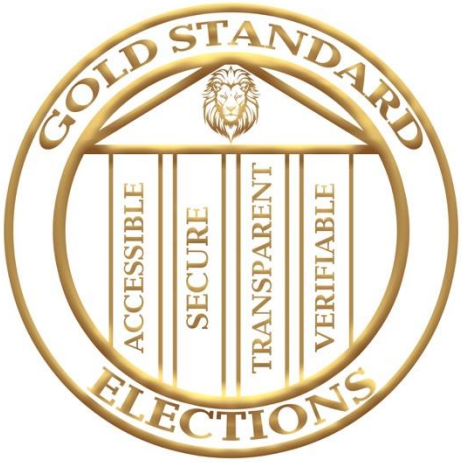

Gold Standard Elections

An in-depth look at how our election system can be re-engineered to ensure accessible, secure, transparent, and verifiable elections voters can trust

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Gold Standard Elections
are Secure, Transparent, Verifiable and Accessible

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I. Summary

Voter confidence in our elections has reached an all-time low. Politicians, election officials, journalists, and cybersecurity experts alike have raised serious concerns about the integrity of our voting systems. More importantly, voters ask critical questions often dismissed or met with hostility and, in some cases, legal action. Widespread irregularities and inconsistent election results only heighten this mistrust. The current systems fail to meet essential standards of accessibility, security, transparency, and verifiability, leaving no way to prove that a breach has not occurred. As a result, voters are denied the assurance that their vote was counted accurately, free from manipulation, and untainted by fraudulent ballots.

This constitutional republic cannot endure if the foundational mechanism for selecting representatives has lost the trust of its citizens. Since voters are entitled to a reliable and credible election system, it is our collective responsibility to restore that trust and safeguard the integrity of our republic.

Addressing the flaws in our election system requires a unified, nationwide effort. The authors aim to equip citizens with the knowledge and tools to implement election systems that restore public trust. Our team comprises individuals from diverse regions across the United States, reflecting the wide disparities in processes and capabilities at the local level. This regional diversity is crucial, as election laws and administrative rules vary between states and counties. Hundreds of dedicated individuals and countless hours of effort have given the authors the insights and clarity needed to create this document.

This paper presents solutions beyond experience, politics, parties, and personal positions. It begins by proposing a framework for establishing robust metrics and then outlines the key phases of the election process, each of which must meet rigorous standards. Finally, it provides a roadmap to guide readers through the essential components of a sound election system. In addition, it offers practical methods for the public, legislators, and election officials to verify that these objectives have been successfully met.

The authors have analyzed each phase of the election process, from voter registration to tabulation and reporting, identifying four cornerstones of election integrity: security, transparency, verifiability, and accessibility. They propose strategies to re-engineer each phase, enhancing process integrity and public trust. While the authors present comprehensive solutions, each state will implement necessary changes based on specific laws and circumstances.

The recommendations provided here are not intended as legal advice. Each stakeholder or representative should understand the relevant legislative and operational frameworks to ensure the successful implementation of changes that meet the gold standard.

This paper evaluates proposals to improve election infrastructure and closely examines the viability of hand-counting ballots. While the call for hand-counting paper ballots has grown, what does it mean, and is it feasible? The authors provide a thorough analysis. Having relied on hand-counting for over 150 years, the paper concludes that hand-counting hand-marked paper ballots remains a viable, fully accessible, secure, transparent, and verifiable solution today.

Election integrity advocates have shown that hand-counting is not only possible but also cost-effective, secure, and transparent. Though it was common in the past, it remains relevant today. The authors propose enhancements to improve its efficiency. Hand-counting hand-marked ballots has long

been the gold standard for transparency and accuracy and is still used to validate machine results. Reviving this practice will restore confidence in elections and save millions for local governments, benefiting citizens, legislators, and decision-makers. (See Appendix Exhibit 1 Cost Savings SD Machine vs Hand Count)

While the authors are confident in their recommendations for a virtuous election system, they recognize that achieving perfection—free of any errors—is unlikely. However, the goal is to implement practical reforms that simplify and clarify the current opaque, complex system, making it more reliable and trustworthy. These reforms will enable election officials to quickly detect and address irregularities or even fraudulent activities as they arise. Currently, when errors occur, the system limits officials' ability to rectify or correct them effectively. The proposed changes will create a more robust election system that is secure, transparent, verifiable, and accessible, ensuring issues can be promptly identified and resolved.

