

0 Connecticut Citizen Election Audit

Citizen Post-Election Audit Report

Independent Observation and Analysis
of Connecticut's Post-Election Audit
of the 2017 General Election

February 13, 2018

We conclude, based on citizen observations and analysis of official audit reports, that the 2017 post-election audits continued to fail to inspire confidence in the accuracy of our elections system and in our election officials, including:

- ▼ 41% of reports required to be submitted to the Secretary of the State by registrars were incomplete or were not submitted.
- ▼ Failure of the Secretary of the State's Office to check that all required reports were submitted and that all submitted reports are completed fully.
- ▼ Weaknesses in ballot chain-of-custody and security.
- ▼ Continued use of flawed electronic audit procedures that are not publicly verifiable.

Developments at the electronic audit point the way to improvement:

- ▲ The Secretary of the State's Office and UConn Voter Center solicited feedback on improving the electronic audits.
- ▲ Write-in counting issues and failure to separate ballots as required were clearly identified by the electronic audit and observed by the Secretary of the State's Office.

The public, candidates, and the Secretary of the State should expect local election officials to be able to organize audits and produce accurate, complete audit reports. The public should expect the Secretary of the State's Office to take the lead in ensuring that the audit is complete and publicly verifiable.

We emphasize that this report does not question any election official's integrity.

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Executive Summary

Introduction

After the November 2017 Election, Connecticut conducted its 18th large-scale post-election audit.^{1,2} This was also the 18th large-scale audit observation for the Connecticut Citizen Election Audit (“Citizen Audit”).

The purposes of our observations are to create election integrity, demonstrate citizen interest in the process, increase citizen involvement in elections, provide feedback to the Secretary of the State and the Connecticut General Assembly on the audit process, and provide the public with the information necessary to determine its confidence in Connecticut's elections.

Citizen Audit volunteer observers invested 27 days observing 24 local counting sessions. Without the service of these volunteers, Connecticut’s post-election audits would take place without public observation, and the insights in this report would not be possible.

¹ In this document we will frequently use the term “audit” when we mean “post-election audit,” “post-election audit counting session,” or other parts of the process, from the random selection to the official report of each post-election audit produced by the University of Connecticut Voter Center (UConn).

² Connecticut statutes require the Secretary of the State and registrars of voters to conduct audits after every election and primary.

Findings

We conclude, based on citizen observations and analysis of official audit reports, that the 2017 post-election audits continued to fail to inspire confidence in the accuracy of our elections system and in our election officials.:

- ▼ **41% of reports required to be submitted to the Secretary of the State by registrars were incomplete or were not submitted.**
- ▼ **Failure of the Secretary of the State's Office to check that all required reports were submitted and that all submitted reports are completed fully.**
- ▼ **Weaknesses in ballot chain-of-custody and security necessary for confidence that ballots were not tampered with between the election and the municipal audit counting sessions.**
- ▼ **Continued use of flawed electronic audit procedures that are not publicly verifiable.**
- ▼ **Increasing instances of write-in ballots not properly separated and being read into scanners multiple times, without detection prior to the audits.**

The public, candidates, and the Secretary of the State should expect local election officials to be able to organize audits and produce accurate, complete audit reports. The public should expect the Secretary of the State's Office to take the lead in ensuring that the audit is complete and publicly verifiable.

Despite our concerns with public verifiability and the procedures used for the electronic audit held at the Secretary of the State's Office, we are pleased with several related developments.

- ▲ **The UConn Voter Center demonstrated progress on enhancing the Audit Station³ to accommodate Electronically-Assisted Post-Election Audits.**
- ▲ **The Voter Center and the Secretary of the State's Office asked us for detailed feedback on the Audit Station and on the Electronic Audit process.**
- ▲ **The Electronic Audit demonstrated that write-in ballots are frequently read into the scanner twice.**
- ▲ **The Secretary of the State's Office observed, with us, that officials frequently do not place write-in ballots and hand-counted ballots in separate envelopes, as required by law.**

We are pleased that the Secretary's Office will consider additional emphasis for annual training on the handling of write-in ballots and the need for placing write-ins and hand-counted ballots in separate envelopes.

We emphasize that this report does not question any election official's integrity. Most election officials are well motivated and of high integrity, as are other public officials. However, unquestioned trust and lack of knowledge can lead to a lack of vigilance that allows errors to be overlooked and opportunity for the occasional bad actor to manipulate elections and audits.

³ The Audit Station is a hardware and software system developed by the UConn Voter Center to rescan and recount ballots for the purpose of auditing independent of the AccuVoteOS scanners used on election day.

Connecticut Continues Flawed Electronic Audits

Summary

For the second year in a row, several municipalities, the Secretary of the State's Office, and the UConn Voter Center conducted electronic audits. In 2016, Connecticut became the first and remains the only state in the United States to replace publicly verifiable audits with unverifiable electronic audits.

These audits represent several steps backward from the traditional manual, hand-count audits:

- Unlike hand-count audits, the electronic audits were not publicly verifiable.⁴ The public and the Citizen Audit cannot determine the accuracy of such audits.
- The audits were conducted without written procedures approved by the Secretary of the State.

The Citizen Audit strongly recommends *Electronically-Assisted Manual Post-Election Audits*:

- The sound science of *Evidence Based Elections* provides the basis for manually checking and transparently verifying the results of an electronic audit. If efficiently conducted, such audits would take approximately the same effort for election officials as the unverifiable electronic audits used for this election.
- Electronically-Assisted Post-Election Audits could provide confidence, with less tedious work, with high accuracy and integrity.

We are pleased that the UConn Voter Center demonstrated progress on enhancing the Audit Station to accommodate Electronically-Assisted Post-Election Audits. We are similarly pleased that both the Voter Center and the Secretary of the State's Office asked us for detailed feedback on the Audit Station and on the electronic audit process.

For complete details on the shortcomings of Connecticut's electronic audits and the alternative of Electronically-Assisted Post-Election Audits, see Appendix B.

⁴ Unlike most government agency and business audits, post-election audits are not conducted independently. They are conducted by the same organizations and individuals responsible for conducting the elections and specifying election equipment. Elections are also highly political. The solution is publicly verifiable audits – audits that can be independently verified by candidates and the public.

Audit Background

After the November 2017 Election, Connecticut conducted its 18th large-scale post-election audit.^{5,6} This was also the 18th large-scale audit observation by the Connecticut Citizen Election Audit (Citizen Audit).

The purposes of our observations are to create election integrity, to demonstrate citizen interest in the process, increase citizen involvement in elections, provide feedback to the Secretary of the State (SOTS) and the Connecticut General Assembly on the audit process, and provide the public with the information necessary to determine its confidence in Connecticut's elections.

By law, the Secretary of the State is required, after each election, to select at random 5%⁷ of Connecticut's voting districts to participate in post-election audits. The audit counting sessions were required to be conducted between November 22, 2017 and December 8, 2017. In the random drawing 34 voting districts were selected for audit from the list of 734 districts. The districts audited were located in 28 municipalities.⁸

Citizen Audit volunteer observers invested 27 days observing 24 local counting sessions⁹ during this period. Observers frequently attended audits on short notice, observed multiple audits, and accommodated last minute changes to the audit schedule. **Without the service of these volunteers, Connecticut's post-election audits would take place without public observation, and the insights in this report would not be possible.**

⁵ In this document we will frequently use the term "audit" when we mean "post-election audit" or "post-election audit counting session." Technically, we believe that the whole process encompassing everything from the preservation of records, random drawings, counting in municipalities, the report by the University of Connecticut, and the evaluation of that report by the Secretary of the State would be the "audit." However, for readability we will usually follow the common practice of using "audit" to refer to parts of the whole.

