or is unsure of ambiguous marks. To refine the results, we can take a look at the write-ins, overvotes, and contests flagged as "gray" based on the evaluation of AuditEngine alone. These are shown in the following pie chart, without reference to the CVRs.

Of course here, we have the detailed CVR and we will use that instead, but this is shown here for demonstration of how the result could be used to identify ballots that need further review. These can then be reviewed using the AuditEngine Adjudicator App.

In the following sections, these categories will be discussed.



**26. Total Flagged Contests:** There were a total of 29,256 ballot-contests flagged for additional scrutiny, which is over the statewide margin of victory of 11,779 votes in the presidential contest, so it would need further scrutiny. This initial screen is not valid because we had only 30% of the ballot images. Also, since there are 159 counties in GA, the differences in all counties would need to be considered.

**27. CVR was Available:** Because the CVR is available, we need not depend only on the flags by AuditEngine. Thus, these are discussed here only to explain the capability available when there is no CVR. The category "ae\_uncategorized" are the ballots that were discovered as variants by the CVR comparison. Thus, we would not have discovered the ae\_uncategorized group without the CVR comparison.

**28. Across All Contests:** We must be cognizant that these figures are across all contests, and there were 61 contests in the election. This would further dilute the effect of the contest variants. Also, each variant should be considered based on whether it would decrease or increase the margin of victory.

**29. AuditEngine flagging detailed breakdown:**

**Non-Gray Write-ins:** 24,805 contests (84.8%)  
 Write-ins are generally reviewed by the election department in detail, and so are

generally not likely to find that these were misinterpreted by the time the canvass is completed. Some contests have no qualified write-in candidates.

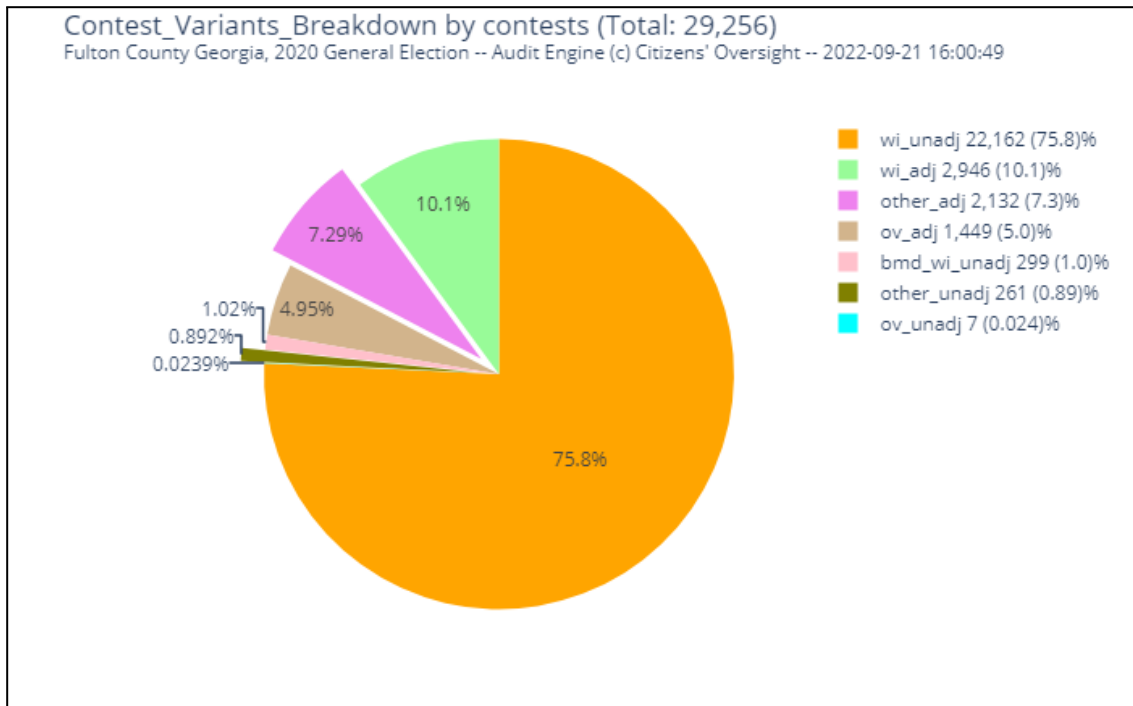
|                            |                |         |
|----------------------------|----------------|---------|
| <b>BMD Write-ins:</b>      | 346 contests   | (1.2%)  |
| <b>Gray Write-Ins:</b>     | 256 contests   | (0.92%) |
| <b>Non-Gray Overvotes:</b> | 1,314 contests | (4.5%)  |
| <b>Gray Overvotes:</b>     | 142 contests   | (0.49%) |
| <b>Other Gray:</b>         | 1,095 contests | (3.7%)  |
| <b>Uncategorized:</b>      | 1,297 contests | (4.4%)  |

These Uncategorized variant contests were not flagged by AuditEngine but were identified due to comparing AuditEngine with the CVR. Thus, these will be found in the "Normal Disagreed" group.

### 4.3 Discrepancy Report -- Contest Variant Breakdown

**30. When the CVR is available,** the Contest Variants can be further categorized and reviewed. This is the most powerful way to analyze an election. Since these are across all contests, the review will more appropriately inform considerations about the general quality of the canvass rather than reflecting on exact outcomes.

**31. Contest Variants:** 29,256 contests (1.0% of all contests) were either disagreed, write-ins, overvotes, or gray-flags pulled from the "Partially Agreed" sheets. Because the Dominion Voting System includes a "modified" record if the ballot was adjudicated and some change was made, this allows our analysis to be even more detailed. But we must emphasize that if a contest is not changed in the 'modified' record, then we are not sure if these were inspected and confirmed or not.



Of the Contest Variants, there were:

### 32. Write-Ins:

The most common form of variant are write-ins. All write-ins total 25,407 variant contests, 87% of all contest variants.

We can break these down based on whether the CVR has a modified record, which means that it may have been reviewed and adjudicated. But the modified record may have been created due to review of a different contest on the ballot. If so, then the entire 'modified' record is created, and if write-in is unchanged, then it probably was not actually reviewed and confirmed. Unfortunately, in the CVR, there is no indication available for "reviewed and confirmed". Therefore, although these are called adjudicated (meaning having the modified record) they may not have been reviewed.

- a. **Unadjudicated Write-ins:** 22,162 Contests on 14,702 sheets (75.8% of contest variants) were write-ins without adjudication records on hand-marked paper ballots.
- b. **Adjudicated Write-ins:** 2,946 Contests on 1,369 sheets (10.1% of contest variants) included 'modified' records, and yet were not necessarily changed or even reviewed. Typically, if adjudicated and rejected, it will be marked as an undervote, and then it will be obvious that it has been reviewed. If unchanged, we don't know from the CVR if it was reviewed.

- c. **Write-ins on BMD ballots:** 299 contests on 223 sheets (1% of contest variants) are keyed-in and do not need to be individually reviewed and decoded from voter's writing, and there is no doubt on a BMD ballot if the contest has a write-in. Therefore, these are generally not adjudicated, and do not have a 'modified' record in the CVR.

**"Officially Qualified Write-in Candidates":** Write-ins have another wrinkle because although the write-in may be properly marked and a name written-in, it is usually not valid unless the name refers to an officially qualified write-in candidate. The voting system may indicate a write-in candidate was correctly indicated, but later, the list is reduced to only the qualified write-in candidates. However, this is a matter of state and local election statutes that may vary from place to place, and procedures used by election officials may vary as well.

Generally, at this stage, the write-ins are not often reduced, based on whether they are on the qualified write-ins list.

Sometimes, the write-ins are for one of the official candidates. In those cases, when reviewed, the vote is awarded to the official candidate. So for example, in this election, if the voter marked the oval for the write-in line and wrote "Trump", then that vote would be awarded to that candidate, even though the candidate is an "official" and not a "write-in" candidate.

All write-ins classifications are further reviewed in a detailed section later in this report.

### **33. Overvotes:**

All overvotes total 1,449 contest variants, 4.9% of all contest variants. Again, we can break these down based on whether they have an adjudicated record.

- a. **Adjudicated Overvotes:** 1,449 Contests on 1,218 sheets (5.0% of contest variants). These appeared on ballots that had modified records, and were not necessarily changed. But there is a general practice among many election districts to review all overvotes and change them to undervotes so as to show that they were reviewed. We consider an overvote that was changed to an undervote as a "confirmed overvote" and it is in this category.
- b. **Unadjudicated Overvotes:** There were only 7 overvotes that did not have a modified record.

All Overvotes will be further detailed in a later section

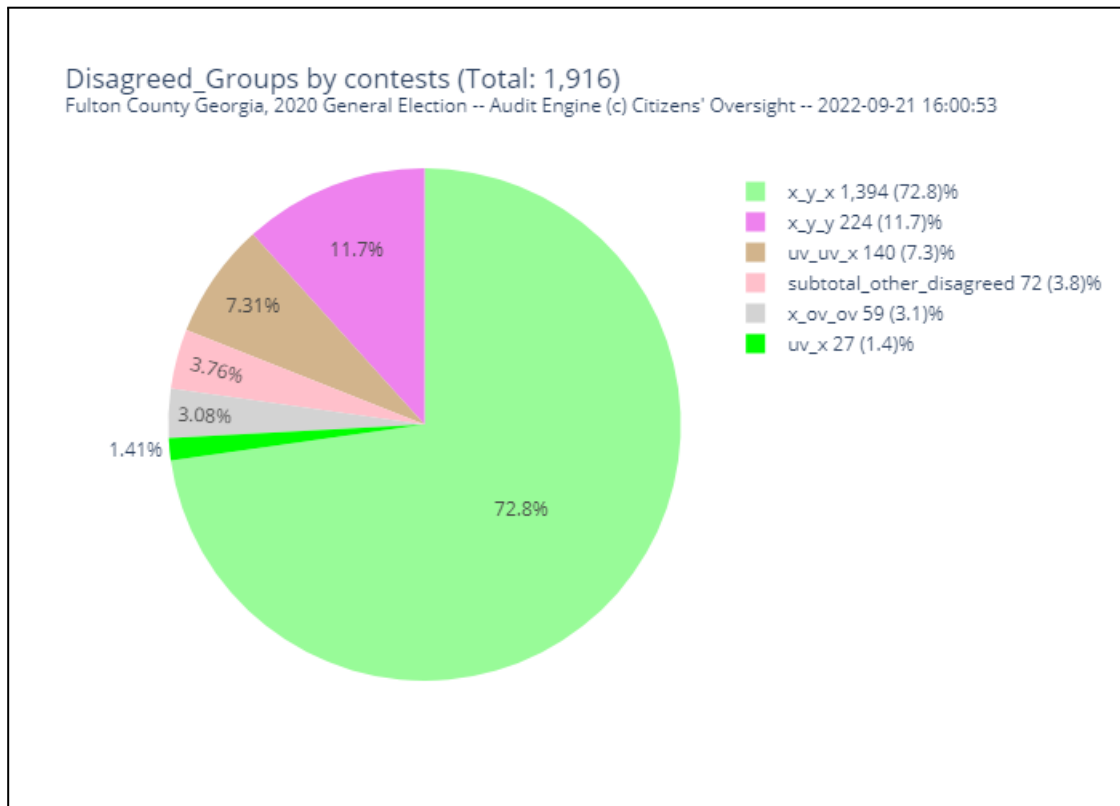
### **34. Other Contest Variants - "Normal Discrepancies":**

Other Contest Variants than Write-ins and Overvotes are "Normal Discrepancies".

There were a total of 2,393 contest variants in this category, 8.2% of all contest variants. Included in this category are contests with true disagreements, but also contests where initially the voting system and AuditEngine disagreed, but after adjudication, the evaluation was in agreement.

## 4.4 Discrepancy Report -- Disagreements

35. Variants other than write-ins and overvotes, the final category includes the "Normal Disagreed" contests. There were 1,980 contests in this category. By "Normal" we only mean that they do not include write-ins or overvotes as their primary categorization by AuditEngine.



### 36. Originally disagreed vote adjudicated to confirm the original AuditEngine interpretation (x\_y\_x):

1,394 contests (70.4% of Contest Variants in the Normal Disagreed category). These were definitely reviewed by Fulton County adjudication staff, and their adjudication agreed with the original AuditEngine evaluation, but disagreed with the initial voting system evaluation. This shows that AuditEngine generally does a better job than Dominion in evaluating these contests.

### 37. Originally disagreed vote; CVR vote confirmed by adjudication (x\_y\_y).

224 contests (11.3% of Contest Variants in the Normal Disagreed category). These are

typically very difficult ballots to interpret and call for human-eye review. Sometimes or very often, the adjudication is incorrect because no adjudication occurred, even though the adjudication record exists. In the case of Fulton County, we find that about 40% of these were not adjudicated and the AuditEngine evaluation was correct, 40% AuditEngine did not get right either, and 20% were in other categories. These will be further examined when the Presidential Contest is reviewed.

**38. Agreed Undervotes, confirmed as votes by adjudication (uv\_uv\_x).**

140 votes (7.1% of Contest Variants in the Normal Disagreed category). These were all definitely adjudicated and the change may be due to other voter marks to explain voter intent. Since undervotes are largely not adjudicated as there are so many, these are likely reviewed in close or critical contests.

**39. Disagreed vote and overvote adjudicated as overvote (x\_ov\_ov):**

59 votes on 53 ballots (3.0% of Contest Variants in the Normal Disagreed category). Despite having the adjudication 'modified' record, these were not necessarily actually reviewed in the adjudication process and very often, the AuditEngine evaluation was correct. These should be reviewed on a contest-by-contest basis if the margin is close.

**40. Unadjudicated disagreed undervotes with CVR votes (uv\_x):**

27 votes on 19 ballots (1.4% of Contest Variants in the Normal Disagreed category). These are likely hesitation marks and should be reviewed on a contest-by-contest basis.

**41. All other normal disagreed categories.**

72 Contests (3.6% of Contest Variants in the Normal Disagreed category). These are best reviewed in contest-specific review.