It is important to emphasize that convenience will not be among the top priorities in establishing the Gold Standard for elections. Convenience must never outweigh security or transparency. The slogan 'Easy to vote and hard to cheat' is misleading, prioritizing convenience over integrity. Every eligible voter must have access to cast their ballot. Still, we must ensure that making voting easier does not compromise the integrity of the process or open the door to fraud. Qualified electors deserve the confidence that their votes were counted. Similarly, the phrase 'safe and secure' often hides a troubling reality: it can mean systems are 'safe from scrutiny' and 'secure from critical review,' such as computer code audits or examinations. Transparency and accountability must be the foundation, not afterthoughts.

The authors aim to dispel the myth that it is impossible to conduct elections in which people can genuinely have confidence. Elections must rise above personal biases, politics, corruption, and demographics. They should serve as the ultimate equalizer, where every legal vote holds the same weight and every voice is heard equally.

When election officials, state legislators, county employees, and concerned citizens collaborate to implement solutions across the four phases of the election process, they will restore public trust. The result will uphold the four cornerstones of Gold Standard Elections (accessibility, security, transparency, and verifiability), creating a robust and reliable system.

To fully realize the potential of each of the cornerstones, it is necessary that:

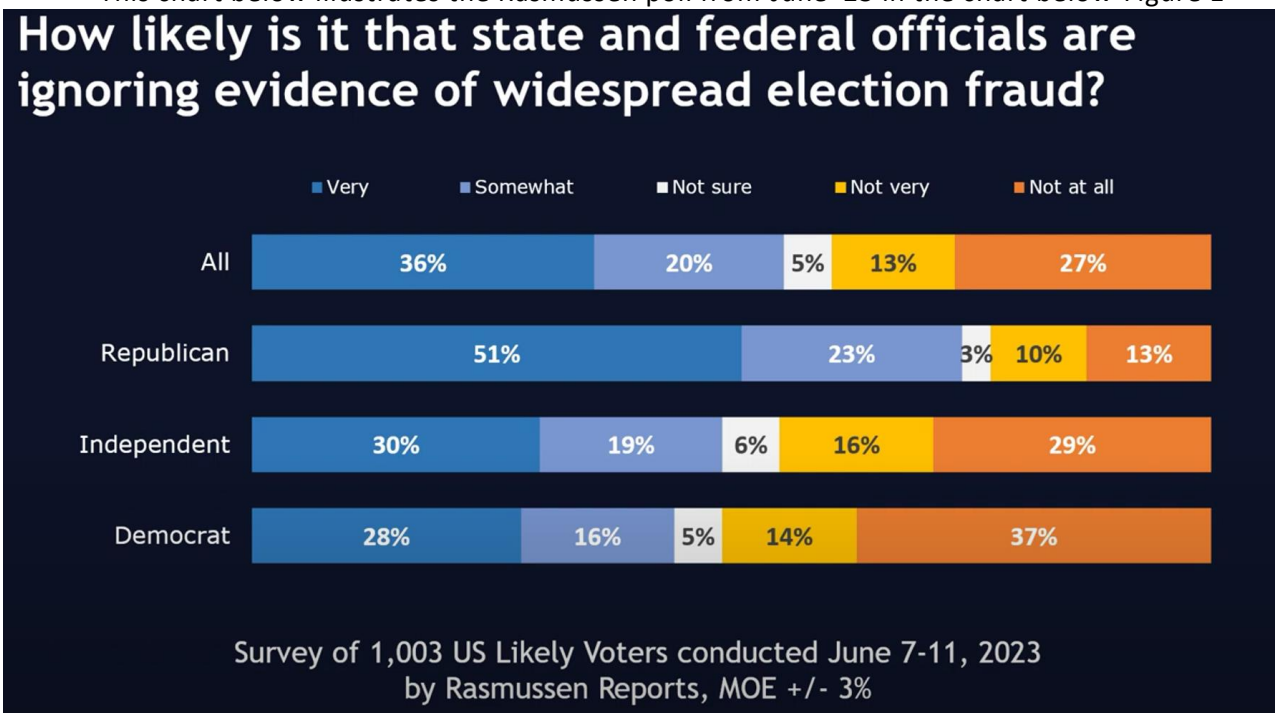
- All phases of the election process are open and transparent to the public, with bipartisan and or impartial participation and oversight
- Poll workers verify voters through proof of citizenship and photo ID
- Local election officials maintain up-to-date voter rolls
- Poll workers log and validate voters via paper poll books
- States return to one day voting in person at their precinct, except for UOCAVA (Uniformed and Overseas Citizens Absentee Voting Act) voters
- Laws minimize absentee and mail-in voting
- Where possible, states institute 100% hand-counting of hand-marked ballots in public with bipartisan representation, with both recorded and live-stream video capabilities
- Election results are publicly reported first to the precinct, then the county, then the state
- The public may gain access to election records 48 hours before canvassing certification occurs