⁶ Connecticut statutes require the Secretary of the State and registrars of voters to conduct audits after every election and primary.

⁷ Effective July 1, 2016 the post-election audits were reduced by the General Assembly from 10% to 5% of districts.

⁸ SOTS press release after the random drawing:

<http://portal.ct.gov/SOTS/Press-Releases/2017-Press-Releases/November-2017-Election-Audits>

⁹ We were unable to send observers to every audit and we were unable to match some who volunteered with audits on dates they were available, in their areas of the State.

Purpose of Connecticut's Random, Post-Election Audits

As stated in the Office of the Secretary of the State's Post-Election Audit Procedures:¹⁰

The primary purpose of the hand count¹¹ audit is to assess how well the optical scan voting machines functioned in an actual election and to ensure that votes cast using these machines are counted properly and accurately.

Good government groups support the "Principles and Best Practices for Post-Election Audits"¹² which includes the following definition and benefits:

Well-designed and properly performed post-election audits can significantly mitigate the threat of error, and should be considered integral to any vote counting system. A post-election audit in this document refers to hand counting votes on paper records and comparing those counts to the corresponding vote counts originally reported, as a check on the accuracy of election results, and resolving discrepancies using accurate hand counts of the paper records as the benchmark. Such audits are arguably the most economical component of a quality voting system, adding a very small cost for a large set of benefits.

The benefits of such audits include:

- *Revealing when recounts are necessary to verify election outcomes*
- *Finding error whether accidental or intentional*
- *Deterring fraud*
- *Providing for continuous improvement in the conduct of elections*
- *Promoting public confidence*

¹⁰ Official Procedures: <http://ctelectionaudit.org/2016/AuditProcedure201605.pdf>

¹¹ Hand count means the manual counting of ballots and votes without relying on voting machines such as optical scanners.

¹² <http://www.electionaudits.org/principles>

Citizen Observation: Challenges and Limitations

Through past experience in observing audits, we have continuously improved our forms, training materials, conference call and video training sessions for observers.

We recognize that there may be occasional errors in our raw data derived from observations. However, when taken as a whole, the observations tell a collective story that is quite consistent and provides valuable feedback for the continuing education of elections officials.

Without our volunteer observers willing to invest a day of their time, being available for short-notice scheduling, and observing to the best of their ability, no one except local election officials would know how post-election audits are conducted in Connecticut. Our observers care about democracy and ensuring that measures are in place to protect the integrity of our elections.¹³

¹³ Upon request of any registrar of voters participating in the audit, we would be pleased to discuss volunteer observation reports and provide feedback applicable to his or her municipality.

Analysis

We Do Not Question Any Election Official's Integrity

This report does not question any election official's integrity. Most elections officials are well motivated and of high integrity, as are other public officials. However, unquestioned trust and lack of knowledge can lead to a lack of vigilance that allow errors to be overlooked and the opportunity for the occasional bad actor to manipulate elections and audits.

At a minimum, lack of attention to detail and opportunities for error and fraud leave voters without justified confidence in our election system and election officials.

Citizen Observation Analysis

Volunteer citizen observers observed local counting sessions and reported their observations on Observation Report Forms.¹⁴ Analysis in this section is based on those reports. Appendix A is a table showing the percentage of "yes" responses on all yes/no questions on Observation Report Forms for this audit and several previous audits. Appendix C describes in detail our methodology of observation and analysis.

Even-Year Elections vs. Odd-Year Elections vs. Primary Elections

In several aspects, it is more appropriate to compare even-year elections with even-year elections, odd-year elections with odd-year elections, and primary elections with primary elections. Even-year elections include statewide races and involve more ballots, yet generally are easier to count manually than municipal elections. Odd-year elections are municipal elections. They involve fewer ballots due to lower turnout, yet present more challenging counts of vote-for-multiple races (for example, "Vote for 3 of the 5 candidates"). Primary election audits require counting only a single race, have far fewer ballots, do not involve cross-endorsements or write-ins, and seldom have vote-for-multiple contests.

A. Procedures Are Unenforceable, Current Laws Are Insufficient

As noted in previous reports, discussions with representatives of the Secretary of the State's Office and the State Elections Enforcement Commission (SEEC) indicated that many, if not all, of the post-election audit procedures, including those covering chain-of-custody, are unenforceable. There has been disagreement between past SEEC Directors and some members of the General Assembly regarding the enforceability of regulations, but there is agreement that current post-election audit procedures are not enforceable.¹⁵

¹⁴ Our latest form used for this observation is available at: <http://ctelectionaudit.org/ObservationReportForm.pdf>.

¹⁵ In 2015, Public Act 15-224 authorized the Secretary of the State to designate enforceable procedures, yet the audit procedures have not been so designated.

A.1 Ballot Security Laws Are Insufficient for Credible Audits

Laws that govern the post-election sealing of ballots, memory cards, and tabulators are unclear and insufficient. After ten years of optical scanner use, the laws have not been updated to recognize that polling place voting with optical scanners involves paper ballots. Most officials interpret the law to imply that polling place ballots are required only to be sealed only until the 14th day after the election, yet the audits do not start until the 15th day after the election. We note that the adherence to prescribed chain-of-custody and ballot security procedures varies widely among audited districts.

Ballots are not uniformly maintained in secure facilities, and access to these storage facilities is not reliably logged or recorded, even though the law requires two individuals to be present when these facilities are accessed. In many towns, each registrar could have undetected lone access to the sealed ballots¹⁶ for extended periods. In many towns, several other individuals also have such access. The lack of uniform security of the ballots diminishes confidence in the integrity of the ballots. This diminishes confidence in the integrity of election results.

Ballots are the basis for the data reported in audits and the foundation for the integrity of the audits and elections. Secure, credible chain-of-custody procedures should preclude the opportunity for a single individual to have any unobserved extended access to ballots, providing the opportunity for an individual to substitute or modify ballots.

A.2 For the Fourth Consecutive Year, Write-In Problems Surfaced

A number of polling places failed to follow procedures that require the sealing of write-ins in a separate envelope. And it's likely that some polling places fail to count valid write-ins.

Unfortunately, the AccuVoteOS does not provide a count of write-in ballots that balance with the number of ballots in the write-in bin. Only a race by race count of the number of write-in bubbles that are filled in would demonstrate that all were accounted for.

The law, closing procedures, and audit procedures should be changed, as follows:

- The law and closing procedures should be changed to require that the number of write-in bubbles be hand counted and compared to the tape, race by race, and compared to those numbers reported in the Moderator's Return. If the counts do not match, officials should be required on election night to find missing write-in ballots in the main bin and to count any registered write-in votes on those ballots. (This is similar to the requirement that ballot counts should be compared to voter check-in list counts, with differences noted and researched.)
- The audit procedures should explicitly require that write-in bubbles should be counted and compared to machine tape counts in audited races, and that any write-in ballots found outside of the write-in envelope be reported.

¹⁶ While useful, ballot bag seals, which are small plastic or plastic and metal numbered devices, supposed to not be reusable, offer little protection, especially when used to protect ballots from those who are responsible for applying and checking seal integrity: *Security Theater: Scary! Expert Outlines Physical Security Limitations*
<http://ctvoterscount.org/security-theater-expert-outlines-physical-security-limitations/>

Also, in 2014 we noted several problems with write-in ballots not counted on election night, because the AccuVoteOS did not direct them to the write-in bin. Every year since has revealed cases of human error, in which officials scanned write-in ballots a second time.