## **4.5 Discrepancy Report -- Contest Discrepancy Report**

**42.** The most effective report is the Contest Discrepancy Report because the disagreements can be related to the margin of victory in a specific contest. The AuditEngine report provides details on the top 10 contests and any contests that are "close" or are the top 5 in terms of the most variants or disagreements:

This portion of the report is at this URL:

[https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US\\_GA\\_Fulton\\_20201103/reports/Discrepancy\\_Report.html#contest-discrepancy-report](https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US_GA_Fulton_20201103/reports/Discrepancy_Report.html#contest-discrepancy-report)



Here is an image clip of the top of the Contest Discrepancy Report table.

| Contest  | Total   | Agreed & NonVariant | Agreed Overvotes | Agreed Write-ins | No CVR | Gray Only | Disagreed | All Variants | Disagreed% of Margin | Variant% of Margin | Vote Margin | Margin% |
|--|---------|---------------------|------------------|------------------|--------|-----------|-----------|--------------|----------------------|--------------------|-------------|---------|
| <a href="#">President of the United States</a>       | 148,312 | 147,385             | 120              | 678              | 0      | 33        | 82        | 927          | 0.10%                | 1.07%              | 86,309      | 58.63%  |
| <a href="#">US Senate (Perdue)</a>                   | 148,312 | 147,999             | 60               | 142              | 0      | 26        | 77        | 313          | 0.10%                | 0.43%              | 73,567      | 51.46%  |
| <a href="#">US Senate (Loeffler) - Special</a>       | 148,312 | 147,108             | 887              | 112              | 0      | 98        | 104       | 1,204        | 0.15%                | 1.77%              | 68,168      | 47.44%  |
| <a href="#">Public Service Commission District 1</a> | 147,682 | 147,416             | 50               | 106              | 0      | 22        | 84        | 266          | 0.12%                | 0.39%              | 67,980      | 47.76%  |
| <a href="#">Public Service Commission District 4</a> | 147,682 | 147,414             | 51               | 103              | 0      | 29        | 83        | 268          | 0.12%                | 0.39%              | 68,880      | 48.95%  |
| <a href="#">US House District 5</a>                  | 65,348  | 65,023              | 39               | 201              | 0      | 11        | 43        | 325          | 0.09%                | 0.70%              | 46,391      | 73.66%  |
| <a href="#">US House District 6</a>                  | 57,102  | 56,988              | 18               | 88               | 0      | 5         | 21        | 134          | 0.13%                | 0.83%              | 46,231      | 80.98%  |

43. For any particular contest, we can focus on the "Disagreed% of Margin" or the "Variant% of Margin". The margin of victory in votes for the contest is between the last-winning candidate and the first-losing candidate. This is not the "pairwise" margin<sup>8</sup>, but the actual margin including all other candidates. For ease of reading, the closest 5 contests are highlighted in terms of the Disagreed% of Margin and Variant% of Margin, and also contests with margins of victory below 10% are highlighted. These contests are also detailed and can be accessed by the contest name link. (Other contests can be added to the report as needed.)

44. The contest "Surveyor" had no listed candidates and no qualified write-ins. All ballots cast were therefore variant contests for this contest. However, in only 7 cases were the evaluations disagreed in terms of whether the target was marked, and there were 37 cases gray-flagged. So although this contest seems very discrepant, there is little actual disagreement and since there were no qualified write-in candidates, it may not be worth reviewing any ballots regarding this contest.

45. Other than Surveyor, the closest two contests were as follows:

| Contest                      | Margin of Victory | Disagreed (% of Margin) | Variant (% of Margin) |
|------------------------------|-------------------|-------------------------|-----------------------|
| State House District 47      | 191 (2.08%)       | 1 (0.52%)               | 16 (8.38%)            |
| County Commission District 2 | 1871 (7.65%)      | 13 (0.69%)              | 52 (2.78%)            |

<sup>8</sup> The pairwise margin considers only the two ballot options and not all the other options in that contest. So if there are three candidates, A, B, C with votes of 50,40,10, then the actual margin is 10% =  $100 * (50 - 40)/100$  but the pairwise margin is  $100 * (50 - 40)/90 = 9\%$ .

## 4.6 Discrepancy Report -- Precinct Report

46. The Precinct Report provides a breakdown of the ballots in each precinct. These values are ballot counts, and are not specific to any particular contest. This report can sometimes highlight issues that may be specific to any particular precinct, but in our opinion is not as valuable as the Contest Discrepancy Report. Nonetheless, we include it because some states have requirements for this report. This report highlights the highest 5 Disagreed% of Margin precincts.

47. Overall, there were 816 sheets with contests categorized as Normal Disagreed cases.

| Precinct Report  |         |       |                     |                  |                  |              |        |           |           |              |                     |                   |  |
|--|---------|-------|---------------------|------------------|------------------|--------------|--------|-----------|-----------|--------------|---------------------|-------------------|--|
| Please note that the figures in this table are by ballot, rather than by contest, and the %Disagree is the number of cases among the ballots in the group rather than of a margin, since these cases are among all the contests in the precinct. |         |       |                     |                  |                  |              |        |           |           |              |                     |                   |  |
| To reduce the report size, precinct details are limited to those precincts that were highlighted or are included in the setting 'ompcvr_report_include_precincts'.   |         |       |                     |                  |                  |              |        |           |           |              |                     |                   |  |
| Precinct   | Style   | Total | Agreed & NonVariant | Agreed Overvotes | Agreed Write-ins | Agreed Blank | No CVR | Gray Only | Disagreed | All Variants | Disagreed% of Total | Variant% of Total | Disagreed Examples   |
| 2  | [1, 17] | 810   | 734                 | 2                | 70               | 0            | 0      | 6         | 3         | 76           | 0.37%               | 9.38%             | ['05150_00228_000083', '05150_00134_000055', '05150_00067_000006']   |
| 5  | [2, 18] | 980   | 860                 | 6                | 109              | 0            | 0      | 8         | 6         | 120          | 0.61%               | 12.24%            | ['05150_00316_000048', '05150_00245_000068', '05160_00092_000095', '05162_00062_000071', '05160_00304_000026', '05160_00207_000028'] |
| 8  | [3, 19] | 178   | 152                 | 1                | 24               | 0            | 0      | 0         | 1         | 26           | 0.56%               | 14.61%            | ['05164_00127_000023']   |
| 11   | [227]   | 138   | 119                 | 2                | 17               | 0            | 0      | 0         | 0         | 19           | 0.00%               | 13.77%            |  |
| 14   | [21, 4] | 875   | 745                 | 0                | 125              | 0            | 0      | 4         | 3         | 130          | 0.34%               | 14.86%            | ['05160_00401_000001', '05164_00127_000027', '05164_00100_000094']   |
| 17   | [228]   | 117   | 94                  | 0                | 21               | 0            | 0      | 1         | 3         | 23           | 2.56%               | 19.66%            | ['05160_00304_000036', '05160_00207_000006', '05162_00332_000087']   |
| 20   | [5]     | 315   | 246                 | 4                | 64               | 0            | 0      | 3         | 3         | 69           | 0.95%               | 21.90%            | ['05160_00439_000049', '05160_00405_000065', '05150_00130_000070']   |

## 4.7 Discrepancy Report -- Presidential Contest

48. To give the reader an understanding of the detail to which AuditEngine provides an ability to analyze the results, we will focus on the contest '*President of the United States*', since it is the most consequential contest and was quite close state-wide with an official statewide margin of 11,779 votes. However in Fulton county and among the ballots we could study, the margin was 86,309 votes with a margin of 58.63%, with Joe Biden receiving 115,788 votes (78.77%) and Donald Trump receiving 29,479 votes (20.05%). Thus, although this was a landslide victory in this county, statewide this contest was still quite close, and any deviation of at least 11,780 votes might flip the election.

The analysis by AuditEngine shows that even if we consider all 927 contest variants, they only account for less than 8% of the total margin needed to flip the election with these results alone. But given that we have only 30% of the ballots, and Fulton is only one county among 159 in Georgia, to be fair, we should assume that we have at most

about 25% of the total margin needed to flip the election and further consideration is warranted.

As you will see, the election staff at Fulton County did a very good job of adjudicating this contest, and there is really no chance the results could be altered based on the ballots included in our audit.

The official results of the Presidential Contest, among the subset of the ballots we could study, had 49 overvotes and 1,062 undervotes. Undervotes on nonBMD ballots in critical contests may be of interest for additional review. These are not included in contest variants in this version of the Discrepancy Report but undervotes will be added as an option in the future as contest variants for critical contests.

| <b>Contest</b>                 | <b>Margin of Victory</b> | <b>Contest Variants (% of Margin)</b> | <b>Disagreed (% of Margin)</b> |
|--------------------------------|--------------------------|---------------------------------------|--------------------------------|
| President of the United States |                          | 927                                   | 82                             |
| (County margin)                | 86,309                   | 1.07%                                 | 0.10%                          |
| (Statewide Margin)             | 11,779                   | 7.8%                                  | 0.69%                          |

**49. General approach for this document:** Here, we will take a sample of a few of the cases in each category. The full Discrepancy Report<sup>9</sup> for the contest "President of the United States" can be reviewed for more details. It provides ballot images for the first 10 cases in each category. Although they are categorized as variants, we do not routinely review agreed write-ins and agreed overvotes or agreed votes flagged as "gray", unless the contest is extremely close, because even if all the variants are ruled for the losing candidate, there is no way to overturn the election.

The cases we did review showed that the election office adjudicated the results well and there is no chance that the outcome could have been different, given that the ballot images are an accurate representation of eligible votes cast.

The notation is covered in the background document, but will be repeated here to refresh the memory:

[bmd\_]AE\_CVR\_ADJ

---

9

[https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US\\_GA\\_Fulton\\_20201103/reports/Discrepancy\\_Report.html#contest-president-of-the-united-states](https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US_GA_Fulton_20201103/reports/Discrepancy_Report.html#contest-president-of-the-united-states)

We will see bmd\_ if the contest variant applies specifically to BMD ballots, and left off if it is a nonBMD (hand marked) ballot.

AE is the AuditEngine evaluation, and will be either 'x', 'wi', 'ov' or 'uv' meaning a vote, a write-in, and overvote, or an undervote, respectively.

CVR is from the cast-vote record, and is the voting system evaluation. It has the same list of abbreviations except it might also have 'y' to mean a vote that differs from the vote 'x'.

ADJ is the adjudication, and if it differs from the CVR value, then we are sure that the contest was reviewed by election staff and changed, otherwise, we are not sure if it was reviewed.

So for example, if the designation were **wi\_uv\_x** then it means that AuditEngine evaluated it as a write-in, the voting system evaluated it as an undervote, and after adjudication, it was evaluated as a vote for a listed candidate.

#### **4.7.1 Normal Disagreements not including overvotes and write-ins.**

##### **50. Originally disagreed vote adjudicated to confirm the original AuditEngine interpretation. x\_y\_x. (58 Cases)**

These are perhaps some of the most interesting, because it points out that most of the time, AuditEngine will correctly interpret voter intent without additional adjudication. In these cases, the AuditEngine interpretation disagreed with the voting system, but then after adjudication, the vote was judged to be the same as the original AuditEngine interpretation. Here are a few cases. Except for the first one, the cases shown are all votes for Joe Biden, and they were correctly adjudicated.



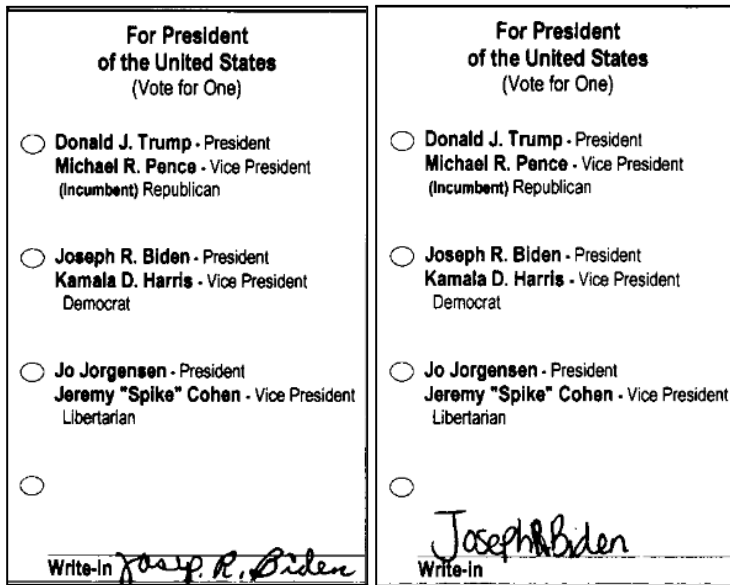
**51. Originally disagreed vote; CVR vote confirmed by adjudication x\_y\_y (13 Cases)**

At first glance, these are cases where AuditEngine failed to provide the proper result. But unfortunately, these may not have been actually adjudicated, even though the CVR does have a 'modified' record. As it turns out, AuditEngine correctly interpreted the first three cases and did not correctly interpret the second three cases. We will be improving our heuristics and will be using these cases to teach our algorithm to do a better job in the future. The second three cases were definitely reviewed by election staff, but the first three were not, even though there was a "modified" record included. Because AuditEngine flags these as gray, they can be further reviewed in very close contests. Sometimes, these are just very hard to decipher. Of the total of 13 cases x\_y\_y, 5 were correctly interpreted by AuditEngine, 5 were not, and the other 3 were write-ins that required human-eye review and were gray-flagged.