II. Introduction/Background

Voters across America are increasingly losing trust in our electronic voting system. This sentiment isn't limited to the electorate alone—it resonates across the political spectrum. Candidates, lawmakers, and citizens from both major political parties have voiced concerns about irregularities, suspected fraud, and foreign interference, especially when their preferred candidates lose. Many of these concerns have proven to be valid.

Polling data underscores this growing distrust among voters. A Rasmussen poll conducted in April/May 2023[1] found that 62% of likely U.S. voters believe there was cheating in the 2020 and 2022 elections. Further Rasmussen surveys in September and November of 2023[2] revealed that 56% of likely voters fear cheating will influence the outcome of the upcoming presidential election. These figures have steadily risen across party lines since 2020, reflecting a widening sense of insecurity. In a CNN poll conducted by SSRS in 2022[3], Americans said they lacked confidence that U.S. elections reflected the will of the people. Forty-eight percent of Americans said they think it is at least somewhat likely that, in the next few years, some individuals involved in the electoral process and elected officials will successfully overturn the results of a U.S. election since their party did not win. Does such widespread doubt suggest that voters have confidence in the election process? The evidence seems to indicate otherwise.

This chart below illustrates the Rasmussen poll from June '23 in the chart below-Figure 1



https://www.youtube.com/watch?v=OUTGOIUX97A1

The impact of losing confidence in election results cannot be understated. When security, transparency, verifiability, and accessibility ae compromised, it's no surprise that trust in the system has eroded.

Is it time to review the rushed decision post Gore v Bush when the Help America Vote Act (HAVA)[4] was implemented? Looking back, did we, as a nation, make the right choices? Clint Curtis, a former computer programmer who wrote the first computer-based tabulation prototype and vote-flipping algorithm, has doubts.[5]

Before 2004, cyber experts like Clint Curtis, via testimony to Congress[5] and Avi Rubin[6], warned about the vulnerabilities within our voting system and the genuine possibility that parts or the whole could be compromised, with catastrophic consequences. While some lawmakers heeded these warnings and voiced concerns, the government's response was troubling, doing little or nothing to address the risks. As time passed, the infrastructure for electronic voting expanded, but the vulnerabilities remained.

For example, U.S. Senator Amy Klobuchar, D-MN, issued the following statement on reports that Russians hacked election infrastructure in 39 states on June 13, 2017:

> "Free and fair elections are the cornerstone of our democracy. It is clear that a foreign adversary attempted to undermine our election – and now we are learning that as many as 39 states may have been hit by Russian hackers. This is unacceptable. As Ranking Member of the Senate Rules Committee, I am renewing my call for a classified briefing for the Committee on the full extent of Russian interference in U.S. election systems. As much information as possible should also be made publicly available. We need to know exactly what happened to know how to best strengthen our election infrastructure and prevent it from ever happening again." [7]

Although she does not use this terminology, Senator Klobuchar refers to the possibility of election interference, if not stolen elections. Stolen elections come from strong motives.

Cybersecurity experts nationwide who have invested the time to fully understand the election ecosystem agree that electronic voting machines are vulnerable to intrusion and manipulation by domestic and foreign actors with malicious intent. In addition, basic industry standards, such as upgrades to security patches and antivirus software, are often not implemented. Furthermore, computer systems are prone to random reboots, errors, and malfunctions. The primary election equipment vendors, such as Dominion, Election Systems and Software (ES&S), and Hart InterCivic, are owned by private equity firms, often with little transparency about their ownership or operations. These companies, along with their third-party contractors, exercise centralized control over critical aspects of the election process, including data collection, tabulation, and transmission, leaving little room for oversight.