As we explained in 2014:

When a ballot with write-in bubbles filled in, the scanner counts the other votes on the ballot and counts the number of write-in bubbles by race. It is designed to drop the ballot into the write-in bin, separate from the main ballot bin and the auxiliary bin. At the end of Election Day, the scanner prints on its tape the ballot counts, vote counts, and the number of write-in votes per race. Closing regulations require officials to hand count and report any write-in votes for registered write-in candidates on ballots in the write-in bin and seal them in a separate envelope in the sealed ballot bag.¹⁷ Election procedures assume the AccuVoteOS functions as designed. Often it does not.

There are flaws in Connecticut's AccuVoteOS scanners, procedures, and the law, which let some write-in votes go uncounted. The audits are insufficient to determine the rate that write-in votes are undercounted in this way.

- Occasionally the AccuVoteOS and associated ballot box fail to direct write-in ballots to the write-in bin, dropping them instead into the main bin.
- When write-in ballots are counted on Election night, only those in the write-in bin are counted.
- Although the scanner counts the number of write-in bubbles by race, officials are required to count only the subset of votes for registered write-in candidates.
- There is no requirement in procedures or the law that the number of write-in bubbles per race be reported and compared to the tape counts.
- The audit procedures do not require that write-in bubbles be counted, even when they match with the tape counts, the audit does not distinguish between the ballots that were in the write-in bin and those that were not. Thus, audit counts of write-in bubbles matching is not an indication that all were subject to hand-count on Election night.

A deposit in the incorrect bin is an election equipment problem and procedures are inadequate to compensate for that problem. There is a solution. The law and closing procedures should be changed such that the number of write-in bubbles per race in the hand count and on the machine tape should be reported and required to balance.

¹⁷ Regulation Sec. 9-242a-23 http://www.sots.ct.gov/sots/lib/sots/regulations/title_09/242a.pdf

B. Laws and Procedures Are Not Followed or Understood

Problems uncovered in this year's observation include: incorrectly completed forms, chain-of-custody concerns, inconsistent counting methods, failure to count all required ballots, error-prone, confusing totaling processes, problems related to write-in counting, and problems with results reconciliation.

The Official Audit Procedures¹⁸ were frequently not followed, were not enforced, and, as noted previously, may not be enforceable. Additionally, the procedures still lack detailed guidance in efficient counting methods that would provide accurate and observable results. See Section C below.

Our observations indicate that some towns do a good job of using the procedures in the audit, following each step, in order, and enhancing them with effective detailed counting methods. However, in other towns there is no evidence that election officials are referencing or following the procedures. Some who attempt to follow the steps do not seem to understand them and appear to be reading the procedures for the first time at the start of the counting session. Frequently, effective counting procedures are coupled with *ad-hoc*, disorganized totaling procedures. This causes inaccuracies and frustration for officials and makes it difficult to observe the accumulating vote totals from teams and their batches to reach the final totals.

In this audit, one municipality did not perform the required hand-count. They read ballots through a scanner and reported that result as the audit. We know this only because a Citizen Audit observer was there. This was reported to the Secretary of the State's Office.

B.1 For the Fourth Consecutive Year, Write-In Problems Surfaced

Also reference A.2 above.

Over time, we have noted increasing instances of write-ins being read twice. Initially, we and officials may not have noticed the problem, especially in manual audits, with officials attributing those instances to "Human Error" in counting. In this audit officials noticed three districts in the electronic audit where this occurred or was suspected of occurring. It is likely that this problem is more frequently detected in electronic audits.

This problem should normally be noticed and corrected shortly after the election, based on discrepancies between the number of voters signed in and the number of ballots counted. When discovered or suspected, the solution is a *discrepancy recanvass*, designed specifically to recount in order to remedy a suspected election night counting error.

This could be considered a benefit of the audit, if the Secretary of the State's Office takes action to correctly instruct moderators how to handle write-ins, and instructs moderators, head moderators, registrars, and municipal clerks correctly check results and to then have head moderators call for discrepancy recanvasses.

¹⁸ The latest SOTS procedures: <http://ctelectionaudit.org/2016/AuditProcedure201605.pdf>

The Citizen Audit will add questions designed detect these issues to our Observation Report Form so that in future audits, we will have a more exact number of cases where these procedures are not followed.

B.2 The Law to Separate Write-ins and Hand-Counted Ballots is Not Being Followed

The Moderator's Manual and Regulations 9-242a-23 require that write-in ballots and handcounted ballots from the auxiliary bin be separated and enclosed in depository envelopes on election night. That did not happen in at least two towns selected for the electronic audit. The write-in and hand-counted ballots were mixed in with all the other ballots. This makes reconciliation difficult:

- It is impossible to determine which ballots were actually hand counted and how they were judged for voters' intent and confuses the comparison between election night counts and audit counts.
- When write-ins are read into a scanner twice, counting them a second time in that audit is time consuming and error prone. **Unfortunately this is often not done, leaving the audit results all but useless.**

Once again, if the Secretary of the State's Office and Registrars take action to correctly instruct moderators and provide them the proper envelopes, this would then be a benefit of the audit.

The Citizen Audit will add this issue to our Observation Report Form so that in future audits we will have a more exact number of cases where these procedures are not followed.

B.3 Official Audit Reports Are Not Sent or Not Tracked by the SOTS Office

For this audit, audit report forms were not received from two of the districts audited. Nevertheless, we appreciate the assistance of the Secretary of the State's Office in providing us with copies of the official municipal audit reports that were submitted.

B.4 Forty-One Missing, Incorrectly Completed Forms, and Incomplete Audit Counting

Several registrars' reports were incomplete due to insufficient data to determine the actual results of the local audits, and if and how they were performed. As in the past, in some reports we can make assumptions and fill in the missing data. In this audit some reports are so incomplete that we cannot make reasonable assumptions.

We are equally concerned that such reports were accepted by the Secretary of the State's Office and UConn as representing the actual results of the audit. Voters should expect that the SOTS review such reports and return them to local officials to be completed.

Without complete reports we cannot analyze or verify the results of the audit and provide any level of confidence in the optical scanners in those districts, nor in the officials charged with supervising and performing the audits. This, after all, is the statutory purpose of the audits.

Audit Report

Town Name: _____ Voting District (and polling place name): _____

District Numbers: (Cong _____) (State Senate _____) (Assembly _____)

Ballot Carrying Case Seal Number: _____ Audit Date: _____

Total of tabulator-counted ballots - hand counted at the audit: Totals ballots counted by tabulator as shown on tabulator tape produced on election night:

Ballot Carrying Case Seal Number (When Rescaled After Audit): _____

A	B	C	D	E	F
Office	Candidate	Machine Totals (Tape)	Undisputed Vote Totals	Questionable Vote Totals	Overall Hand Count Totals (D + E)

Explanation of Differences:

*Submit completed forms within 48 hours by fax to 1-866-392-4023*Registrar of Voters: _____
(Signed) (Printed)Registrar of Voters: _____
(Signed) (Printed)

Official Audit Report Form - Figure 1

Reviewing the official district reports submitted to the Secretary of the State, we note that several report forms were not accurately completed. This made it difficult to create comprehensive statistics and to depend on the audits as a vehicle for assessing the voting machines' accuracy and correct programming, the statutory purpose of the audits. See Table 1 on the following page.