|  |  |  |
|--|--|--|
| <p style="text-align: center;"><b>For President<br/>of the United States</b><br/>(Vote for One)</p> <p><input type="radio"/> Donald J. Trump - President<br/>Michael R. Pence - Vice President<br/>(Incumbent) Republican</p> <p><input checked="" type="radio"/> Joseph R. Biden - President<br/>Kamala D. Harris - Vice President<br/>Democrat</p> <p><input type="radio"/> Jo Jorgensen - President<br/>Jeremy "Spike" Cohen - Vice President<br/>Libertarian</p> <p><input type="radio"/></p> <p>Write-in</p>          | <p style="text-align: center;"><b>For President<br/>of the United States</b><br/>(Vote for One)</p> <p><input checked="" type="radio"/> Donald J. Trump - President<br/>Michael R. Pence - Vice President<br/>(Incumbent) Republican</p> <p><input type="radio"/> Joseph R. Biden - President<br/>Kamala D. Harris - Vice President<br/>Democrat</p> <p><input type="radio"/> Jo Jorgensen - President<br/>Jeremy "Spike" Cohen - Vice President<br/>Libertarian</p> <p><input type="radio"/></p> <p>Write-in</p>            | <p style="text-align: center;"><b>For President<br/>of the United States</b><br/>(Vote for One)</p> <p><input type="radio"/> Donald J. Trump - President<br/>Michael R. Pence - Vice President<br/>(Incumbent) Republican</p> <p><input checked="" type="radio"/> Joseph R. Biden - President<br/>Kamala D. Harris - Vice President<br/>Democrat</p> <p><input type="radio"/> Jo Jorgensen - President<br/>Jeremy "Spike" Cohen - Vice President<br/>Libertarian</p> <p><input type="radio"/></p> <p>Write-in</p>          |
| <p style="text-align: center;"><b>For President<br/>of the United States</b><br/>(Vote for One)</p> <p><input type="radio"/> Donald J. Trump - President<br/>Michael R. Pence - Vice President<br/>(Incumbent) Republican</p> <p><input type="radio"/> Joseph R. Biden - President<br/>Kamala D. Harris - Vice President<br/>Democrat</p> <p><input type="radio"/> Jo Jorgensen - President<br/>Jeremy "Spike" Cohen - Vice President<br/>Libertarian</p> <p><input type="radio"/></p> <p>Joseph R. Biden<br/>Write-in</p> | <p style="text-align: center;"><b>For President<br/>of the United States</b><br/>(Vote for One)</p> <p><input checked="" type="radio"/> Donald J. Trump - President<br/>Michael R. Pence - Vice President<br/>(Incumbent) Republican</p> <p><input checked="" type="radio"/> Joseph R. Biden - President<br/>Kamala D. Harris - Vice President<br/>Democrat</p> <p><input type="radio"/> Jo Jorgensen - President<br/>Jeremy "Spike" Cohen - Vice President<br/>Libertarian</p> <p><input type="radio"/></p> <p>Write-in</p> | <p style="text-align: center;"><b>For President<br/>of the United States</b><br/>(Vote for One)</p> <p><input type="radio"/> Donald J. Trump - President<br/>Michael R. Pence - Vice President<br/>(Incumbent) Republican</p> <p><input type="radio"/> Joseph R. Biden - President<br/>Kamala D. Harris - Vice President<br/>Democrat</p> <p><input type="radio"/> Jo Jorgensen - President<br/>Jeremy "Spike" Cohen - Vice President<br/>Libertarian</p> <p><input type="radio"/></p> <p>Joseph R. Biden<br/>Write-in</p> |

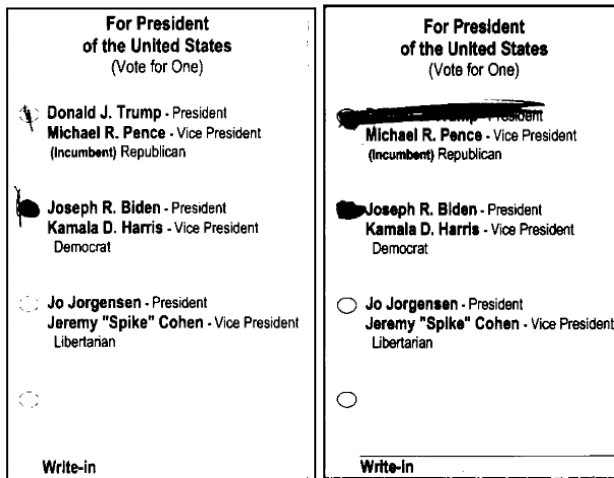
**52. Agreed Undervotes, confirmed as votes by adjudication uv\_uv\_x: (2 cases)**

These are definitely adjudicated because the record is changed for this contest.



The election staff adjudicated these correctly, and the fact that they reviewed and awarded these votes which were originally undervotes gives us additional confidence in the result overall.

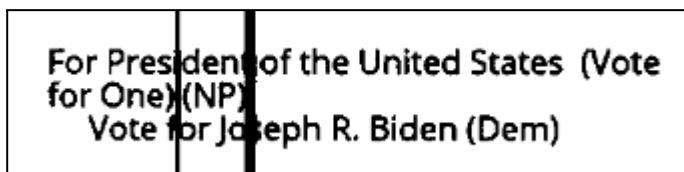
**53. Disagreed vote and overvote adjudicated as overvote: x\_ov\_ov (2 cases) --** In these cases, it does not appear that these were actually adjudicated. AuditEngine correctly interpreted the first one, and was fooled by the second one.



That concludes the review of special cases regarding the Presidential Contest. Clearly, the consistency is confirmed between the official outcome and the ballot image evidence.

**54. Disagreed BMD vote: bmd\_x\_y (1 case) --** This is one of the few BMD ballots which were not successfully parsed due to corruption in the image. The presidential contest

was marked as "UNREADABLE" and was gray-flagged for additional review. The image had two lines through the text.



#### 4.7.2 Write-ins detailed -- With and Without Adjudication Record

##### 55. Write-ins:

Write-ins are the largest portion of contest variants, normally about 80% of all contest variants. On BMD machines (which we largely did not include in the audit because the images were deleted), write-ins are keyed-in directly and there is no difficulty in determining if the voter wanted to include a write-in. And then, those write-ins can also be easily reviewed to see if they match any qualified write-ins, because hand-writing does not need to be deciphered. For non-BMD ballots, we find that most jurisdictions only adjudicate to the point of saying "this is a write-in" but not to say "this is a write-in and there is a name written-in, and the name is included in the qualified write-in candidate list". Sometimes, we do see that the adjudication also went this extra step.

For both BMD and hand-marked ballots, if a listed candidate is written-in, it might affect the vote count between two listed candidates. But that situation is a fraction of the total number of write-ins -- maybe at most 10% -- so other than that, write-ins can largely be ignored when considering if the outcome might change.

##### 56. wi\_wi\_wi: Adjudicated Confirmed Write-ins (217 cases).

The CVR for these includes the 'modified' record which is created when at least one contest is modified due to the adjudication process. Since this contest was not changed between the 'original' and 'modified' CVR records, we don't know if it was reviewed at all during adjudication.

To be accepted as a write-in, the name must be among the qualified write-in candidates. The list is provided in the CVR as follows:

Loren Collins, Gloria La Riva, Barbara Bellar, Brian Carroll,  
David Byrne, Deborah Rouse, Don Blankenship, Howie Hawkins,  
Jade Simmons, Kasey Wells, Kathryn Gibson, Mark Charles,  
Peter Sherrill, President R19 Boddie, Shawn Howard, and  
Princess Jacob-Fambro



Thus, we expect the adjudicated and accepted write-in would be one of those names. The first 10 cases provides an idea:

|  |                                    |
|--|------------------------------------|
| Jesus Christ                             | Not a qualified write-in Candidate |
| Dario David Hunter<br>Dawn Neptune Adams | Not a qualified write-in Candidate |
| Kanye West                               | Not a qualified write-in Candidate |
| Jade Simmons                             | LEGITIMATE                         |
| Matt Blackwell                           | Not a qualified write-in Candidate |
| Mitt Romney                              | Not a qualified write-in Candidate |
| Kanye West                               | Not a qualified write-in Candidate |
| Javon Andrews                            | Not a qualified write-in Candidate |
| Brian Carroll                            | LEGITIMATE                         |
| Gloria La Riva<br>Sunil Freeman          | LEGITIMATE                         |

Of these first 10 examples, only three (30%) were legitimate write-ins. Thus, we may assume that these were not actually adjudicated, or they were adjudicated enough to say only that the mark was clear and good, but not that the write-ins were also legitimate candidates. Regardless of whether these are legitimate or not, they cannot alter the margin of victory unless the write-in candidate is one of the official listed candidates, since the top two candidates were listed, and if such a change were made, it would be wi\_wi\_x type.

**57.wi\_wi\_uv: Adjudicated Rejected Write-ins (marked as undervote, 470 cases):**

Most of the write-ins (470 cases) were adjudicated, rejected, and the write-ins marked as undervotes. This occurs when the name written-in is not a qualified write-in candidate. These were definitely reviewed and rejected. If the election staff had fully reviewed all write-ins, then we would see about 70% of the 217 'wi\_wi\_wi' cases above (152) moved from the wi\_wi\_wi case and rejected and found in this category.

The first 10 cases provide an idea:

|                  |  |
|------------------|--|
| Michael R. Pence | This is an interesting case and arguably, the vote should have been awarded to Trump/Pence, because that is an official option on the ballot, and if you just write "Trump" the write-in is deemed correct. But it is true that Pence was not running for President, so a very constrained approach may not allow this. In other jurisdictions in GA, we see some election staff regarding this as a vote for Trump. |
| Mickey Mouse     | Not a qualified write-in Candidate   |
| Mitt Romney      | Not a qualified write-in Candidate   |
| Kayne West       | Not a qualified write-in Candidate   |
| Assata Shakur    | Not a qualified write-in Candidate   |
| Tulsi Gabbard    | Not a qualified write-in Candidate   |
| Jesus            | Not a qualified write-in Candidate   |
| Tulsi Gabbard    | Not a qualified write-in Candidate   |
| Jesus Christ     | Not a qualified write-in Candidate   |
| Bob Ross         | Not a qualified write-in Candidate   |

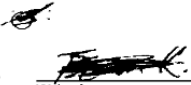
**58. Originally Agreed write-ins rejected by adjudication to overvotes: wi\_wi\_ov (1 case).** This is an interesting case because, as we will see, the approach is inconsistent. Here, the AuditEngine evaluation was that the darker mark on the write-in would override the light mark for Jo Jorgensen. This is incorrect. This should have also been flagged as "gray" because of that decision, so we will review our heuristics to make sure this is correctly flagged in the future. The voting system regarded this initially as a write-in also, then, after adjudication, it was ruled an overvote.

**For President  
of the United States**  
(Vote for One)

**Donald J. Trump** - President  
**Michael R. Pence** - Vice President  
(Incumbent) Republican

**Joseph R. Biden** - President  
**Kamala D. Harris** - Vice President  
Democrat



**Jo Jorgensen** - President  
**Jeremy "Spike" Cohen** - Vice President  
Libertarian

  
Write-in

We believe the proper interpretation of voter intent should have been a vote for Jo Jorgensen because the write-in was not left blank, it, and the mark, were scratched out. Other marks by the same voter were simple checkmarks. We will mention a similar case when we get to overvotes. Of course, since Jorgensen is not one of the two leading candidates, whether this is correctly adjudicated will not change the outcome.

**59. Originally Agreed write-ins rejected by adjudication to votes. wi\_wi\_x (2 cases):**

This can be a fairly common case when voters don't just select the official candidate, but instead write in the name:

|  |  |
|--|--|
| <p style="text-align: center;"><b>For President<br/>of the United States</b><br/>(Vote for One)</p> <p><input type="radio"/> <b>Donald J. Trump</b> - President<br/><b>Michael R. Pence</b> - Vice President<br/>(Incumbent) Republican</p> <p><input type="radio"/> <b>Joseph R. Biden</b> - President<br/><b>Kamala D. Harris</b> - Vice President<br/>Democrat</p> <p><input type="radio"/> <b>Jo Jorgensen</b> - President<br/><b>Jeremy "Spike" Cohen</b> - Vice President<br/>Libertarian</p> <p><br/><b>Donald J. Trump</b><br/>Write-in</p> | <p style="text-align: center;"><b>For President<br/>of the United States</b><br/>(Vote for One)</p> <p><input type="radio"/> <b>Donald J. Trump</b> - President<br/><b>Michael R. Pence</b> - Vice President<br/>(Incumbent) Republican</p> <p><input type="radio"/> <b>Joseph R. Biden</b> - President<br/><b>Kamala D. Harris</b> - Vice President<br/>Democrat</p> <p><input type="radio"/> <b>Jo Jorgensen</b> - President<br/><b>Jeremy "Spike" Cohen</b> - Vice President<br/>Libertarian</p> <p><br/><b>Joe Biden</b><br/>Write-in</p> |
|--|--|

**60. Adjudicated disagreed write-ins confirmed as uv. (wi\_uv\_uv) (4 cases) --** Some voters may mark the write-in target and leave the line blank as a way to vote for

none-of-the-above. In these cases, the mark was poorly marked and properly recognized by AuditEngine but there was no name written in, resulting in an undervote.

The first two examples are cases where the voting system did not recognize the lighter marks and ruled that it was an undervote. If these were reviewed in adjudication, they would not have changed that conclusion, even though normally this should have been first ruled a write-in.

|   |   |
|---|---|
| <p><b>For President of the United States</b><br/>(Vote for One)</p> <p><input type="radio"/> Donald J. Trump - President<br/>Michael R. Pence - Vice President<br/>(Incumbent) Republican</p> <p><input type="radio"/> Joseph R. Biden - President<br/>Kamala D. Harris - Vice President<br/>Democrat</p> <p><input type="radio"/> Jo Jorgensen - President<br/>Jeremy "Spike" Cohen - Vice President<br/>Libertarian</p> <p><input type="radio"/></p> <p><u>Neither</u><br/>Write-In</p> | <p><b>For President of the United States</b><br/>(Vote for One)</p> <p><input type="radio"/> Donald J. Trump - President<br/>Michael R. Pence - Vice President<br/>(Incumbent) Republican</p> <p><input type="radio"/> Joseph R. Biden - President<br/>Kamala D. Harris - Vice President<br/>Democrat</p> <p><input type="radio"/> Jo Jorgensen - President<br/>Jeremy "Spike" Cohen - Vice President<br/>Libertarian</p> <p><input checked="" type="radio"/></p> <p><u>Nobody</u><br/>Write-In</p> |
|---|---|

The next two cases are a bit more interesting, and it could be argued that they were incorrectly adjudicated.

|   |  |
|---|--|
| <p><b>For President of the United States</b><br/>(Vote for One)</p> <p><input type="radio"/> Donald J. Trump - President<br/>Michael R. Pence - Vice President<br/>(Incumbent) Republican</p> <p><input type="radio"/> Joseph R. Biden - President<br/>Kamala D. Harris - Vice President<br/>Democrat</p> <p><input type="radio"/> Jo Jorgensen - President<br/>Jeremy "Spike" Cohen - Vice President<br/>Libertarian</p> <p><input type="radio"/></p> <p><u>Michael Joseph R. Biden</u><br/><u>Michael R. Pence</u><br/>Write-In</p> | <p><b>For President of the United States</b><br/>(Vote for One)</p> <p><input type="radio"/> Donald J. Trump - President<br/>Michael R. Pence - Vice President<br/>(Incumbent) Republican</p> <p><input type="radio"/> Joseph R. Biden - President<br/>Kamala D. Harris - Vice President<br/>Democrat</p> <p><input type="radio"/> Jo Jorgensen - President<br/>Jeremy "Spike" Cohen - Vice President<br/>Libertarian</p> <p><input type="radio"/></p> <p><input type="radio"/></p> <p><input type="radio"/></p> <p><input type="radio"/></p> <p><input type="radio"/></p> <p>Write-In</p> |
|---|--|

In the first case, clearly voter intent is to vote for Joseph R. Biden. But since the oval was not completed, the voting system did not notice this was a possible write-in. AuditEngine detects not only the oval but also possibly written in markings. Here, even though the CVR for this ballot was adjudicated, this contest was probably not even reviewed, or the adjudication staff would have ruled for Biden.