To support this conclusion, Senator Klobuchar stated in an interview with Meet the Press on August 5th, 2018, "I am very concerned that you could have a hack that finally went through. You have 21 states that were hacked into, and they didn't find out about it for a year." [8] Meanwhile, local election officials, who are responsible for operating these voting machines and electronic equipment, have little to no technical experience or expertise to recognize simple mistakes or internal manipulation.

The entire election process is complex, messy, non-transparent, and no longer controlled at the local level. Key administrative responsibilities, once managed by local election officials trusted by voters, have been outsourced to private third-party vendors, who are not subject to Freedom of Information requests. This shift has created a dynamic in which voters and local officials must place their trust in multi-billion-dollar corporations to accurately record, track, count, and protect their votes. Given these

challenges, it's no surprise that confidence in the electronic voting systems is waning, ultimately undermining the faith in the democratic process of our elections in a free Republic.

Can we honestly claim to be free if our votes are not counted accurately and are potentially diluted by fraudulent or illegal votes? As the Federal Prosecution of Election Offenses, *Eighth Edition* states:

> Our constitutional system of representative government only works when the worth of honest ballots is not diluted by invalid ballots procured by corruption. As the Supreme Court stated in a case upholding federal convictions for ballot box stuffing: "Every voter in a federal …election, … whether he votes for a candidate with little chance of winning or for one with little chance of losing, has a right under the Constitution to have his vote fairly counted, without its being distorted by fraudulently cast votes." Anderson v. United States, 417 US 211, 227 (1974). When the election process is corrupted, democracy is jeopardized. Accordingly, the effective prosecution of corruption of the election process is a significant federal law enforcement priority.[9]

The only truly secure and transparent way to achieve election results that everyone can trust may be to remove electronic voting machines, electronic poll books, and the reliance on digital systems altogether. Instead, we should return to hand-counted, hand-marked paper ballots, which are less susceptible to manipulation and have not been compromised by fraudulent or illegal votes, many of which have historically emerged through the absentee voting process, unsecure drop boxes, and unverified signatures.

A modernized version of the hand-counting process would be a necessary part of this solution, ensuring transparency and accountability at every stage of the election. Yet, hand-counting alone is not a panacea; it must be part of a broader, more comprehensive approach to rebuilding trust in our elections. This broader framework, addressing multiple components of the election process, will be explored further in Section IV.

III. Current Situation

We have already demonstrated a lack of security, transparency, verifiability, and accessibility in the current election process, which is a true "BLACK-BOX" operation with multiple physical components, phases, and people involved. There are only four things we know for sure after an election, which in recent years has often been a drawn-out affair:

1. There was a voting period where ballots were cast
2. Some number of people cast votes
3. Winners were declared
4. The public lacks evidence to verify #1-3

In many states, existing laws mandate that the counting of ballots shall be public. This high bar of transparency has been under assault since the introduction of electronic election machines into our election process.

Beth Biesel, Dallas County Election Judge since 2010, recently commented, "Oddly enough, the electronic tabulation machines are not held to the same gold standard as hand counting."

In the current computer-based election systems, transparency requires, at a minimum, public access to:

1. Logic and accuracy tests
2. Cast vote records
3. Ballot images
4. Log files
5. Source code review and validations

Unfortunately, these are not being made available to the public, and even when they are, they often present significant issues, including:

1. **Logic and accuracy tests**: These tests are often insufficient to instill confidence in the accuracy of the machines. They do not prove that the machines will perform accurately under real-world operating conditions beyond the controlled test scenarios.
2. **Cast Vote Records (CVRs)**: These records are vulnerable to manipulation, casting doubt on their integrity.
3. **Ballot images**: These images can also be manipulated, and since the cast vote records are based on the ballot image data, not the actual physical ballots, this introduces further risks to the accuracy of the results.
4. **Log files**: These can be altered, deleted, or set to a limited size before being overwritten and often fail to accurately reflect all activities during the election process.
5. **Source code review**: Transparency is nearly nonexistent here, as primary vendors use proprietary clauses to avoid full disclosure. Additionally, changes to the source code may occur through updates or "patches," which can alter the code without fully revealing what has been modified.

In summary, we cannot prove that our election systems are secure and reliable. There is no independent third-party audit or enforcement to confirm that the equipment is functioning as certified.