	2017	2015	2013	2011 ¹⁹
Number of ballots counted by hand or machine not filled in or filled in incorrectly	2	1	1	1
Some columns not completed and/or incorrectly completed	5	6	6	10
Minor arithmetic/transcription errors	5	3	1	3
Reports with negative counts of questionable ballots	0	1	3	
Fewer races or candidates counted than required by law	0	1	7	11
Missing reports from SOTS	2	2	3	4
Differences attributed to questionable votes, but not reported in Col. E	3	0	3	3
Cross-endorsed candidates not counted as such	0	3		2
Differences attributed to questionable votes, but not enough reported	0	0	1	
Total incorrect or missing reports	14 ²⁰	15	22	34
Districts selected	34	68	66	73
Rate of incomplete reports	41%	22%	29%	29%

Errors in Official Report Forms - Table 1

Incomplete data should be taken seriously. The Secretary of the State should not accept incomplete forms, should insist that forms be filled out correctly and that enough races are counted and, where necessary, should perform investigations, including recounting ballots or votes. These investigations should be announced publicly in advance to allow public observation. Every significant difference is an opportunity for an election error or malfeasance to remain undetected. Images of the actual official Audit Report Forms obtained from the Secretary of the State's Office, and our data compiled from those reports, can be viewed at: <http://www.CTElectionAudit.org>.

In recent years, we noted a continuing trend of improvement. Obviously that trend dramatically reversed ?headed in the wrong direction this year.

¹⁹ We present several tables in this report from the 2015, 2013, and 2011 audits. The odd-year 2011, 2013, and 2015 elections are similar municipal elections and are more directly comparable than State and Federal even-year elections.

²⁰ Some district reports had more than one error, counted only once in this total.

B.5 “Human Error” Should Not Be Accepted as an Explanation of Differences

	2017	2015	2013	2011
Reports attributing differences in counts to “Human Error”	6 ²¹	19	20	14
Rate of “Human Error” excuse in official reports	22%	28%	30%	19%

Official Forms Listing “Human Error” as Cause of Differences - Table 2

Officials routinely attribute differences in counts to “Human Error.” Accepting that as the reason or excuse completely negates the purpose of the audit. Without reliable, accurate counting in the audit it is impossible to attribute errors to either machines or humans. Hand counts which are inaccurate do not imply that machine counts were accurate.

Registrars submitting and the SOTS Office accepting reports with “Human Error” as explanations are also contradictory to the published procedures, which state:

Small differences of one or two unexplained votes can often occur, but such differences should be verified by at least two counts. It is your responsibility to be thorough and comfortable that your counts of the ballots are accurate. If you are not confident in your counts then you should continue counting and recounting until you are satisfied that your hand count result is accurate.

Differences excused by “Human Error” should not be accepted by the SOTS Office nor by the University of Connecticut in their reporting of scanner accuracy. They should be investigated, determined, and reported accurately.

There were also illogical explanations of differences in the official audit report forms:

²²There were more than five ballots which could be interpreted differently due to improper filling out of the ovals. [Yet, no questionable votes were listed on the form.] Any one of those ballots could explain the differences. [Not really, since there were differences of up to three for a single candidate.]

11 write-in ballots were put through the tabulator by the moderator on election night.

Four votes were identified as questionable by the machine audit. [Yet no questionable votes were listed on the report form.]

Difference was unacceptable write-ins. [Impossible since neither they nor the scanner counted the write-ins.]

²¹ Counts are significantly reduced, because the audit was reduced to 5% of districts from 10% of districts prior to 2016. Also, “Human Error” is not a reasonable explanation for electronic audits.

²² All observer and official comments in this report are edited for grammar and clarity. Our editorial comments are in brackets “[]”.

B.6 Multiple Chain-of-Custody Concerns

In several observations,²³ observers expressed concerns with chain-of-custody and ballot security.

Question	% Yes:	2017	2015	2013	2011
Do you have any concerns with the chain of custody?		29%	32%	23%	17%
A single individual can access ballot containers in storage.		48%	42%	52%	41%

Municipalities Where Observers Noted Chain of Custody Concerns - Table 3

Single officials deliver ballots, single individuals were left with ballots, and ballots were left alone with observers. In other cases, seals were improperly applied, were open, or were not used.

A larger concern is that, in many towns, single individuals may access the ballots undetected for extended periods of time. In 48% of towns surveyed in this audit, a single individual can access the ballot storage. In other towns, even though policies require more than one person to access ballots, there are few or no protections in place to prevent a single person from accessing the ballots.²⁴ This is a serious problem, since single individuals could change the ballots and be undetected. **At minimum it destroys the credibility of audits and elections.** We note an ongoing decline in towns where single individuals are allowed access to ballots.

From observers:

Only one person delivered the ballots and I'm pretty sure only one person put them away.

The ballots after counting were placed in cardboard boxes that were taped with wide packaging tape across upon which was written a name or the district. They were not returned to the bags with the locks.

LARGE hole in bottom of bag/cart. Flap on bottom inside was up. Got in water on way to audit. Several ballots wet and impossible to read through the scanner in the electronic audit. Also, hole would make it possible for someone to get at ballots and switch without changing seal.

Opening Chain of Custody seems unconventional, since "technicians" given the task of custody of the ballot bags from the secure storage at the [moving company] facility to the City Clerk vault are not sworn elected officials of the city. In addition, this morning district ballot bags were open prior to the official start of the audit, to sort into groups of 50. Even though they were under the custody of both registrars and resealed, this seems irregular.

²³ We did not observe every characteristic of every audit counting session that we attended. Some questions did not apply; in some audits observers could not fully observe audits that continued beyond one day, etc.

²⁴ Numbered tamper-evident seals are a useful protection, but without extensive procedures for their verification and other strong ballot protections, at best they provide a few seconds of protection from possible compromise. For examples, see: <http://www.cs.princeton.edu/~appel/voting/SealsOnVotingMachines.pdf> and <http://www.cs.princeton.edu/~appel/voting/Johnston-AnalysisOfNJSeals.pdf>

C. Training and Attention to Counting Procedures Are Inadequate and Inconsistently Followed

C.1 Audit Organization and Counting Procedures:

Observers expressed concerns that many of the audits were not well organized. Observers noted the following concerns, which frequently occurred within the same municipalities:

Question	%Yes:	2017	2015	2013	2011
MA ²⁵ : Do you have any concerns that the auditing was not well-organized?		29%	36%	13%	18%
Other than electronic auditing, do you have any concerns with the integrity of the process?		25%	21%	0%	6%
MA: Do you have any concerns that the manual count was inaccurate?		33%	21%	0%	6%
Do you have any concerns that the officially reported information is inaccurate?		5%	16%	0%	6%
Do you have any concerns with the transparency/observability of the process?		6%	3%	3%	6%

Municipalities Where Observers Noted Procedural Concerns - Table 4

The levels of concerns in these areas are generally comparable the level of concerns in election audits in recent years.

From observers:

They did not do the required manual count. They used the AccuVoteOS tabulator to count for the audit.

The system depended on the one registrar keeping track of many stacks of ballots. That was rather chaotic. They were transparent, and the one registrar often asked for help and verification from whoever was available. But they didn't care at all that the counts were all wrong. No attempt was made to reconcile.

[One] Registrar told me she was not informed of the audit date/time; she was included in today's process simply by coming into the room and helping to move the ballots around. This is not the first time I have witnessed a partisan division of responsibility for an audit.

State Audit Procedures Manual was given to all participants prior to today. Instructions were not detailed, and how they counted was left up to the teams, i.e. batch size and whether they counted all races on each ballot or one race at a time.

²⁵ "MA" indicates observations applicable only to *manual audits*.

C.2 Need for Dual Verification

Observers noted that audit counting procedures requiring “two eyes,” i.e., dual verification of the count of individual ballot, were frequently ignored. When a large number of ballots are counted by a single individual, miscounts can require tiring recounts and unnecessary investigation. When single individuals count hundreds of ballots or votes, errors are almost inevitable.