In the second case, this is even more borderline, because you could argue that the voter intended to vote for Biden. This voter only circled the party of the candidates they wanted to vote for, and did the same in all other contests. So it is clear this was voter intent, and if actually adjudicated, the election staff should have awarded this vote to Biden.

In both cases, had these been adjudicated according to what we believe is correct, it would have widened the victory for Biden.

**61. Originally Disagreed write-ins confirmed as overvotes. wi\_ov\_ov** (1 case). This again demonstrates the weakness in the CVR format since this appears to be adjudicated but has not been. This could be a legitimate adjudication, as long as this was done systematically for all similar cases. But, as we will soon see, it is not always done the same way, and instead, a selected oval target with a blank write-in line, when there is an official candidate marked, is accepted sometimes as a legitimate vote for the listed candidate, and not as an overvote.

**For President  
of the United States**  
(Vote for One)

**Donald J. Trump** - President  
**Michael R. Pence** - Vice President  
(Incumbent) Republican

**Joseph R. Biden** - President  
**Kamala D. Harris** - Vice President  
Democrat

**Jo Jorgensen** - President  
**Jeremy "Spike" Cohen** - Vice President  
Libertarian

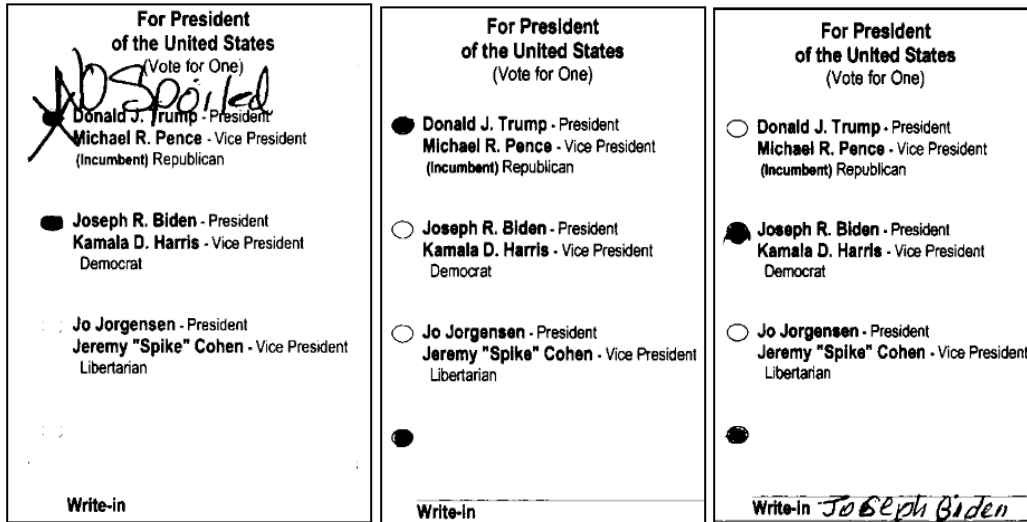
Write-in

### 4.7.3 Overvotes

We will now turn to various cases involving overvotes. Overvotes are a bit easier than write-ins, because there is nothing written to interpret, but if a contest is marked as an overvote in the CVR, it will not also be marked as a write-in. Thus, in some cases, write-ins will be involved even though it is classified as an overvote. We did not include detailed review of agreed overvotes ov\_ov\_ov (42 cases) or agreed and adjudicated

(and marked as undervote) (8 cases), because these were unlikely to change, but can be included as an option in the report.

**62. Originally Agreed overvotes resolved by adjudication to votes. ov\_ov\_x** (87 cases) -- this is a common situation particularly if the voter marks both the official candidate name AND fills in the write-in for the same candidate. Then it is a single vote for the official candidate. The other common case is where there was an overvote that was canceled by additional marking by the voter. There are a few other cases where it was clear the overvotes were reviewed.



In the first case, clearly voter intent is for Joe Biden. The second case was awarded to Trump, and yet it had a marked and blank write-in line. Earlier we pointed out this case where the same situation was an overvote. The third case was correctly awarded to Biden.

|   |  |   |
|---|--|---|
| <b>For President<br/>of the United States</b><br>(Vote for One)   | <b>For President<br/>of the United States</b><br>(Vote for One)  | <b>For President<br/>of the United States</b><br>(Vote for One)   |
| <input type="radio"/> Donald J. Trump - President<br>Michael R. Pence - Vice President<br>(Incumbent) Republican  | <input type="radio"/> Donald J. Trump - President<br>Michael R. Pence - Vice President<br>(Incumbent) Republican | <input checked="" type="radio"/> Donald J. Trump - President<br>Michael R. Pence - Vice President<br>(Incumbent) Republican |
| <input checked="" type="radio"/> Joseph R. Biden - President<br>Kamala D. Harris - Vice President<br>Democrat     | <input checked="" type="radio"/> Joseph R. Biden - President<br>Kamala D. Harris - Vice President<br>Democrat    | <input type="radio"/> Joseph R. Biden - President<br>Kamala D. Harris - Vice President<br>Democrat                          |
| <input checked="" type="radio"/> Jo Jorgensen - President<br>Jeremy "Spike" Cohen - Vice President<br>Libertarian | <input type="radio"/> Jo Jorgensen - President<br>Jeremy "Spike" Cohen - Vice President<br>Libertarian           | <input type="radio"/> Jo Jorgensen - President<br>Jeremy "Spike" Cohen - Vice President<br>Libertarian                      |
| <input type="radio"/>   | <input checked="" type="radio"/>   | <input checked="" type="radio"/>  |
| <hr/> Write-in  | <hr/> Joseph R. Biden<br>Write-in  | <hr/> <del>Winnie Roth</del><br>Write-in  |

In the other cases, AuditEngine and the voting system viewed these as overvotes and after adjudication, they were correctly resolved to a single vote.

**63. Originally Disagreed overvotes confirmed by adjudication as votes. ov\_x\_x (2 cases):**

These may not have been adjudicated, again we don't know. But they happen to have been done correctly. The second case, we will be reviewing as we believe AuditEngine should have selected the darker choice, as Jo Jorgensen was very much lighter, but still slightly marked.

|  |  |
|--|--|
| <b>For President<br/>of the United States</b><br>(Vote for One)  | <b>For President<br/>of the United States</b><br>(Vote for One)  |
| <input type="radio"/> Donald J. Trump - President<br>Michael R. Pence - Vice President<br>(Incumbent) Republican | <input type="radio"/> Donald J. Trump - President<br>Michael R. Pence - Vice President<br>(Incumbent) Republican |
| <input checked="" type="radio"/> Joseph R. Biden - President<br>Kamala D. Harris - Vice President<br>Democrat    | <input checked="" type="radio"/> Joseph R. Biden - President<br>Kamala D. Harris - Vice President<br>Democrat    |
| <input type="radio"/> Jo Jorgensen - President<br>Jeremy "Spike" Cohen - Vice President<br>Libertarian           | <input type="radio"/> Jo Jorgensen - President<br>Jeremy "Spike" Cohen - Vice President<br>Libertarian           |
| <input checked="" type="radio"/>   | <input type="radio"/>  |
| <hr/> Joseph R. Biden<br>Write-in  | <hr/> Write-in   |

## 5 Discussion of Interesting Issues in Fulton County

There are a number of interesting but still inconsequential issues in Fulton County that are worth additional treatment.

### 5.1 Ballots from DeKalb County

#### 64. DEKALB COUNTY ballots mixed in and processed by Fulton County (5 ballots).

As mentioned, there were 5 ballots from DeKalb county mixed into the ballots, and these were processed by the voting system. The Dominion voting system is used by all counties in Georgia, and in these cases, the ballot is the same size and in fact, the first few contests (President, Senate contests, Public Service commissioner, and U.S. Congress 5th Dist.) are all in the same place on the ballot, so those were interpreted correctly.

But the rest of the contests were not in the right locations, and were not correctly interpreted as a result.

It has:

|                          |                           |
|--------------------------|---------------------------|
| State Senator 44th Dist. | (Gail Davenport Selected) |
| State House 83rd Dist.   | (Becky Evans Selected)    |

And the back has many contests that are not appropriate for Fulton County. The voting machine interpreted this as style 335 in Fulton County. The style designator does not indicate what county it is from, so the voting machine interprets it as if it were the Fulton County ballot.

The back has the contests Constitutional Amendments 1 and 2 both approved by the voter (YES) and the Statewide Referendum was voted YES.



The machine interpretation of this ballot attempted to interpret the ballot as if it were in Fulton County.

**DEKALB COUNTY**  
648-FC

**OFFICIAL ABSENTEE/PROVISIONAL/EMERGENCY BALLOT**  
OFFICIAL GENERAL AND SPECIAL ELECTION BALLOT  
OF THE STATE OF GEORGIA  
NOVEMBER 3, 2020

**INSTRUCTIONS:**

|   |   |
|---|---|
| <b>To Vote</b>  | <b>Warning</b>                                    |
| 1. Use black or blue ink to mark the ballot   | Do NOT use red ink or felt tip pen to mark ballot |
| 2. Completely fill in the empty oval to the left of the candidate name or choice in all races you wish to vote  | Do NOT circle, underline or mark through choices  |
| 3. If voting for a Write-in candidate, completely fill in the empty oval to the left of the Write-in selection, then write the name of the write-in candidate in the space provided | Do NOT use check marks or X to mark ballot        |
|   | Do NOT mark more choices per race than allowed    |
|   | Do NOT sign, cut, tear or damage the ballot       |

**If you make a mistake or change your mind on a selection:**

A. Do not attempt to mark through the selection or attempt to erase. Write "Spoiled" across the ballot and across the return envelope.  
B. Mail or return the spoiled ballot and envelope to your county board of registrars; a new official absentee ballot will be mailed to you.

**If you decide to vote in-person:** Surrender the ballot to the poll manager of an early voting site within your county or the precinct to which you are assigned. You will then be permitted to vote a regular ballot.

\* Understand that the offer or acceptance of money or any other object of value to vote for any particular candidate, list of candidates, issue or list of issues included in this election constitutes an act of voter fraud and is a felony under Georgia law. (O.C.G.A. 21-3-294(a), 21-3-289(a) and 21-3-353(a))

|  |   |  |
|--|---|--|
| <p><b>For President of the United States</b><br/>(Vote for One)</p> <p><input type="radio"/> Donald J. Trump - President<br/>Michael R. Pence - Vice President<br/>(Incumbent) Republican</p> <p><input checked="" type="radio"/> Joseph R. Biden - President<br/>Kamala D. Harris - Vice President<br/>Democrat</p> <p><input type="radio"/> Jo Jorgensen - President<br/>Jeremy "Spillie" Cohen - Vice President<br/>Libertarian</p> <p><input type="radio"/> Write-in<br/><i>Joseph R. Biden</i></p> <p><b>For United States Senate</b><br/>(Vote for One)</p> <p><input type="radio"/> David A. Perdue<br/>(Incumbent) Republican</p> <p><input checked="" type="radio"/> Jon Ossoff<br/>Democrat</p> <p><input type="radio"/> Shane Hazel<br/>Libertarian</p> <p><input type="radio"/> Write-in<br/><i>Jon Ossoff</i></p> | <p><b>SPECIAL ELECTION</b></p> <p><b>For United States Senate</b><br/>(To Fill the Unexpired Term of Johnny Isakson, Resigned)<br/>(Vote for One)</p> <p><input type="radio"/> Al Bartell<br/>Independent</p> <p><input type="radio"/> Allen Buckley<br/>Independent</p> <p><input type="radio"/> Doug Collins<br/>Republican</p> <p><input type="radio"/> John Fortuin<br/>Green</p> <p><input type="radio"/> Derrick E. Grayson<br/>Republican</p> <p><input type="radio"/> Michael Todd Greene<br/>Independent</p> <p><input type="radio"/> Annette Davis Jackson<br/>Republican</p> <p><input type="radio"/> Deborah Jackson<br/>Democrat</p> <p><input type="radio"/> Jamaica James<br/>Democrat</p> <p><input type="radio"/> A. Wayne Johnson<br/>Republican</p> <p><input type="radio"/> Tamara Johnson-Sheahey<br/>Democrat</p> <p><input type="radio"/> Matt Lieberman<br/>Democrat</p> <p><input type="radio"/> Kelly Loeffler<br/>(Incumbent) Republican</p> <p><input type="radio"/> Joy Felicia Slade<br/>Democrat</p> <p><input type="radio"/> Brian Slowinski<br/>Libertarian</p> <p><input type="radio"/> Valencia Stovall<br/>Independent</p> <p><input type="radio"/> Ed Tarver<br/>Democrat</p> <p><input type="radio"/> Kandice Taylor<br/>Republican</p> <p><input checked="" type="radio"/> Raphael Warnock<br/>Democrat</p> <p><input type="radio"/> Richard Dien Winfield<br/>Democrat</p> <p><input type="radio"/> Write-in<br/><i>Raphael Warnock</i></p> | <p><b>For Public Service Commissioner</b><br/>(To Succeed Jason Shaw)<br/>(Vote for One)</p> <p><input type="radio"/> Jason Shaw<br/>(Incumbent) Republican</p> <p><input type="radio"/> Robert G. Bryant<br/>Democrat</p> <p><input type="radio"/> Elizabeth Melton<br/>Libertarian</p> <p><input type="radio"/> Write-in<br/><i>Robert G. Bryant</i></p> <p><b>For Public Service Commissioner</b><br/>(To Succeed Lauren Bubba McDonald, Jr.)<br/>(Vote for One)</p> <p><input type="radio"/> Lauren Bubba McDonald, Jr.<br/>(Incumbent) Republican</p> <p><input checked="" type="radio"/> Daniel Blackman<br/>Democrat</p> <p><input type="radio"/> Nathan Wilson<br/>Libertarian</p> <p><input type="radio"/> Write-in<br/><i>Daniel Blackman</i></p> <p><b>For U.S. Representative in 117th Congress From the 5th Congressional District of Georgia</b><br/>(Vote for One)</p> <p><input type="radio"/> Angela Stanton-King<br/>Republican</p> <p><input checked="" type="radio"/> Nikema Williams<br/>Democrat</p> <p><input type="radio"/> Write-in<br/><i>Nikema Williams</i></p> <p><b>For State Senator From 44th District</b><br/>(Vote for One)</p> <p><input type="radio"/> Benjamin Brooks<br/>Republican</p> <p><input checked="" type="radio"/> Gail Davenport<br/>(Incumbent) Democrat</p> <p><input type="radio"/> Write-in<br/><i>Gail Davenport</i></p> <p><b>For State Representative In the General Assembly From 83rd District</b><br/>(Vote for One)</p> <p><input checked="" type="radio"/> Becky Evans<br/>(Incumbent) Democrat</p> <p><input type="radio"/> Write-in<br/><i>Becky Evans</i></p> |
|--|---|--|

**Turn Ballot Over To Continue Voting**

The interesting thing is that this ballot was also adjudicated, and yet it was not correctly and completely adjudicated. It appears that the adjudication software does not easily allow the election office staff to consider other contests other than the ones the voting system considers to need adjudication.