As Rick Weible, a Computer Cyber Expert with 28 years of experience, says, "Transparency is the inoculation to all conspiracy theories. When election officials make statements that they do not know what the ballot images or cast vote records are and they fail to release them for public inspection, all trust is immediately lost. An immediate return to hand counting with public bi-partisan oversight is required."

Another primary concern with our current election system is early voting, whether in person or via mail. Early voting poll data can potentially be modeled to predict not only turnout but potential results via sophisticated algorithms. If nefarious actors can access the tabulator data via hacking or other methods (internal hidden modems/flash drives), they can "fine-tune" algorithms to flip or weight votes in favor of a particular candidate. Professor Halderman demonstrates how easy this is in a GA courtroom for the Curling vs. Raffensberger lawsuit.[10]

The cost and issue of recruiting ample and capable poll workers for early voting is also of concern. A cost-benefit analysis of early voting centers should be assessed since total turnout may be lower than one day of voting. A study in 2017 by the Heritage Foundation concluded that the disadvantages of early voting outweighed the advantages.[11] Regarding mail-in and absentee voting, chain of custody issues abound, and voters are reliant on subjective signature verification. An extended voting period gives

potential bad actors more data and time intervals to act. In order to secure our elections, it is recommended to minimize early and absentee voting.

In summary, we have an election system that can be compromised at every stage of the process. Set aside the propagandized debate of the issue and consider the concerns if this was any other sector. Cyber experts across the nation and abroad say that there is no doubt that our electronic election system has been exposed to compromise for years, and no one can prove that it has not been, and there have been no remedies or solutions to these issues. Every electronic system is vulnerable, whether a major industry, large enterprise, banking system, government entity, military operation, or small personal home computer system. How can we delegate our precious, valuable vote, our voice, and the election of our leaders to a process that injects additional avenues for manipulating our elections?

IV. Voter Distrust: Major concerns with the current election system

The following summarizes the critical vulnerabilities and attack surfaces contributing to the growing mistrust of electronic voting systems. While this list is not exhaustive, we will address many of these concerns in our recommendations and solutions section, offering secure, transparent, verifiable, and accessible alternatives to mitigate their impact. Ultimately, the role of election officials should be to serve the citizens by ensuring the integrity and fairness of the election process and giving as much control of the process back to the citizenry.

Overall Vulnerabilities

- **Unapproved Procedural Changes**: Substantial changes to election procedures have occurred without proper legislative oversight. For example, the Delaware Supreme Court ultimately found same-day voter registration unconstitutional[12] and the Wisconsin Supreme Court ruled absentee ballot drop boxes illegal. [13]
- **Compromised Election Integrity**: Modifications to election laws, such as the introduction of early voting, mail-in ballots, Ranked Choice Voting, and drop boxes, have raised concerns over the security of the election process.
- **Lack of Transparency**: The denial of access to crucial election records and reports and failure to fulfill record requests breeds distrust. For instance, citizens in South Carolina and South Dakota were denied access to Cast Vote Records and audit logs, further fueling suspicion.
- **Federal Overreach**: Through Albert Sensors, federal agencies have direct access to county voting equipment and are continuously monitoring activity. While states are constitutionally responsible for managing their elections, the use of these sensors opens a vulnerability door, compromising state control and introducing federal overreach during the voting process. [14]
- **Weak Chain of Custody**: Inadequate or nonexistent chain of custody protocols have led to the disappearance of ballots and election equipment, undermining the integrity of the election process. [15]
- **Poor Voter/Signature Verification**: Inadequate or inconsistent verification of voters and signatures raises questions about the legitimacy of ballots and election outcomes. [16]
- **Inaccurate Voter Rolls**: Voter rolls contain inaccuracies, such as ineligible domiciles or electors. For instance, the Wisconsin voter database contained 7.1 million registrants despite the state only having 4 million adults eligible to vote. [17]
- **Unverifiable Ballots**: Many ballots use barcodes or QR codes for tabulation, preventing voters from independently verifying that their votes are accurately recorded and counted.

- **Vendor Control**: Billion-dollar companies hold near-total control over the election process, providing the following essential systems:
    - Vendor-supplied paper for ballots
    - Vendor-developed software for election day operations
    - Ballot Marking Devices (BMDs) for printing ballot codes that voters cannot verify
    - Scanners for reading ballots
    - Tabulators for counting votes
    - Programmed USB sticks to compile vote totals for counties

The core issue here is that citizens no longer control their election systems. If citizens do not control the process, the system is fundamentally flawed. Election officials should assist citizens in managing and conducting their elections, ensuring transparency, security, and trust at every step.