Question	% Yes:	2017	2015	2013	2011
MA: Were the ballots counted by each team such that a second election official verified each count?		62%	66%	61%	72%
MA: IF HASH MARKING USED: Did a second official observe that each vote was read accurately?		50%	36%	53%	36%
MA: IF HASH MARKING USED: Did a second official make duplicate hash marks observe that each hash mark was recorded accurately?		62%	28%	56%	36%
MA: IF STACKING/PILES USED: Was the vote counting process such that two election officials verified that each vote was stacked as marked?		67%	82%	57%	62%
MA: IF STACKING/PILES USED: Were the stacks of ballots counted such that two election officials verified that each stack was counted accurately?		67%	62%	86%	54%

Municipalities Audited Manually Where Observers Noted Dual Verification Concerns - Table 5

Comparing only the manual count statistics, over time, the use of double checking continues to vary.

From observers:

The smaller inconsistencies are definitely due to human error as there was not much that was rechecked.

For 6 of the 11 counting teams, both individuals read the ballots and agreed upon the reading before one member of the team recorded the vote on a special form. The other member observed the hash marks. For the other 5 teams one member announced the vote and the other member recorded the hashmark.

No one was ever told to check each other.

Electronic Audit: In the Electronic Audits, the system prevented the observation of actual ballots being counted. Observers judged that most ballot images displayed were observed by two officials, yet in most cases where two individuals observed ballot images, they could not actually have been verified in the one to three seconds the ballot images were displayed - especially since all count results were not displayed on the screen for districts with a large number of candidates and races.

For complete details on the shortcomings of Connecticut's electronic audits and the alternative of Electronically-Assisted Post-Election Audits, see Appendix B.

Question	% Yes:	2017
EA ²⁶ : While you were observing, in your judgment, did two local election officials look at each ballot?		88%
EA: While you were observing did one of the individuals ask to slow down or go back and review ballots?		75%
EA: If you concentrated, did you have time to validate that the Audit Center correctly adjudicated each bubble on a ballot?		25%
EA: If you concentrated, did you have time to check that each vote on the ballot was correctly counted on the right for each ballot?		0%
EA: In your judgment, could each official have checked the accuracy of bubble adjudication and the counts for 90% of the ballots?		13%

Electronic Audit Concerns - Table 6

From observers:

It appeared to me that the registrars for the two electronic audits I observed were less engaged in the overall process as my experiences with manual audits.

The tallying of the ballot on the screen was shown in Alpha [candidate name] order not Ballot [layout] order making it impossible to verify that the count was accurate in the time that the registrars were given to view each ballot image. In addition, the side bar with tallies showed only partial tallies. You would have to scan down to see the rest of the tallies. That was never done.

1. Need to confirm that counters have adequate vision to perform this task; 2. Too fast going from one ballot to the next such that no comparing of ballot marks on the left portion of the screen with vote count on the right column on the screen is possible; 3. No way to check that the spots on the ballot on the screen are actually those on the paper ballot, 4. no way to check that the final audit summary tally matches the sum of all the columns on the right for each ballot; 5. Weakest part of this electronic system is not the electronic parts but the movable parts - ballot feeder, optical scanner, printer - what will be the back-up and support of these [once they are deployed as planned, with one Audit Station per region]?

²⁶ "EA" indicates observations applicable only to *electronic audits*.

C.3 The Importance of Blind Counting

Blind counting is a method of counting without pre-conceived knowledge of the expected outcome. When counting teams know the machine totals or know the differences between their counts and the machine totals, there is a natural human tendency to make the hand count match the machine count. This risks taking shortcuts and seeking unjustified explanations for discrepancies which, in turn, lower the credibility of the process and undermines confidence in the audit results.

Question	% Yes:	2017	2015	2013	2011
MA: Were counters kept unaware of the election totals for the ballots or races they were counting until counting and recounting each race was finally complete?		87%	75%	67%	48%
MA: If initial counts were off, were counters kept unaware of the exact and approximate level of difference?		62%	50%	40%	38%

Municipalities Where Observers Noted Blind Counting Concerns - Table 7

In November 2017 when 38% of manual counts were off, counters were informed of the exact or approximate number of discrepancies. 13% percent had the counts available This continues an improving trend. Yet the wide-spread lack of blind counting greatly reduces the credibility of the audit.

From observers:

For one candidate, a Registrar announced that the count was off by 10 and that the ballots would need to be recounted.

Counters were told they were off by a certain number, but it was not emphasized whether their initial count was high or low by that number.

Total number of ballots that they "should" find was announced.

Electronic Audit: One advantage of the Electronic Audit is that knowledge of results by local election officials cannot change the machine results. Yet we note that without a manual audit of actual ballots against the Audit Station results, there is no way to confirm that the reported electronic audit results accurately reflect the cast ballot and vote totals.

C.4 Lack of Written Electronic Auditing Procedures

Electronic Audit: There were no written procedures for the Electronic Audit. There was some training by University of Connecticut staff, who also assisted the election officials and answered their questions.

The law passed in 2015 authorized Electronic Audits:

...provided (1) the Secretary of the State prescribes specifications for (A) the testing, set-up and operation of such equipment, and (B) the training of election officials in the use of such equipment...

Without written procedures, it is difficult to determine if the Secretary of the State in fact authorized the procedures employed and impossible to assess if authorized procedures, if any, were uniformly followed.

Official Audit Report Data Analysis

After the local counting sessions, officials complete and submit the Official Audit Report Forms to the SOTS. Where possible, observers collect copies of the forms at the counting session. The Citizen Audit also receives official copies of the forms from the SOTS Office.

The statistics in this section were produced from the official forms. The images of those forms and our detailed data compiled from those forms are available at <http://CTElectionAudit.org>.

As stated earlier: Without complete reports we cannot analyze and verify the results of the audit, or provide any level of confidence in the optical scanners in those districts, nor in the officials charged with supervising and performing the audits.

Ballot Count Accuracy

Any unexplained difference greater than or approaching the automatic recanvass trigger of 0.5% should be a concern.²⁷

Unlike vote counts (discussed later) there can be no “questionable” ballot counts. Any difference in ballot counts must be due to optical scanner or human error, or both. Human errors²⁸ are not limited to audit hand counts. Scanners or ballots could have been mishandled and incorrectly counted on Election Day, read through the scanner twice, misplaced on Election Day, or subsequently misplaced.

²⁷ In state-wide contests the margin is much less. The recanvass trigger is 2000 votes, which in a presidential election is approximately 0.12%.

²⁸ Ultimately, almost all errors are human errors in counting, software programming, election setup, or failing to follow procedures. Exceptions would include hardware errors or fraud.

Machine Totals (Tape)	Audit Count	Difference	Percent Difference
1504	1491	13	0.9%
449	438	11	2.4%
2179	2177	2	0.1%
995	994	1	0.1%
1122	1121	1	0.1%
588	587	1	0.2%
804	805	-1	-0.1%

All Ballot Count Differences in the Audit - Table 8

Based on observer reports, we do not believe that all of the hand counts are accurate because of the questionable counting methods observed. Because of these differences and incorrectly completed reports, we also have no basis to conclude that the scanners counted all ballots accurately, which is the purpose of the audit.

Based on our observations and analysis for this audit, we conclude that the scanners in the election and manual counters in the audit were both at least generally accurate in counting ballots in those municipalities which provided complete reports.

Most likely some of those incomplete reports are due to lack of attention to detail and a lack of motivation by officials, yet we have no basis to conclude that some of them do not hide errors or intentional fraud. The integrity of the audit depends on complete, accurate work and oversight.