The referendum contests were in both counties. But even after adjudication, the referendums were not changed to reflect the marks.

Of course, AuditEngine is not able to do any better with these ballots. Due to this problem, we added optical character recognition (OCR) of the county name during the initial study of the ballot images and also when the images are processed during vote extraction.

Surprisingly, even though the modified record was created, some of the contests that could have been adjudicated to correct values, were not. The last four contests were all actually voted "Yes, Yes, Yes, Yes" but in the adjudicated record, they were evaluated as Yes, OV, UV, OV. So clearly, they were not actually checked during the adjudication process. But the way the voting system adjudication works, it would be very hard for the workers to adjudicate these properly.

that were in common among the two counties. But the larger question is how these ballots were able to be included in the set to begin with.

The adjudication tool provided by Dominion is graphically oriented and it would not be easy at all to override and adjudicate all contests

| Original   | Modified (Adjudicated)   |
|--|--|
| <p>State House District 56<br/> Write-in<br/> District Attorney - Atlanta<br/> Write-in<br/> Clerk of Superior Court<br/> BLANK CONTEST<br/> Sheriff<br/> Write-in<br/> Tax Commissioner<br/> BLANK CONTEST<br/> Surveyor<br/> BLANK CONTEST<br/> Solicitor General<br/> BLANK CONTEST<br/> County Commission District 4<br/> BLANK CONTEST<br/> Soil and Water - Fulton County<br/> Write-in<br/> Constitutional Amendment #1<br/> YES<br/> Constitutional Amendment #2<br/> OVER-VOTE<br/> YES (NOT COUNTED)<br/> NO (NOT COUNTED)<br/> Statewide Referendum A<br/> BLANK CONTEST<br/> Atlanta Homestead Exemption - Special<br/> OVER-VOTE<br/> YES (NOT COUNTED)<br/> NO (NOT COUNTED)</p> | <p>Adjudicated at 8:55 PM on 11/4/2020 by emsadmin02</p> <p>President of the United States<br/> Joseph R. Biden (Dem) (100%)<br/> US Senate (Perdue)<br/> Jon Ossoff (Dem) (99%)<br/> US Senate (Loeffler) - Special<br/> Raphael Warnock (Dem) (100%)<br/> Public Service Commission District 1<br/> Robert G. Bryant (Dem) (100%)<br/> Public Service Commission District 4<br/> Daniel Blackman (Dem) (99%)<br/> US House District 5<br/> Nikema Williams (Dem) (95%)<br/> State House District 56<br/> Write-in (98%)<br/> District Attorney - Atlanta<br/> Write-in (100%)<br/> Clerk of Superior Court<br/> BLANK CONTEST<br/> Sheriff<br/> Write-in (99%)<br/> Tax Commissioner<br/> BLANK CONTEST<br/> Surveyor<br/> BLANK CONTEST<br/> Solicitor General<br/> BLANK CONTEST<br/> County Commission District 4<br/> BLANK CONTEST<br/> Soil and Water - Fulton County<br/> Write-in (100%)<br/> Constitutional Amendment #1<br/> YES (100%)<br/> Constitutional Amendment #2<br/> OVER-VOTE<br/> YES (NOT COUNTED) (33%)<br/> NO (NOT COUNTED) (100%)<br/> Statewide Referendum A<br/> BLANK CONTEST<br/> Atlanta Homestead Exemption - Special<br/> OVER-VOTE<br/> YES (NOT COUNTED) (48%)<br/> NO (NOT COUNTED) (100%)</p> |

65. The second page overlaid with the target map for this style shows that nothing is correct, and unfortunately, the voting machine continues to process the ballot without any alert.

|  |  |
|--|--|
| <p>For District Attorney of the Stone Mountain Judicial Circuit<br/>(Vote for One)</p> <p><input type="checkbox"/> Cathelene "Tina" (Dem)</p> <p><input checked="" type="radio"/> Sherry Boston<br/>Clerk (Incumbent) Democrat</p> <p><input type="radio"/> Sherry Boston<br/>Write-in</p>   | <p><b>PROPOSED CONSTITUTIONAL AMENDMENTS</b></p> <p>- 1 -</p>  |
| <p>For Clerk of Superior Court of DeKalb County<br/>(Vote for One)</p> <p><input type="checkbox"/> Patrick "Pat" (Dem)</p> <p><input checked="" type="radio"/> Debra DeBerry<br/>Sheriff (Incumbent) Democrat</p> <p><input type="radio"/> Debra DeBerry<br/>Write-in</p>  | <p>Authorizes dedication of fees and taxes to their intended purposes by general state law.</p> <p>House Resolution 164<br/>Act No. 597</p> <p>*Shall the Constitution of Georgia be amended so as to authorize the General Assembly to dedicate revenues derived from fees or taxes to the public purposes for which such fees or taxes were intended?*</p> <p>Constitution Amendment #2 NO</p> <p><input checked="" type="radio"/> YES</p> <p><input type="radio"/> NO</p>   |
| <p>For Sheriff<br/>(Vote for One)</p> <p><input type="checkbox"/> Arthur E. Ferdinand (Dem)</p> <p><input checked="" type="radio"/> Harold Dennis<br/>Tax Commissioner (Incumbent) Republican</p> <p><input type="radio"/> Melody M. Maddox<br/>Supervisor (Incumbent) Democrat</p> <p><input type="radio"/> Melody M. Maddox<br/>Write-in</p> | <p>- 2 -</p> <p>Waives state and local sovereign immunity for violation of state laws, state and federal constitutions.</p> <p>House Resolution 1023<br/>Act No. 596</p> <p>*Shall the Constitution of Georgia be amended to waive sovereign immunity and allow the people of Georgia to petition the superior court for relief from governmental acts done outside the scope of lawful authority or which violate the laws of this state, the Constitution of Georgia, or the Constitution of the United States?*</p> <p><input checked="" type="radio"/> YES</p> <p><input type="radio"/> NO</p> |
| <p>For Tax Commissioner<br/>(Vote for One)</p> <p><input checked="" type="radio"/> Irvin J. Johnson<br/>Keith (Incumbent) Democrat</p> <p><input type="radio"/> Irvin J. Johnson<br/>Solidarity General (Write-in)</p>   | <p>STATEWIDE REFERENDUM</p>  |
| <p>For Chief Magistrate<br/>(Vote for One)</p> <p><input checked="" type="radio"/> Beryl A. Anderson<br/>(Incumbent) Democrat</p> <p><input type="radio"/> Beryl A. Anderson<br/>Barbara J. Gresham (Rep) Write-in</p>   | <p>- A -</p> <p>Establishes a tax exemption for certain real property owned by charities.</p> <p>House Bill 344<br/>Act No. 149</p>  |
| <p>For Solicitor General of DeKalb County<br/>(Vote for One)</p> <p><input type="checkbox"/> Natalie Hoff (Dem)</p> <p><input checked="" type="radio"/> Donna Coleman-Stribling<br/>County Co.-ist (Incumbent) Democrat</p> <p><input type="radio"/> Donna Coleman-Stribling<br/>Write-in</p>  | <p>*Shall the Act be approved which provides an exemption from ad valorem taxes for all real property owned by a purely public charity, if such charity is exempt from taxation under Section 501(c)(3) of the federal Internal Revenue Code and such real property is held exclusively for the purpose of building or repairing single-family homes to be financed by such charity to individuals using loans that shall not bear interest?*</p> <p>Special YES</p> <p><input checked="" type="radio"/> YES</p> <p><input type="radio"/> NO</p>   |
| <p>For Chief Executive Officer<br/>(Vote for One)</p> <p><input type="checkbox"/> Alan Toney (Dem)</p> <p><input checked="" type="radio"/> Michael "Mike" Thurmond<br/>Soiland...on County (Incumbent) Democrat</p> <p><input type="radio"/> Michael Thurmond<br/>Write-in</p>   | <p>Atlanta H.-- Special NO</p> <p><input checked="" type="radio"/> YES</p> <p><input type="radio"/> NO</p> <p><b>SPECIAL ELECTION DEKALB COUNTY</b></p>  |
| <p>Ethics Question<br/>(Vote for One)</p>  | <p>Ethics Question<br/>(Vote for One)</p>  |

## **66. How did these get into the ballot set?**

One of the more concerning questions is: How did these ballots get into the set of ballots processed by Fulton County? Ideally, if ballots that are appropriate for a different county were deposited in any dropbox, the election workers would coordinate with the other county and provide them to the other county.

As these are hand-marked paper ballots, they are likely "absentee" or early voted ballots, perhaps submitted by mail or deposited in a drop box. We note that Fulton County and DeKalb County are geographically adjacent and both include the Atlanta metropolitan area.

It is likely that ballots from the adjoining county are deposited into the ballot dropboxes. Given that a common voting system is used throughout all counties in Georgia, the envelopes may be much the same. It may be possible a ballot for DeKalb, that was deposited in a Fulton county dropbox, would be missed by workers and included in the set of ballots processed for Fulton county.

## **67. THE USUAL ABSENTEE OR VOTE-BY-MAIL PROCESS:**

The usual process for processing absentee ballots relies on the ballot envelope to first decide if the voter is eligible, and to prevent a voter from voting twice. As the ballots are first received, a digital image is created of the front of the envelope, and the voter ID is read from the barcode. The signature in that digital image is then matched with the signature on file. Signature matching can occur using automated matching, using machine learning technology, or staff members may do matching by human-eye. If the signature matches, and if the voter has not yet voted, then the ballot (which is still in the unopened envelope) is accepted. At that point, the envelope is opened, the ballot is removed, and it then becomes anonymous and cannot be linked to the voter.

The following are scenarios where the DeKalb ballots could be mixed into the Fulton County set.

## **68. SCENARIO 1: DeKalb Envelope Accepted from Dropbox.**

If the voter from DeKalb County properly voted their ballot and inserted it into the DeKalb envelope, then deposited it in a Fulton County dropbox, then could it be processed?

If the voter IDs use a similar numbering system, it may be possible for the machine to read the front of the envelope and find that the voter ID number is also one that is valid for Fulton County, but for a different voter.

But then the ballot envelope is further filtered by checking the signature against the reference signature on file. If a worker looked at the record, we suggest it would NOT

be easily possible for the ballot to be accepted for two completely different people even if the voter IDs were both considered valid, but it could be.

If the ballot was accepted in this scenario, then one voter in Fulton County would be marked as voted, when that voter actually did not, and the voter in DeKalb County did not vote, according to official records. If the voter in Fulton county actually did try to vote in person, then they may discover that their ballot seemingly has already been cast, and this may lead to some suspicions of election fraud.

In this scenario, the DeKalb ballots would be improperly accepted, just as the ballot image and CVR evidence proves. This scenario is certainly possible.

To make sure this does not happen, it seems clear that it will be important to make sure that voter-ID numbers include the COUNTY of the ballot, and if any ballots are detected for some other county, then they are out-stacked. There should be a standard method to transfer ballots between counties if they have been deposited in drop boxes for the wrong county.

#### **69. SCENARIO 2: DeKalb Envelope Mailed and Accepted**

If the voter from DeKalb County properly voted their ballot and inserted it into the DeKalb envelope, then mailed it, then could it be processed?

No, the envelope would be returned to DeKalb county because of the address on the envelope.

#### **70. SCENARIO 3: Fulton Envelope**

If the voter from DeKalb County properly voted their ballot but inserted it into a Fulton County envelope, then could it be processed as the evidence shows?

It seems that yes, it would be definitely processed if the voter was a valid voter in Fulton County and had a Fulton County envelope, but somehow was able to get a DeKalb County ballot. Because of the low number of ballots, it does not appear to be malicious.

#### **71. SCENARIO 4: Raw Ballot Added**

If the eligibility and signature screening processes were skipped, then ballots could be potentially added to the set of ballots processed in Fulton County, even if they were from the wrong county. Thus, if stacks of voted ballots were improperly "stuffed" into the set of ballots processed, then ballots from the wrong county could exist in the ballot set, because they would not be filtered by first examining the voter ID and signature matching.