Vote Count Accuracy

Col C Machine Totals (Tape)	Col D Undisputed Vote Totals	Col E Questionable	Col F Total Hand Count (D + E)	Difference (F - D or E - D)	Percent Difference
588	617	0	617	-29	-4.9%
337	318	0	318	19	5.6%
602	616	0	616	-14	-2.3%
470	456	1	457	13	2.8%
643	656	0	656	-13	-2.0%
594	607	0	607	-13	-2.2%
578	591	0	591	-13	-2.2%
657	669	0	669	-12	-1.8%
418	407	0	407	11	2.6%
574	564	0	564	10	1.7%
448	439	0	439	9	2.0%
1504	1474	21	1495	9	0.6%
192	184	0	184	8	4.2%
769	777	0	777	-8	-1.0%
334	326	0	326	8	2.4%
1550	1542	0	1542	8	0.5%
461	453	0	453	8	1.7%
297	289	0	289	8	2.7%
523	530	2	532	-7	-1.3%
156	149	0	149	7	4.5%
363	357	0	357	6	1.7%
308	302	0	302	6	1.9%
640	633	1	634	6	0.9%
145	139	0	139	6	4.1%
507	500	1	501	6	1.2%
142	148	0	148	-6	-4.2%
276	270	0	270	6	2.2%
1650	1656	0	1656	-6	-0.4%

766	772	0	772	-6	-0.8%
151	146	0	146	5	3.3%
148	143	0	143	5	3.4%
421	426	2	428	-5	-1.2%
154	149	0	149	5	3.2%
664	659	0	659	5	0.8%
158	153	0	153	5	3.2%
741	736	0	736	5	0.7%
693	689	0	689	4	0.6%
336	332	0	332	4	1.2%
251	246	1	247	4	1.6%
505	501	0	501	4	0.8%
515	511	0	511	4	0.8%
568	564	0	564	4	0.7%
284	280	0	280	4	1.4%
1707	1703	0	1703	4	0.2%
609	605	0	605	4	0.7%
259	255	0	255	4	1.5%
302	298	0	298	4	1.3%
356	352	0	352	4	1.1%

Candidate Count Differences Greater than 3 in the Audit- Table 9

The table above presents, by number and percentage, vote differences greater than three between hand-counted votes and machine-counted votes, after all ballots with questionable votes are considered and all votes for cross-endorsed candidates are totaled.

Based on observer reports, **we do not believe that all of the hand counts of votes are accurate. Yet there is no way to judge the accuracy of the optical scanners in these districts, leaving little to provide trust in the election results and confidence in officials' abilities to perform their duties.**

The following tables show the number of candidate counts with varying count differences between the optical scanners and the hand counts, after considering that so called questionable votes may or may not have been counted by the scanners:²⁹

²⁹ The maximum benefit of any doubt is given to the scanners, counting a difference only when a scanner counted more votes than the sum of questionable votes and undisputed votes, or when a scanner counted less than the number of undisputed votes.

Candidate Vote Count Difference Range	Number of Differences in Range	% of All Candidate Counts 2017	2015	2013	2011
0	509	62.5%	67.6%	60.1%	56.1%
1-3	88	22.5%	26.4%	35.5%	34.5%
4-6	28	7.2%	4.2%	4.0%	7.0%
7-9	10	2.6%	0.9%	1.1%	1.6%
>9	10	2.6%	0.9%	1.3%	0.8%
Average Difference in Votes:		1.3	0.80	0.96	1.12

Summary of Vote Count Differences-Table 10

Once again, without credible audit reports, the data in this table are of little use in evaluating accuracy or comparing results to earlier elections and primaries.

Range of % of Count Difference	Number of Candidate Counts	2017 % Of All Counts In Range	2015	2013	2011
0	255	62.5%	67.6%	60.1%	56.1%
> 0 and < 0.5 %	73	28.7%	13.7	17.6%	18.8%
0.5 % and < 1.0 %	25	6.4%	6.1%	12.1%	14.4%
1.0 % and < 2.0 %	16	4.1%	5.6%	7.0%	6.4%
2.0 % and < 5.0 %	20	5.1%	3.7%	2.8%	2.5%
5.0 % and < 10.0 %	2	0.5%	0.4%	0.4%	.5%
10.0 % and greater	0	0	0.9%	0.3%	1.3%
Average Difference %		0.24%	0.22%	0.14%	0.28%

Trend of Vote Count Differences by Percent -Table 11

“Questionable” Votes

Observations and comments from election officials indicate confusion about classifying “undisputed ballots” and about counting “questionable votes.” An undisputed ballot is a ballot with no apparent problem or questionable votes on it. A questionable vote is a mark on a ballot that may not have been read properly by the optical scanner. Based on observations, counting teams and registrars demonstrated a variety of interpretations of what constitutes “undisputed” and “ballots with questionable votes.” Audit statistics confirm these observations.

Col C Machine Totals (Tape)	Col D Undisputed Vote Totals	Col E Questionable	Col F Total Hand Count (D + E)	Difference (F-D or E-D)	Percent Questionable
1475	1450	24	1474	1	1.6%
1385	1362	23	1385	0	1.7%
1504	1474	21	1495	9	1.4%
1419	1397	21	1418	1	1.5%
1003	983	20	1003	0	2.0%
1144	1124	18	1142	2	1.6%
1068	1051	17	1068	0	1.6%
2615	2600	15	2615	0	0.6%
1015	1006	10	1016	0	1.0%
2488	2478	10	2488	0	0.4%
106	96	10	106	0	9.4%
199	190	9	199	0	4.5%
696	688	9	697	0	1.3%
824	816	8	824	0	1.0%
227	219	8	227	0	3.5%
162	155	7	162	0	4.3%
519	513	7	520	0	1.3%
532	525	6	531	1	1.1%
702	697	6	703	0	0.9%
166	160	6	166	0	3.6%
804	799	6	805	0	0.7%
234	230	6	236	0	2.6%
761	757	5	762	0	0.7%
555	550	5	555	0	0.9%

Col C Machine Totals (Tape)	Col D Undisputed Vote Totals	Col E Questionable	Col F Total Hand Count (D + E)	Difference (F-D or E-D)	Percent Questionable
535	530	5	535	0	0.9%
1159	1155	4	1159	0	0.3%
1043	1039	4	1043	0	0.4%
576	574	4	578	0	0.7%
567	563	4	567	0	0.7%
544	541	4	545	0	0.7%
900	896	4	900	0	0.4%
1107	1103	4	1107	0	0.4%
92	88	4	92	0	4.3%
663	660	4	664	0	0.6%
717	712	4	716	1	0.6%
738	735	4	739	0	0.5%
1038	1035	4	1039	0	0.4%
557	553	4	557	0	0.7%

Questionable Votes Over 3 - Table 12

	2017	2015	2013	2011
Overall % Questionables	0.26%	0.73%	0.63%	0.77%
Counts over 12 Questionables	8 ³⁰	23	19	52

Trend in Questionable Votes -Table 13

³⁰ 2017 was a 5% audit, so compared to 10% audits in previous years, the count would likely have been about 16.

About the Citizen Audit

The Connecticut Citizen Election Audit ("Citizen Audit")

Our purpose is to increase integrity and confidence in elections, for the benefit of the voters of Connecticut. We provide independent audit observations, independent audits, and independent reports focusing on the integrity of elections and election administration. We are non-partisan and strive for objectivity and integrity in our work. The Citizen Audit has observed and reported on every general primary and election since the statewide implementation of optical scan voting in Connecticut in 2007.

EXECUTIVE DIRECTOR/BOARD

Significant decisions and reports are approved by majority vote of the Board. Members of the Board are experienced volunteer observers, with diverse skills, political affiliation, and geographic representation. Current members of the Board are:

- Luther Weeks, Executive Director
- Kathleen Burgweger, Jean de Smet, Aaron Goode, Julie Lewin, Tessa Marquis, Jan-Maya Schold, Douglas Sutherland, and Victoria Usher

CITIZEN-POWERED

The Citizen Audit is an entirely volunteer, citizen-powered organization. We appreciate every Citizen Audit volunteer. Without dozens of volunteers spending days and hours on each election objectively observing, auditing, and reporting, the promise of publicly verifiable elections could not be pursued and will never be attained.

Acknowledgments

Coordination and editing for this project by Luther Weeks with editing by Julie Lewin.

We appreciate the responsive and cordial replies to our requests for information from the SOTS Office and from registrars of voters across Connecticut.

Contact/Additional Information

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Appendix A. Observation Report Statistics

Question % Yes:	Yes Nov 2017	Yes Nov 2015	Yes Nov 2013	Yes Nov 2011
Were the ballots delivered to the site by at least two individuals?	83%	88%	96%	94%
Were you permitted to observe that ballot container seals were not tampered with?	100%	94%	97%	96%
Were the ballot container seals intact?	95%	91%	94%	96%
Were you able to see the seals and the seal numbers on the Moderator's Return?	96%	87%	90%	100%
Did the supervisor review the state audit procedures with the counting team?	64%	70%	83%	70%
Did the supervisor clarify procedures for everyone before beginning to count ballots?	64%	68%	84%	70%
Did the supervisor review the ballot and vote counting procedures in detail with the counting teams?	50%	66%	78%	65%
MA ³¹ : Did the supervisor review that two people should observe each ballot on the screen and that the counts on the right match the ballot bubbles?	25%			
MA: Was the total number of BALLOTS counted before the VOTES were counted for races?	80%	82%	91%	97%
MA: Were the BALLOTS counted by each team such that a 2nd election official verified each count?	62%	66%	61%	72%
MA: If multiple teams counted BALLOTS, was the totaling independently verified by a second election official?	63%	77%	77%	86%
MA: IF HASHMARKING USED: Did a second official observe that each vote was read accurately?	50%	36%	53%	36%

³¹ "MA" indicates observations applicable only to *manual audits*.

MA: IF HASHMARKING USED: Did a second official make duplicate hashmarks OR observe that each hashmark was recorded accurately?	62%	28%	56%	36%
MA: IF STACKING/PILES USED: Was the vote counting process such that two election officials verified each vote was stacked as marked?	67%	45%	57%	62%
MA: IF STACKING/PILES USED: Were the stacks of ballots counted such that two election officials verified that each stack was counted accurately?	67%	62%	86%	54%
MA: IF HASHMARKING USED: Were you permitted to see that each vote was read accurately?	100%	100%	100%	100%
MA: IF HASHMARKING USED: Were you permitted to see that each hashmark was recorded accurately?	100%	100%	100%	100%
IF STACKING/PILES USED: Were you permitted to see that each vote was placed in a correct stack?	100%	82%	78%	100%
MA: IF STACKING/PILES USED: Were you permitted to see that the count of ballots in piles was accurate?	67%	86%	82%	100%
MA: Were counters kept unaware of the election totals for the ballots or races they were counting until counting and recounting each race was finally complete?	87%	75%	67%	48%
MA: If initial counts were off, were counters kept unaware of the exact and approximate level of difference?	62%	50%	40%	38%
MA: Were votes on questionable ballots ruled upon separately race by race for reporting as questionable votes in the Audit Report?	77%	80%	77%	89%
MA: Were votes on such ballots ruled upon prior to the tallying of votes for each race AND counts not adjusted based on knowledge of the results of the total count for each race?	83%	80%	71%	70%
MA: Did elections officials find a match between machine counts and manual counts at the end of the initial count of each races?	23%	23%	33%	17%
MA: Did elections officials try to resolve mismatched counts by counting again?	54%	65%	63%	81%
MA: Did elections officials try to resolve mismatched counts by changing counting teams?	20%	37%	54%	28%

Did elections officials resolve mismatched counts by the end of the audit?	42%	55%	64%	41%
MA: Were you able to confirm that hashmarks for each team and batch were tallied accurately? (i.e You could confirm that the number of hashmarks matched the total for each group of hashmarks.)	100%	90%	90%	96%
Were you able to confirm that the number of ballots from multiple teams/batches was tallied accurately?	93%	90%	94%	96%
MA: Were you able to confirm that the number of votes from multiple teams/batches was tallied accurately?	85%	90%	91%	93%
Did elections officials record counts, including unresolved discrepancies if any, on official forms by the end of the audit?	93%	90%	92%	96%
Were you given an opportunity to have a copy or make a copy of the official forms?	100%	90%	88%	96%
Did the BALLOT counts on the optical scanner tape(s) printed on election-night match the tabulator tape ballot count transcribed on the audit report form(s)?	100%	89%	95%	96%
Did the RACE counts on the optical scanner tape(s) printed on election-day match the machine tape race counts transcribed IN COLUMN 'C' on the audit report form(s)	92%	84%	95%	92%
Were the ballots under the observation of at least two individuals at all times during the observation?	87%	81%	94%	96%
Could you confirm that ballots were returned to their proper containers?	95%	100%	93%	97%
Were the ballot containers resealed?	100%	97%	96%	100%
Were seal numbers recorded correctly on forms?	95%	100%	100%	96%
Do you have any concerns over the way the room was laid out?	0%	6%	9%	14%

Do you have any concerns that the auditing was not well-organized?	29%	36%	38%	28%
Do you have any concerns with the integrity of the counting and totaling process?	25%	21%	18%	21%
EA ³² : Other than electronic auditing, do you have any concerns with the integrity of the process?	0%			
MA: Do you have any concerns that the manual count was inaccurate?	33%	21%	32%	31%
Do you have any concerns that the officially reported information is inaccurate?	5%	16%	6%	7%
Do you have any concerns with the transparency/observability of the process?	6%	3%	6%	7%
Do you have any concerns with the chain-of-custody?	29%	32%	23%	17%
How many people are required to access ballots? One	48%	42%	52%	41%
Were there any memory card problems in pre-election testing or on election day?	5%	28%	47%	90%
Were there any problems with the IVS voting system for persons with disabilities? (Or were some not setup?)	5%	3%	19%	37%
Were there any other significant events, ballot problems, scanner problems or occurrences before during or after the election of note?	15%	22%	33%	18%
EA: While you were observing, in your judgment, did two local election officials look at each ballot?	88%			
EA: While you were observing did one of the individuals ask to slow down or go back and review ballots?	75%			
EA: If you concentrated, did you have time to validate the Audit Center correctly adjudicated each bubble on a ballot?	25%			

³² “EA” indicates results applicable only to electronic audits.

EA: If you concentrated, did you have time to check that each vote on the ballot was correctly counted on the right for each ballot?	0%			
EA: In your judgement, could each official have checked the accuracy of bubble adjudication and the counts for 90% of the ballots?	13%			

Observation Report Statistics -Table 14

Appendix B. Electronic Audit Details

This appendix is presents in detail the electronic audit methods employed by election officials and a better alternative. It is adapted from the November 2016 Post-Election Audit Report.

The Unverifiable Methods Used for the Electronic Audits

The electronic audits were conducted with the UConn Audit Station, developed over that last few years by the UConn Voter Center.³³ The audits generally followed the methods and claims made in a 2013 paper authored by UConn and the SOTS Office:³⁴

- Ballots are rescanned, analyzed, and recounted by the Audit Station in batches.
- The scanner ballot images, the system's interpretation of marks on the image, and how the votes were counted for each image are simultaneously projected on a screen.
- Two local election officials are to view each image, check the interpretation, and check the votes counted. They may override the system's interpretation of each image. On the projected ballot images, bubbles interpreted and counted by the system as votes or as possible (questionable) votes are over-marked by shades of light green and light red.
- At the end of counting a voting district, a summary report of the totals of the counts for the district for each contest is printed.