We note in this news article, dropbox "transfer forms show ballots returned without envelopes, making them ineligible to be counted. Others were from different counties and different states, also not counted."<sup>10</sup>

## 72. Distribution of votes on these ballots

We reviewed the voted selections on these ballots and found that they were all for Biden, which is actually quite possible, given the landslide victory of Biden within Fulton County. The chance of hitting all Biden votes in a random sample of 5 votes where Trump only got 20% of the vote, is about 33%. So we must not give this occurrence too much significance, but it is curious.

| Ballot ID          | Presidential Vote |
|--------------------|-------------------|
| 05160_00441_000001 | Biden             |
| 00729_00118_000055 | Biden             |
| 00729_00116_000047 | Biden             |
| 05150_00134_000055 | Biden             |
| 05160_00441_000013 | Biden             |

## 73. Steps for additional investigation

To further investigate this error, it will be important to know the exact data collected from the front of the envelope and whether the barcode alone was used to determine the voter ID number, and if voter ID number ranges overlap between these adjacent counties. Had the voter ID been unique across counties (such as if the voter ID has a field that identifies the county) then Scenario 1 would have been impossible.

Scenarios 3 and 4 would then be the only possibilities. We will continue to explore this issue in an attempt to fully understand it, and to be able to recommend changes so it will not be possible in the future.

## 5.2 Ballots from May 19, 2020 Primary Election

74. AuditEngine could not process 5 ballots. This is usually due to corruption of ballot images in most other audits. But upon further investigation, we found that these ballots were from the primary election held on May 19, 2020, and since the ballots were

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<https://www.gpb.org/news/2021/06/17/fact-check-fulton-county-not-missing-ballots-or-hundreds-of-drop-box-custody-forms> "Fact Check: Fulton County Is Not Missing Ballots Or Hundreds Of Drop Box Custody Forms" -- although a few forms (8) were unaccounted for.

longer, were not processed by AuditEngine.

**75.** These ballots can be reviewed at this following link in the Discrepancy report:  
[https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US\\_GA\\_Fulton\\_20201103/reports/Discrepancy\\_Report.html#unprocessed-ballots-report](https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US_GA_Fulton_20201103/reports/Discrepancy_Report.html#unprocessed-ballots-report)

**76.** We reviewed the votes on these ballots.

| Ballot ID          | Presidential Vote |
|--------------------|-------------------|
| 05150_00348_000003 | Biden             |
| 05150_00223_000098 | Trump             |
| 05160_00492_000050 | Trump             |
| 05160_00259_000100 | Trump             |
| 05164_00132_000100 | Biden             |

**77.** We checked and these ballots were not included in the canvass, even though the ballot images were included in the ballot image set. These ballots had a longer page length, and would immediately trigger an error when scanned. They should also stick out like a sore thumb, if included in any stack of ballots, which were shorter in the general election than in the primary.

How could this happen?

**78. SCENARIO 1: User Sends or Drops Old Ballots and Old Envelopes**

In this scenario, we assume that a voter had an absentee or Vote-by-Mail ballot that was unused in the prior election, perhaps the voter voted but did not mail it in at the right time. During the election, that voter may have just sent it in instead of the ballot for this election, or in addition to the ballot for this election.

**79.** If the front of the envelope does not identify the election as part of the initial screening, then it might be included in the ballot set. If it were, and if the voter also sent in the correct ballot for the election, then the correct ballot may have been inappropriately rejected, while accepting the bad ballot.

**80.** To avoid this scenario, the front of the envelope must encode into the barcode not only the Voter ID and the County, but also the election. We believe it already had this encoding in the barcode, and if we are correct, then this scenario would not be possible without some additional error.

## **81. SCENARIO 2: Voter Puts Wrong Ballot In the Correct Envelope**

It is perhaps the most likely scenario in that a voter has a tendency to save up ballots from older elections if the voter did not vote in that election. And further, assume that the voter was able to put the ballot from the primary election into the correct envelope for this election. The ballot envelope would be reviewed and approved. When the ballot was removed and placed into the set of ballots, it should be easily noticed, because the ballots from the primary were actually a bit longer.

Yet, this scenario appears to be viable and would result in the ballot images found in the set.

## **82. SCENARIO 3: Raw ballots were accepted without envelopes**

Although it seems nearly impossible that these primary ballots would go unnoticed in the scanning process since they were longer than the general election ballots, they could have been deposited in drop-boxes as raw ballots. We note that the drop-box transfer documents did document some instances of raw ballots without envelopes deposited in the drop boxes.<sup>11</sup> These ballots were not included in the canvass, despite being included in the ballot images.

## **83. SCENARIO 4: Malicious actor inserts old ballots that will not be processed while removing undesired ballots**

Since these ballots would be known to never be processed, there is a possibility that they could be used to "stomp" on correctly voted ballots, and take them out of processing without changing the grand totals. Assume that a malicious fraudster had access to the ballots and could substitute these unprocessable ballots for ballots which they did not want to be counted. The undesired ballots could be safely removed without altering the total number of ballots cast.

We must be careful to acknowledge that only 5 ballots are involved here, so the idea it was the agenda of a malicious actor is hardly supported by this fact.

## **5.3 Ballot with Incorrect CVR**

**84.** We turn now to a single unusual (but eventually explained) case where the ballot was correctly processed, but the CVR for that ballot was incorrect. This case has not been discussed previously in this report, but it was initially reported in the Discrepancy

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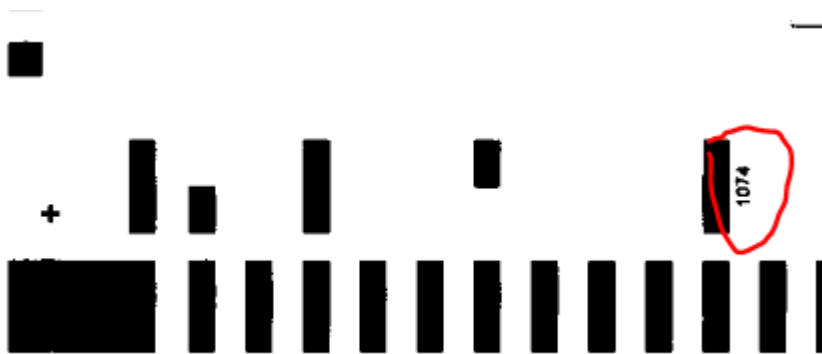
<sup>11</sup>

<https://www.gpb.org/news/2021/06/17/fact-check-fulton-county-not-missing-ballots-or-hundreds-of-drop-box-custody-forms> -- Described in the DeKalb Ballots case.



Report under "Non Additive Groups" and listed as a "Ballot Variant", however, now that it is explained, it is correctly classified as a non-variant fully agreed ballot. It was originally classified by AuditEngine as a Ballot Variant because the list of contests in the Cast Vote Record did not match the list of contests on the ballot, and in fact the ballot was a completely different style. Note: This has since been corrected as described below, and thus the ballot is no longer considered a ballot variant. Nevertheless, we will describe the situation encountered.

**85.** In our review of this ballot, with Ballot ID: 05160\_00202\_000001, we can first notice that the ballot style, as indicated in the card\_code is 1074



**86.** We note that the presidential contest is clearly voted for Jo Jorgensen, Senate Seats: David Perdue, and Doug Collins; Jason Shaw and Lauren "Bubba" McDonald for Public Service Commissioners. It has the contest for the 6th Congressional District, voted for Karen Handel

| FULTON COUNTY<br>900-SS03   |   |  |
|---|---|--|
| OFFICIAL ABSENTEE/PROVISIONAL/EMERGENCY BALLOT  |   |  |
| OFFICIAL GENERAL AND SPECIAL ELECTION BALLOT<br>OF THE STATE OF GEORGIA<br>NOVEMBER 3, 2020   |   |  |
| <b>INSTRUCTIONS:</b>  |   |  |
| <b>To Vote</b><br>1. Use black or blue ink to mark the ballot.<br>2. Completely fill in the empty oval to the left of the candidate name or choice in all races you wish to vote.<br>3. If voting for a Write-in candidate, completely fill in the empty oval to the left of the Write-in selection, then write the name of the write-in candidate in the space provided.   | <b>Warning</b><br>Do NOT use red ink or felt tip pen to mark ballot.<br>Do NOT circle, underline or mark through choices.<br>Do NOT use check marks or X to mark ballot.<br>Do NOT mark more choices per race than allowed.<br>Do NOT sign, cut, tear or damage the ballot.   |  |
| <b>If you make a mistake or change your mind on a selection:</b><br>A. Do not attempt to mark through the selection or attempt to erase. Write "Spotted" across the ballot and across the return envelope.<br>B. Mail or return the spotted ballot and envelope to your county board of registrars; a new official absentee ballot will be mailed to you.   |   |  |
| <b>If you decide to vote in-person:</b> Surrender the ballot to the poll manager of an early voting site within your county or the precinct to which you are assigned. You will then be permitted to vote a regular ballot.   |   |  |
| <i>Understand that the offer or acceptance of money or any other object of value to vote for any particular candidate, list of candidates, issue, or list of issues included in this election constitutes an act of voter fraud and is a felony under Georgia law, (O.C.G.A. 21-2-284(e), 21-2-285(f) and 21-2-382(e)).</i>   |   |  |
| <div style="text-align: center;"><b>For President of the United States</b><br/>(Vote for One)</div> <p><input type="radio"/> Donald J. Trump - President<br/>Michael R. Pence - Vice President<br/>(Incumbent) Republican</p> <p><input type="radio"/> Joseph R. Biden - President<br/>Kamala D. Harris - Vice President<br/>Democrat</p> <p><input checked="" type="radio"/> Jo Jorgensen - President<br/>Jeremy "Spike" Cohan - Vice President<br/>Libertarian</p> <p><input type="radio"/></p> <p>Write-in</p> <hr/> <div style="text-align: center;"><b>For United States Senate</b><br/>(Vote for One)</div> <p><input checked="" type="radio"/> David A. Perdue<br/>(Incumbent) Republican</p> <p><input type="radio"/> Jon Ossoff<br/>Democrat</p> <p><input type="radio"/> Shane Hazel<br/>Libertarian</p> <p><input type="radio"/></p> <p>Write-in</p> | <div style="text-align: center;"><b>SPECIAL ELECTION</b></div> <div style="text-align: center;"><b>For United States Senate</b><br/>(To Fill the Unexpired Term of<br/>Johnny Isakson, Resigned)<br/>(Vote for One)</div> <p><input type="radio"/> Al Bartell<br/>Independent</p> <p><input type="radio"/> Allen Buckley<br/>Independent</p> <p><input checked="" type="radio"/> Doug Collins<br/>Republican</p> <p><input type="radio"/> John Fortuin<br/>Green</p> <p><input type="radio"/> Derrick E. Grayson<br/>Republican</p> <p><input type="radio"/> Michael Todd Greene<br/>Independent</p> <p><input type="radio"/> Annette Davis Jackson<br/>Republican</p> <p><input type="radio"/> Deborah Jackson<br/>Democrat</p> <p><input type="radio"/> Jamesia James<br/>Democrat</p> <p><input type="radio"/> A. Wayne Johnson<br/>Republican</p> <p><input type="radio"/> Tamara Johnson-Sheahey<br/>Democrat</p> <p><input type="radio"/> Matt Lieberman<br/>Democrat</p> <p><input type="radio"/> Kelly Loeffler<br/>(Incumbent) Republican</p> <p><input type="radio"/></p> | <div style="text-align: center;"><b>For Public Service Commissioner</b><br/>(To Succeed Jason Shaw)<br/>(Vote for One)</div> <p><input checked="" type="radio"/> Jason Shaw<br/>(Incumbent) Republican</p> <p><input type="radio"/> Robert G. Bryant<br/>Democrat</p> <p><input type="radio"/> Elizabeth Melton<br/>Libertarian</p> <p><input type="radio"/></p> <p>Write-in</p> <hr/> <div style="text-align: center;"><b>For Public Service Commissioner</b><br/>(To Succeed Lauren Bubba McDonald, Jr.)<br/>(Vote for One)</div> <p><input checked="" type="radio"/> Lauren Bubba McDonald, Jr.<br/>(Incumbent) Republican</p> <p><input type="radio"/> Daniel Blackman<br/>Democrat</p> <p><input type="radio"/> Nathan Wilson<br/>Libertarian</p> <p><input type="radio"/></p> <p>Write-in</p> <hr/> <div style="text-align: center;"><b>For U.S. Representative in 117th Congress From the 6th Congressional District of Georgia</b><br/>(Vote for One)</div> <p><input checked="" type="radio"/> Karen Handel<br/>Republican</p> <p><input type="radio"/> Lucy McBath<br/>(Incumbent) Democrat</p> <p><input type="radio"/></p> <p>Write-in</p> |

87. When we look at the "Audit Mark" which is the third page of the ballot image file, we see the voting system interpretation of this ballot. We can note that this matches the obvious marking on the ballot.