The Audit Station is creative in its method of displaying images for verification and adjudication by officials. Unfortunately, that creativity adds nothing to the public verifiability of the audit, while requiring unnecessary, tedious, and challenging work for local officials. Leading scientists in the field of post-election auditing have explained why such audits fall short:³⁵

- **Like all electronic and computer equipment, the scanner is subject to error and fraud via hacking:**
 - **There is no guarantee that the images displayed represent an accurate rendition of the actual ballots.**
 - **There is no guarantee that counts displayed for each image are faithfully added to the totals printed at the end of the district audit.**

³³ University of Connecticut, School of Engineering, Center for Voting Technology Research: <https://voter.engr.uconn.edu/voter/>

³⁴ <https://voter.engr.uconn.edu/voter/2013/06/computer-assisted-post-election-audits/>

³⁵ statistics.berkeley.edu/~stark/Preprints/retabNotAudit13.pdf

- It has not been established that individual officials can and will actually and faithfully review hundreds or thousands of individual images, the system's interpretation, and the system's associated race counts.

Note: Such claims would need to be verified in theory and in practice. The officials reviewing images and counts for hours are likely to believe in the accuracy of the AccuVoteOS and the Audit Station. At minimum, it should be proven that individuals with such beliefs, could and would reliably detect differences less than 0.5% affecting a single candidate in an election with many races, while reviewing thousands of ballots for a voting district.

- Our observation indicated that faithful evaluation of images was not possible in the November audit. Under the control of officials, images and counts were displayed for from one to three seconds.
 - In six of seven teams of officials, two officials did not faithfully watch the projected display of all ballots. As ballots were displayed under the control of one official, the other official at times looked away, stood and turned away to prepare the next batch of ballots for scanning, or were reading and typing on their cell phones.
 - At the rate of one to three seconds, we believe it would be difficult for officials to determine if the Audit Station had marked a bubble that was not filled in.
 - At the rate of one to three seconds, we believe it would be difficult for officials to notice if the Audit Station missed a mark that was filled-in elsewhere on the ballot.
 - At the rate of one to three seconds, we believe it was not possible to verify that all bubbles highlighted were correctly counted and that those not highlighted were not counted.

At about three seconds, observers found it barely possible to verify only that the race for President was accurately marked and counted. Doing that for even a handful of votes in succession took extreme concentration – it is not reasonable to think that officials could maintain the necessary concentration for dozens of ballots, let alone thousands.

- The November Election ballot, like every even year election, was a relatively simple 8.5" x 11" single-sided ballot, with five vote-for-one races. November Municipal election ballots range from 11 columns with a couple of vote-for-multiple races, to back-to-back 8.5" x 17" pages with many large vote-for-multiple races. The UConn researchers explained that in those cases both sides of the ballots and all the candidate counts would appear on a single projected screen.
- In November 2017 there were larger, multi-page ballots. The results on the right hand of the display did not show results of all the races and candidates being audited. Thus those counts could not have been verified by the officials, even if the ballot were displayed for an extended period.

A Simpler Way, A Better Way, A Publicly Verifiable Way

Electronically-Assisted Manual Post-Election Audits

There is a way to get the efficiency and accuracy benefits of electronic auditing with the confidence of public verifiability. It is to manually audit the electronic counting and to verify both the interpretations of ballots and the totaling of results. The sound science of Evidence Based Elections³⁶ points the way to performing such a manual audit of an electronic audit:

- As each ballot is interpreted by the system, a so-called Cast Vote Record (CVR) is created that is associated with the ballot. The Cast Vote Record is a database record that lists the interpretation of each bubble as voted, possibly voted, or not voted.
- At the completion of the scanning and interpretation of a district, all the CVRs are exported in a standard computer readable format (such as .csv) and made available to a reasonable number of observers on a standard media (such as CDs or thumb drives). The file of CVRs can then be independently counted by observers to assure that the sum of the CVRs equals the totals printed by the Audit Station³⁷. Such counting could use software trusted by observers and, if necessary, verified by a hand count of each CVR.
- A relatively small number CVRs are randomly selected and compared to the associated ballots. Any differences between the CVRs and the actual ballots as interpreted by officials must be recorded .

Since ballots are in order and in batches, it is relatively easy to locate each randomly selected ballot. If the system printed out an easily read page for each randomly selected ballot with the batch number, ballot number in the batch, and the bubble interpretations for the CVRs, it would be relatively easy for officials to locate ballots and compare them to the printed CVRs. It could be done openly such that observers could verify that the printed CVRs matched the exported CVRs, and that the officials correctly compared the CVRs to the ballots and correctly recorded any differences.

- Any differences between the CVRs and the selected ballots are a cause for concern with the accuracy of the Audit Station and may be cause to question the accuracy of the audit. With a well-designed and functioning system differences, if any, should be rare.

³⁶ <http://www.stat.berkeley.edu/~stark/Preprints/evidenceVote12.pdf>

³⁷ A quick survey of election officials and advocates indicates that CVRs for entire elections or audits are regularly provided to requesters in the states of AZ, NY, CO and SC. In SC, they are published online.

Appendix C. Methodology

The following activities were performed in the course of the project to organize observers and collect and analyze data for the report. They are in approximate time sequence:

- Just prior to the election, we emailed past observers an invitation to sign up on the web to observe local counting sessions specifying the dates they were available to observe and the distance they were willing to travel to an observation. Observers were encouraged to provide at least three availability dates and volunteer to travel at least 35 miles. Observers were also instructed to sign up for a conference call training session and were emailed training materials, including access to video training.
- Our observers attended and participated in the random drawing of districts to be audited. After the drawing, the SOTS Office issued a press release with the list of selected districts and selected alternate districts.
- Municipalities and districts in the drawing were recorded in our Audit Database. We sent emails, made calls, and left voice mails with registrars of voters of the selected municipalities, to learn the dates and times of their local audit counting sessions.
- Observers participated in conference call and web video trainings in the days prior to the start date of the local audit counting sessions, which began 15 days after the election.
- Starting shortly after the drawing and extending through the audit period, as the audit dates were obtained from local officials, observers were matched and tentatively scheduled for upcoming local audit counting sessions. Some audit dates were forwarded to us from the SOTS Office as that office was informed of dates by local officials. Often schedule changes were made when observers were unable to observe a tentatively scheduled audit. Some observers signed up for additional dates. Others volunteered to observe additional audits.
- **Electronic Audit:** Prior to the electronic audits, the Secretary of the State's Office provided us with the tentative schedule of the electronic audits, and at the drawing they informed us of the tentative period for the electronic audits.
- Observers attended audits, completed paper Observation Report Forms,³⁸ and, where possible, collected draft or final copies of the official SOTS Audit Report Forms found on the last page of the Official Audit Procedures. Copies of Audit Report Forms were mailed or scanned by observers to us for early data entry. Observers submitted most Observation Report Forms, using the SurveyMonkey tool, while some mailed or emailed paper forms for data entry by the Citizen Audit.
- **Electronic Audit:** Four Citizen Audit volunteers observed, videotaped, and reported on the electronic audits which were held in the at the Secretary's offices at 30 Trinity Street, Harford. A prototype Electronic Observation Report Form was used.
- We reviewed Observation Reports and consolidated multiple reports from the same municipality.
- The SOTS Office provided copies of received Official Audit Report Forms to us on January 3, 2018.

³⁸ <http://ctelectionaudit.org/ObservationReportForm.pdf>

- We completed data entry of all Official Audit Report Forms based on the official data.
- Data and Observation Reports were analyzed and compared with past results, and this report was created.