Scanned on: ICC Tabulator: 5160 Batch: 202  
Poll ID: 649 Ballot ID: 1074

President of the United States  
Jo Jorgensen (Lib)  
US Senate (Perdue)  
David A. Perdue (I) (Rep)  
US Senate (Loeffler) - Special  
Doug Collins (Rep)  
Public Service Commission District 1  
Jason Shaw (I) (Rep)  
Public Service Commission District 4  
Lauren Bubba McDonald, Jr. (I) (Rep)  
US House District 6  
Karen Handel (Rep)  
State Senate District 32  
Kay Kirkpatrick (I) (Rep)  
State House District 52  
Deborah Silcox (I) (Rep)  
District Attorney - Atlanta  
Fani Willis (Dem)  
Clerk of Superior Court  
Cathelene "Tina" Robinson (I) (Dem)  
Sheriff  
Patrick "Pat" Labat (Dem)  
Tax Commissioner  
Arthur E. Ferdinand (I) (Dem)  
Surveyor  
Write-in  
Solicitor General  
Keith E. Gammage (I) (Dem)  
County Commission District 2  
Bob Ellis (I) (Rep)  
Soil and Water - Fulton County  
Alan Toney (I)  
Constitutional Amendment #1  
NO  
Constitutional Amendment #2  
YES  
Statewide Referendum A  
YES

88. However, if we review the Cast-Vote-Record, we see different information, showing style 1115, and a vote in the Presidential contest (Contest Id 1) for Donald Trump (Candidate Id 1)

```

{
  "Version": "5.5.12.1",
  "ElectionId": "Fulton Nov 03 Original",
  "Sessions": [
    {
      "TabulatorId": 5160,
      "BatchId": 202,
      "RecordId": 1,
      "CountingGroupId": 3,
      "ImageMask": "D:\\NAS\\Fulton Nov 03 Original\\Results\\",
      "SessionType": "ScannedVote",
      "VotingSessionIdentifier": "",
      "UniqueVotingIdentifier": "",
      "Original": {
        "PrecinctPortionId": 1012,
        "BallotTypeId": 179,
        "IsCurrent": true,
        "Cards": [
          {
            "Id": 1115,
            "PaperIndex": 0,
            "Contests": [
              {
                "Id": 1,
                "ManifestationId": 10393,
                "Undervotes": 0,
                "Overvotes": 0,
                "OutstackConditionIds": [],
                "Marks": [
                  {
                    "CandidateId": 1,
                    "ManifestationId": 43268,
                    "PartyId": 0,
                    "Rank": 1,
                    "MarkDensity": 100,
                    "IsAmbiguous": false,
                    "IsVote": true,
                    "OutstackConditionIds": []
                  }
                ]
              }
            ]
          },
          {
            "Id": 2,
            "ManifestationId": 10394,
            "Undervotes": 0,
            "Overvotes": 0,
            "OutstackConditionIds": [],
            "Marks": [
              {
                "CandidateId": 4,
                "ManifestationId": 43272,
                "PartyId": 0,
                "Rank": 1,
                "MarkDensity": 100,
                "IsAmbiguous": false,
                "IsVote": true,
                "OutstackConditionIds": []
              }
            ]
          }
        ]
      }
    }
  ]
}

```

89. Putting it into readable form, we have the voting system's cast-vote record made more easily understandable by using our own internal JSON format:

```

{'original': {'President of the United States': {'undervotes': 0,
'overvotes': 0,
'votes': {'Donald J. Trump (I) (Rep)': 1},
'tot_votes': 1,
'num_ballots': 1,
'writeins': 0},
'US Senate (Perdue)': {'undervotes': 0,
'overvotes': 0,
'votes': {'David A. Perdue (I) (Rep)': 1},
'tot_votes': 1,
'num_ballots': 1,
'writeins': 0},
'US Senate (Loeffler) - Special': {'undervotes': 0,
'overvotes': 0,
'votes': {'Doug Collins (Rep)': 1},
'tot_votes': 1,
'num_ballots': 1,
'writeins': 0},
'Public Service Commission District 1': {'undervotes': 0,
'overvotes': 0,
'votes': {'Jason Shaw (I) (Rep)': 1},
'tot_votes': 1,
'num_ballots': 1,
'writeins': 0},
'Public Service Commission District 4': {'undervotes': 0,
'overvotes': 0,
'votes': {'Daniel Blackman (Dem)': 1},
'tot_votes': 1,
'num_ballots': 1,
'writeins': 0},
'US House District 11': {'undervotes': 0,
'overvotes': 0,
'votes': {'Barry Loudermilk (I) (Rep)': 1},
'tot_votes': 1,
'num_ballots': 1,
'writeins': 0},
'State Senate District 6': {'undervotes': 0,
'overvotes': 0,
'votes': {'Jennifer "Jen" Jordan (I) (Dem)': 1},
'tot_votes': 1,
'num_ballots': 1,
'writeins': 0},
'State House District 52': {'undervotes': 0, 'overvotes': 0, 'votes': {'Shea
Roberts (Dem)': 1}, 'tot_votes': 1, 'num_ballots': 1, 'writeins': 0},
'District Attorney - Atlanta': {'undervotes': 1, 'overvotes': 0, 'votes': {},
'tot_votes': 0, 'num_ballots': 1, 'writeins': 0},
'Clerk of Superior Court': {'undervotes': 1, 'overvotes': 0, 'votes': {},
'tot_votes': 0, 'num_ballots': 1, 'writeins': 0},
'Sheriff': {'undervotes': 1, 'overvotes': 0, 'votes': {}, 'tot_votes': 0,
'num_ballots': 1, 'writeins': 0},
'Tax Commissioner': {'undervotes': 1, 'overvotes': 0, 'votes': {}, 'tot_votes':
0, 'num_ballots': 1, 'writeins': 0},
'Surveyor': {'undervotes': 1, 'overvotes': 0, 'votes': {}, 'tot_votes': 0,
'num_ballots': 1, 'writeins': 0},
'Solicitor General': {'undervotes': 1, 'overvotes': 0, 'votes': {},
'tot_votes': 0, 'num_ballots': 1, 'writeins': 0},
'Soil and Water - Fulton County': {'undervotes': 1, 'overvotes': 0, 'votes':
{}}, 'tot_votes': 0, 'num_ballots': 1, 'writeins': 0},
'Constitutional Amendment #1': {'undervotes': 1, 'overvotes': 0, 'votes': {}},
'tot_votes': 0, 'num_ballots': 1, 'writeins': 0},
'Constitutional Amendment #2': {'undervotes': 0, 'overvotes': 0, 'votes':
{'YES': 1}, 'tot_votes': 1, 'num_ballots': 1, 'writeins': 0},
'Statewide Referendum A': {'undervotes': 0, 'overvotes': 0, 'votes': {'NO': 1},
'tot_votes': 1, 'num_ballots': 1, 'writeins': 0}}

```

**90.** We can note that above, the votes for President and Public Service Commissioner differ, as well as the fact that the CVR has "U.S. House District 11", while the ballot has the contest "U.S. House District 6". This was categorized as a "Ballot Deviant" by

AuditEngine, as the list of contests on the ballot as denoted by the style indication, do not match the list of contests in the CVR. Since AuditEngine reads the ballot style directly from the ballot, this ballot was correctly interpreted by AuditEngine.

**91.** So in summary, the ballot image is style 1074, and the third page of the ballot image, the Dominion voting system AuditMark, is correct. But the Cast Vote Record for this same Ballot ID is style 1115, and the contests on the ballot and the votes do not match. (This ballot was in Counting Group 3, Absentee by Mail.)

**92.** In our research into this ballot, we also looked for other ballots with the exact same voting pattern. We found there was only one other ballot in the entire set of ballots from Fulton County that had the same pattern, and it was in the same batch as this ballot, 20 ballots later in the set, Ballot ID: 05160\_00202\_000020. The fact that this pattern exists only one other time does not absolutely mean that it is the same ballot shown twice (overwriting the records 20 ballots earlier), but it certainly could be.

### **93. How did this error occur?**

We have further investigated this issue and found that actually there are two "Cards" records in the same CVR record. Originally, we had guessed there would only ever be one "Cards" record, because we did not know when a ballot would have multiple cards. Here, we find that there are two "Cards" records, and the second record DOES match the ballot image. The reason for keeping the first card is still a bit mystifying.

**94.** Since this was discovered, we have added a detection of multiple cards in the CVR and now report that in the Metadata (BIF) report. This was the only ballot with multiple Card entries in the CVR in Fulton County. We have heard that in Gwinnett County, there were also records like this, and they were always the first record of the batch. We have not confirmed this because the CVR for that county was not shared with us.

### **95. Possibly a Jam**

We think that maybe this was due to a jam in the outstacking area, and so the first ballot was scanned, and a CVR record formed. Then it jammed. The next ballot was scanned, and it was recorded in the same first ballot record as the second card. Then, the first physical card, now in the outstacking area, was pulled from the jam and replaced in the input bin, to be then scanned again and properly interpreted, 20 ballots later.

This seems like a viable possibility. To research this, we should look at the event log for the voting machine scanner to determine if, in fact, there was a jam.

It is unclear why the voting system records the jammed ballot in the CVR as the first Card for this ballot.

#### **96. Not a corrupted file**

This could not be a corrupted file, because the cast-vote record simply had a second Card record. It does not appear to be a random defect in the file.

#### **97. Not Human Error**

We don't see any way that this could be a human error, because the production of the images and cast vote record is completely under the control of the voting system.

## **5.4 Federal-Only Ballots Creates Privacy Hazard**

**98.** The Metadata Report in this election provides a breakdown of the ballot styles and the number of ballots in each style. This report can be accessed at this link:

[https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US\\_GA\\_Fulton\\_20201103/reports/bif\\_report.html](https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US_GA_Fulton_20201103/reports/bif_report.html)

**99.** In that report, see the "Card code analysis" and focus on the columns "style\_num", "count", "hexstyle", and "ballot\_type\_id". See "style\_num" column with numbers from 17 to 205. These are all "ballot\_type\_id" = 2, and have the same hexstyle, consisting of four contests, all the Federal races. You will note that there are very few ballots in each style.

**100.** A similar situation exists for "style\_num" values in the range from 553 to 659 (ballot\_type\_id 74) and "style\_num" values in the range from 759 to 821 (ballot\_type\_id 93).

**101.** It is our understanding that this occurs with UOCAVA (Uniformed and Overseas Citizens Absentee Voting Act -- 52 USC Ch. 203<sup>12</sup>) ballots because those voters may use a Federal write-in absentee ballot for use in general, special, primary, and runoff elections for Federal office.

**102.** We notice that UOCAVA ballots that are received as Federal-only ballots are resulting in the use of many (199) Federal-only ballot styles and very few (avg 3.2) ballots in each style, with sometimes a single ballot of a style. This is a privacy hazard because the identity of the voter may be linked with their ballot given information about

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<sup>12</sup> <https://www.fvap.gov/uploads/FVAP/Policies/uocavalaw.pdf>

who voted using this method. (AuditEngine does not have UOCAVA voter information and does not ever link voters to their ballots.)

- 103.** In the entire election in Fulton County (528,776 ballots), there were 650 ballots from all UOCAVA voters and they are classified into 199 ballot styles. All Federal-only ballots were BMD ballots, and we understand that the election staff enters these using the Dominion BMD machines after receiving Federal-only ballots that may be the general write-in type.
- 104.** These rare styles create a privacy threat. As we do not have the information about who may have cast these Federal-only ballots in specific precincts, it is not possible for anyone reviewing our report without additional information to link these ballots to the voters.
- 105.** We recommend that UOCAVA Federal-only ballots that are received be entered into the normal ballot style for their residence address, and simply leave the non-Federal contests blank. This will then allow these ballots to be merged with others of the same style and precinct. The staff can check that no other contests are voted as part of their data-entry process and review.
- 106.** If voters themselves use the BMD system to create their ballots, we recommend that a mode be available where the voter is provided the Federal contest only, and yet, when created, it should create a BMD summary card in the same format as the normal ballot, with all the other contests marked with "BLANK CONTEST". In this way, the additional 199 styles used can be eliminated and ballot privacy enhanced. Any Federal-only style has a corresponding style in the same precinct with all contests on it. When the Federal-only voter votes on the machine, or if the ballot is created by election staff transcribing hand-written ballots, then the result should be a normal (non-Federal-only) ballot but with all non-Federal contests unvoted.
- 107.** For example, ballot 00729\_00007\_000078 is the only ballot with style 608, which is a Federal-only ballot for precinct 760. Instead of creating a special style for these ballots, the normal ballot style should be used. In this case, it should use style 738 which is the full ballot for the precinct 760, with ballot\_type\_id of 86. There are already 1,343 ballots in that precinct and ballot style, so the ballot is effectively anonymized if there are other ballots that also have left those contests blank. In this example, we checked and there were 6 ballots with all non-Federal contests left blank among the 1,343 in the precinct.
- 108.** Another way to handle this is to place all Federal-only ballots with similar style in a virtual precinct. In this case, there would be 4 virtual precincts and there would likely be many other ballots in each one.



## 6. General evaluation

Compared with other counties we have processed with AuditEngine, Fulton County did not have the least number of concerns. We noticed that not all the overvotes and write-ins were adjudicated, according to the CVR.

Of course, our primary issue with our ability to completely audit this election was that 72% of the ballot images were missing. We hope and trust that this will be improved in future elections, and that the ballot images will be posted for the public to review at no cost.

In 1,396 contests on 613 sheets, AuditEngine correctly evaluated voter intent without requiring additional adjudication, while the voting system incorrectly evaluated all these 1,396 contests prior to human-eye adjudication. Each of these cases were adjudicated by Fulton County election staff and so ultimately, both AuditEngine and the adjudication staff agreed in these cases. We continue to analyze these because they show that AuditEngine did correctly evaluate these cases without human intervention.

When AuditEngine incorrectly interpreted voter intent without adjudication, AuditEngine itself flagged those cases "gray", which means that the evaluation was in a "gray area" or heuristics were used, and thus human-eye adjudication would be called for. There were 224 contests on 99 sheets in this category. In those cases, the marks by the voters were quite problematic and difficult to ascertain, but in perhaps about half the cases, AuditEngine did interpret voter intent properly. Yet these were not checked in adjudication or at least it was unclear as no changes were made.

- 1. Fulton County deleted 380,458 images of ballot sheets and those were therefore unavailable.** This represented 72% of the ballots and were probably all BMD ballots. We believe this was not a malicious act but due to the fact that the machines were new to Georgia and the need to save and post the images was not understood.
- 2. The overall election processing by Fulton County was "very good" with few real issues.**

Although the quality of the data was sub-par due to the missing images, there were only 262 repeated ballot images. The first case of a repeated ballot was included in the official results, and we skipped the second case, so that the result for that ballot was not doubled.

We skip the second case of a repeated ballot as a matter of convention. If a ballot image archive is corrected by the election staff and a new archive provided, the new one should be the first one used, and therefore listed first in the settings. This sometimes happens if we find that the number of images does not match the number of ballots cast, and then we go back to the election staff and ask for it to be corrected. If a new archive is provided, then it should be listed first.

We found discrepancies of, at most, just over 1% of the margin in any contest, and therefore the ballot image data studied was consistent with the official results.

### **3. AuditEngine parsed the human readable text on BMD ballots and found zero discrepancies.**

AuditEngine does not rely on the QR Code on BMD ballots, but instead parses the human readable text of the ballot summary which describes the selections of the voter. We do this because the human readable text is voter verifiable while the QR Code is not, even though it is much more expensive in terms of CPU processing requirements to OCR the text rather than read the barcode. AuditEngine then compares the readable text with the cast vote record on a ballot-by-ballot basis. We found zero discrepancies between the cast-vote records and the voter verifiable text summaries.

We believe this is an important feature of AuditEngine because it checks on the possibility that the text on the ballot says one thing while the QR Code encodes something else.

However, we must repeat that 380,458 images of ballot sheets were deleted and unavailable, and these were largely the QR Code ballots.

### **4. 5 ballots from DeKalb County and 5 ballots from the prior May 19, 2020 primary election were somehow included.**

The DeKalb ballots were partially correctly tallied but many of the contests were not understood by Fulton County machines. Adjudication did not fix the rest of the contests that were in common. We discussed how these might have been included in the canvass.

### **5. The One Case of "Multiple Cards"**

This case is understood in terms of how to match this to the images, but how this occurs is still unexplained and we need additional help to understand how multiple cards should ever occur. We have heard that in Gwinnett County, there were additional cases of multiple cards, but we did not have the ability to check it because the data was not shared with us.

### **6. UOCAVA Ballots Classified by Precinct Creates a Privacy Hazard**

We notice that UOCAVA ballots that are received as Federal-only ballots are resulting in the use of many (199) Federal-only ballot styles and very few (avg 3.2) ballots in each style, with sometimes a single ballot of a style. This is a privacy hazard because the identity of the voter may be linked with their ballot given information about who voted using this method. (AuditEngine does not have UOCAVA voter information and does not ever link any voters to their ballots.)

We recommend that UOCAVA Federal-only ballots that are received be entered into the normal ballot style for their residence address, and simply leave the non-Federal contests blank. This will then allow these ballots to be merged with others of the same style and precinct. The staff can check that no other contests are voted as part of their data-entry process and review.

## 7. Conclusion

This audit is one of a set that shows the value of performing ballot image audits to check on the tabulation of elections from modern voting systems that utilize ballot images. We must caution the reader that finding consistency between the ballot images and the official reported results is not sufficient to fully audit an election, as there are still concerns regarding voter eligibility, chain of custody, whether the ballot images are a faithful representation of the ballots, and other factors.

We hope that election officials and the public see the value of such a review of ballot images to increase voter confidence in election results.

For further information, please visit <https://auditengine.org>. We appreciate funding by the public for these independent audits.

### Primary Author: Raymond Lutz



Raymond Lutz is the founder and executive director of Citizens' Oversight Projects, a 501(c)3 nonpartisan nonprofit organization that has been involved in providing oversight to elections for over 15 years. Lutz has a Masters degree in electronics and software engineering, with experience in the document management and printer/scanner/fax/copier industry, and medical device industry. He is the lead developer of AuditEngine.

### How to Comment

Please send questions and comments about this report to [support@citizenoversight.org](mailto:support@citizenoversight.org)

## APPENDIX 1 -- Links to detailed reports

Auditing Elections Using Ballot Images and AuditEngine -- General Background:

[Auditing Elections Using Ballot Images and AuditEngine -- General Background](#)

This Narrative Report:

[GA Fulton 20201103 Narrative Report](#)

The following page provides links to the automated reports.

[https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US\\_GA\\_Fulton\\_20201103/reports/Final\\_Report.html](https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US_GA_Fulton_20201103/reports/Final_Report.html)

## APPENDIX 2

### 1. Ballot Image Archive (BIA) Report

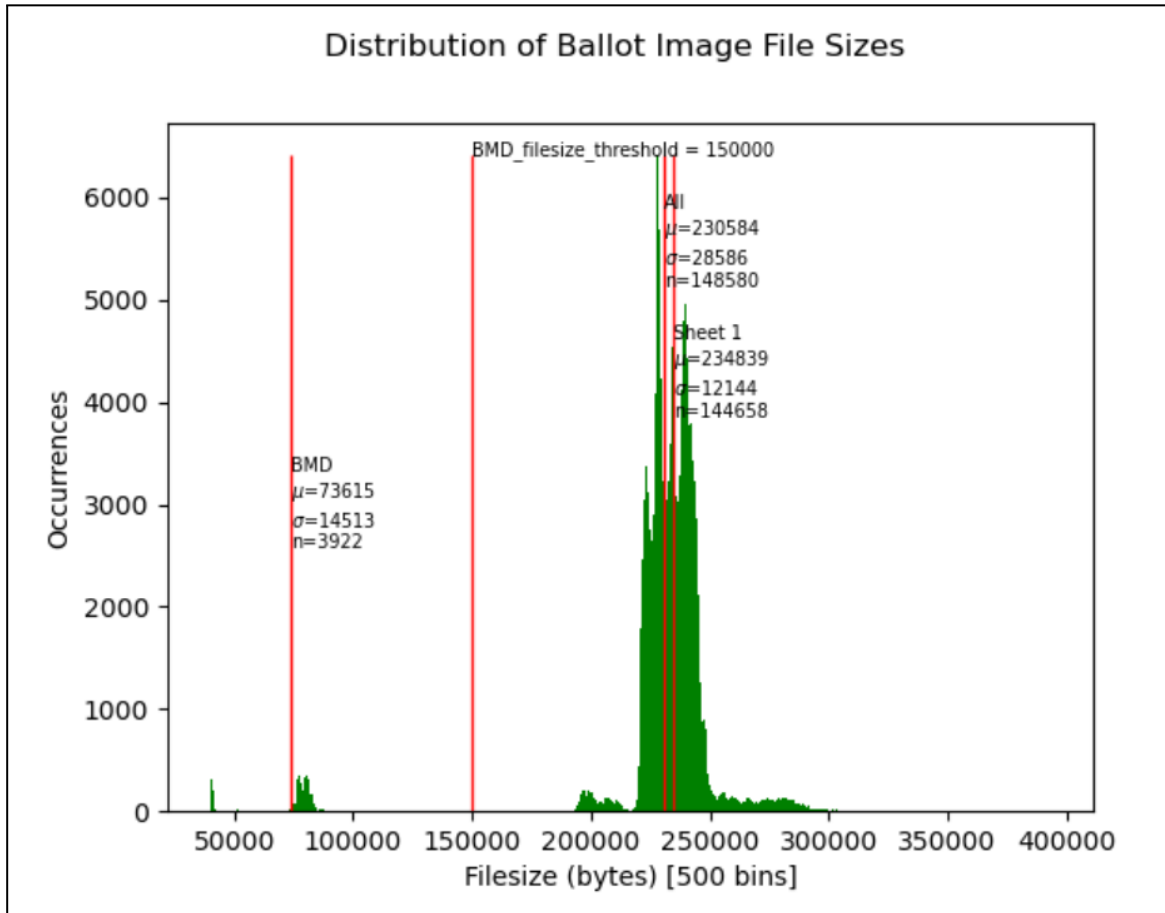
**109.** The BIA BIF (Ballot Information File) report is the metadata and other statistics that can be extracted by just reviewing the ballot image archives. This report for Fulton County can be found at this URL:

[https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US\\_GA\\_Fulton\\_20201103/reports/biabif\\_report.html](https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US_GA_Fulton_20201103/reports/biabif_report.html)

**110.** The number of zip archives: 5.

**111.** The following is the file size distribution chart:

- a. There were two groups of ballot images.
- b. Sheet1 group is the hand-marked paper ballots with average size of 234KB
- c. The BMD ballots had an average size of 74KB.



- 112.** There were 148,318 raw image files and 148,056 unique ballot images, with 262 repeated images. They were repeated only in the ballot image archives due to the archives including a batch twice at different levels of the directory structure. The Dominion Voting System did not treat these repeated images as separate ballots, thus they were processed only once. AuditEngine recognizes each pair of repeated and identical ballot images as the same ballot, and does not process them twice.
- 113.** Although these repeated ballots were not processed twice by the voting system, we believe it is possible that other researchers may have misinterpreted these as rescans of the same ballot, because the ballot image will appear the same.
- 114.** We note that we did limited searching for rescans but did not find any. We are aware that if batches of ballots are scanned twice and included in the totals, this may only be in the CVR and ballot images and not in the tabulation results of the voting system. We encountered this issue in the 2020 General Election in Volusia County,

FL<sup>13</sup>, where the CVR and ballot images differed from the aggregated totals. That defect in the ES&S equipment we have not seen yet in the Dominion systems.

115. The number of precincts, parties, and groups is NOT something that can be discerned from the directory structure in the case of Dominion, so these are enumerated as just 1 each.

116. There were 3,922 BMD ballots detected by inspecting the file size.

117. All ballots had only one sheet, and there were no unusual extremes.

## 2. EIF -- Election Information File.

118. The "Parsed EIF Report" is at this link:

[https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US\\_GA\\_Fulton\\_20201103/reports/EIF\\_Parse\\_Report.html](https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US_GA_Fulton_20201103/reports/EIF_Parse_Report.html)

119. The Election Information File (EIF) describes all the contests and options, including the official names and names used on BMD ballots. The EIF was generated by first parsing the Cast Vote Record (CVR) files, and then edited manually. Dominion provides excellent metadata in their CVR but does not provide the exact strings used in BMD ballots, and as those are read using OCR (Optical Character Recognition), we need the exact strings of the contest names and options (candidate names or Yes/No), to ensure accurate BMD summary card reading.

## 3. BLT BIF -- Ballot BIF (Ballot Information File)

120. The BLT BIF is metadata that is extracted directly from the ballots in a full image review of the ballot images. This initial review extracts just the frame of the ballot, and provides the breakdown of the ballot styles from the ballots, and perhaps other information that can be determined just by extracting certain locations on the ballot using OCR. We prefer to use this first pass to avoid any reliance on the CVR for the ballot styles during the generation of the target map. This information is combined with the Ballot Image Archives (BIA) metadata below.

## 4. Combined Metadata Report (BIF report)

121. The metadata from the BLT BIF is combined with similar metadata from the BIA and CVR metadata to create the Combined Metadata report.

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<sup>13</sup> Case Study of Three Florida Counties, including Volusia. <https://auditengine.org/audit-results/case-study/>  
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- 122.** The combined metadata report (BIF Report) can be found at this URL:  
[https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US\\_GA\\_Fulton\\_20201103/reports/bif\\_report.html](https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US_GA_Fulton_20201103/reports/bif_report.html)
- 123.** The official number of ballots cast was 528,777. There were only 148,318 unique ballot images, with 262 marked as "skipped repeats" by AuditEngine, and not included further in the evaluation by AuditEngine. These additional ballot images are NOT an indication of anything wrong in the actual canvass, but are simply an indication that the ballot image data was not perfectly clean, but was easy to clean up.
- 124.** There were no repeated ballots in the CVRs, but the CVRs lacked 5 ballots (from the primary election). Some other districts had a larger differential between the CVR records and the official results. We find that the Dominion Voting System is better in this regard.
- 125.** There were 380,458 ballots missing from the ballot image archives. These were obviously not processed by AuditEngine. Nonetheless, there were the balance of the BMD ballots that AuditEngine did process; usually there are fewer discrepancies in BMD ballots. AuditEngine processed 3,922 BMD ballots by reading the ballot summary card text and did not find any discrepancies. It was not able to process one BMD ballots due to curved text.
- 126.** The BLT BIF includes only nonBMD ballots, so there is an expected difference between the number of ballot images and the number reviewed in the BLT BIF of 3,923, the number of BMD ballots. According to the CVR, there were a total of 381,626 BMD ballots and except for the 3,922 (plus one not processed due to curved text), these were not processed by AuditEngine.
- 127.** There were 385 precincts identified in the CVR, and 666 different ballot styles defined in the CVR. The ballots processed by AuditEngine had 451 styles.
- 128.** This scan also checks the name of the county at the top of the ballot, and there were 5 ballots marked "DEKALB COUNTY" included in the election. We are unsure exactly how these got into the mix, but since the ballots were of the same vendor and size, Fulton County processed these as if they were FULTON COUNTY ballots. Interestingly, even when adjudicated, they were not fully corrected. This issue will be reviewed in more detail later.
- 129.** There were 5 ballots from the primary election in 2020 that were included in the Ballot Images and were not reflected in the CVR, and could not be processed. These

also were not processed by the voting system (no CVR created) for these ballots.

130. There was one ballot that was considered corrupted, because the ballot style could not be read. The barcode used to express the style for this ballot was corrupted in the image, and so we provided a style override so this ballot could be processed.
131. The remainder of the Combined Metadata Report provides a wealth of information so analysts can study how the input files may be corrupted. We did not need most of this report because the style denoted on the ballot was sufficient to categorize the ballots into the styles. Dominion is good at providing styles and batches because of the structure in their ballot number.

## 5. Styles Report

132. The Styles Report is at this URL:  
[https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US\\_GA\\_Fulton\\_20201103/reports/Styles\\_Report.html](https://us-east-1-audit-engine-jobs.s3.amazonaws.com/US/GA/US_GA_Fulton_20201103/reports/Styles_Report.html)
133. In the election in Fulton County, there were 451 styles identified directly by the code on the ballots. Georgia does not rotate ballot options.
134. The styles were mapped using the AuditEngine TargetMapper component using direct mapping, since the Ballot Styles Masters were not available. It was during this process that we first detected that ballots from DeKalb County had been mixed in, and we added the capability to collect that data during the BLTBIF review and during vote extraction.
135. The Styles Report includes a "redline proof" of each ballot style so it may be inspected. This inspection process is harder than it seems, and is one reason we have introduced the auto-mapping process which reduces the reliance on human inspection, but still does use some human-eye matching. (We are currently investigating some improvements in the presentation of the proofs to make it easier to check them for errors.)
136. Please note that the redline proofs are based on style templates which are generated by combining ballots to clarify and remove stray marks. You can ignore any ghosting marks that you might see and if ovals are darkened, that is due to the somewhat arbitrary selection of ballots in the set of ballots used to create the standardized image templates.



## 6. Vote Extraction

137. Georgia is a voter-intent state. This means that the intent of the voter determines how each contest on each ballot is to be evaluated, rather than arbitrary thresholds and how a machine might read it. For example, if a voter fills in an oval, then crosses it out, and writes "No" next to it, and fills in another oval, then the second oval would be interpreted as the intent of the voter<sup>14</sup>.

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<sup>14</sup> O.C.G.A. 21-2-438 (2010) "(c) Notwithstanding any other provisions of this chapter to the contrary and in accordance with the rules and regulations of the State Election Board promulgated pursuant to paragraph (7) of Code Section 21-2-31, if the elector has marked his or her ballot in such a manner that he or she has indicated clearly and without question the candidate for whom he or she desires to cast his or her vote, his or her ballot shall be counted and such candidate shall receive his or her vote, notwithstanding the fact that the elector in indicating his or her choice may have marked his or her ballot in a manner other than as prescribed by this chapter."