Voting Machine Vulnerabilities

- **Lack of Access to Source Code:** In most states, IT experts are denied access to the source code of voting machines, preventing independent scrutiny and raising serious concerns about the integrity of the systems. [18]
- **Excessive Code Complexity**: The source code is reported to be 4 million lines long—an alarming figure for a system whose primary function is simply to count names or marks on a ballot. This complexity raises questions about unnecessary vulnerabilities and potential backdoors.
- **Outdated Security Standards**: Many voting machines fail to meet modern security standards for both corporate and government systems. They are still certified under outdated 2005 standards by the Election Assistance Commission (EAC)[19], despite the availability of more stringent guidelines, such as the 2021 Voluntary Voting System Guidelines (VVSG 2.0). Even with these updated standards, the newer guidelines still fall short of the security requirements to protect sensitive election data. Older machines, often no longer supported by software vendors with patches or updates, remain in use without being decertified, leaving them vulnerable to attack.
- **Vulnerabilities to Attackers**: Voting systems are vulnerable to manipulation by individuals with minimal technical expertise. Such tampering can go undetected by election officials or the public, highlighting the ease with which elections can be compromised.
- **Irregular Software Updates**: Critical software updates are not performed regularly, exposing systems to security breaches. These updates, often described as "de minimis," can be used to manipulate voting systems without detection, making the machines highly susceptible to tampering.

While the above list is not exhaustive, it underscores significant weaknesses in our electronic voting systems. We will address these issues with specific solutions to minimize their impact. A "Risk and Remediation Matrix" is provided in the Appendix, "Exhibit 2," with a more comprehensive list of potential risks and possible remedial alternatives to the current electronic election process.

The Gold Standard: Four Cornerstones of Safe Elections

Restoring trust in our election system must be our highest priority—and trust must be earned, not demanded. In a constitutional republic, trust is not something we can command and expect to be blindly followed. Instead, we must conduct elections in a manner that fully addresses all questions and provides voters with the confidence that the process is fair, secure, and transparent. The solution to restoring trust is the **Gold Standard**.

The **Gold Standard** is built on four cornerstone principles that must be applied to every phase of the election process. When properly implemented, these principles create an election system that minimizes vulnerabilities and ensures that immediate corrective action can be taken when necessary. Following the Gold Standard creates an environment where public trust can be restored, ensuring that every voter has confidence that the election was conducted properly. The four phases of the election process will be discussed in detail in Section VII.

1. **Elections must be *secure*** – The integrity of the election ecosystem begins with security. There should be no connection to vulnerable networks that could compromise the system. This includes ensuring that election equipment, materials, and data are always secure. Proper security protocols must be in place at every stage, including using locks, seals, surveillance, inventory management, and a strict chain of custody. All processes should be meticulously documented to demonstrate adherence to these protocols. Election equipment and materials should be transferred only by bipartisan teams and under continuous surveillance. Access to election data and equipment should be highly restricted and carefully monitored.
2. **Elections must be *transparent*** – Casting one's ballot must be done in private; every other part of the election process must be done in public. Observers or poll watchers must be able to observe every phase of the election process, and public documentation must be produced to allow the public to review the process later. All phases and reports for elections should be fully observable by the citizens. These principles should be incorporated into state laws across the country. All ballot counting and tallying should be recorded, and the video should be stored as an election record on the county's website according to state law. Anyone, anytime, anywhere, must be able to review the video of a particular race or an entire election if they so choose so that the results of the elections can be easily verified no later than 48 hours after the polls close. No public information requests should be required to view the election results.
3. **Election*s* must *be verifiable*** – Accuracy of the vote is of utmost importance. When voters can verify that the votes are correctly counted, this increases their confidence in the outcome. The chain of custody documentation must be timely, legitimate, and verified. Reconciliation of votes and voters must be done in a fully transparent way. Again, anyone, anytime, anywhere, must be able to review the video of a particular race or an entire election if they so choose so that the results of the elections can be quickly confirmed or corrected no later than 48 hours after the polls close. Public information requests should *not* be required to view the election results. Ideally, all this information should be free to the voters. If the cornerstones of accessibility, transparency, and security are met, citizens can verify that the election was called correctly.
4. **Elections must be accessible for all legal voters** – Election laws must make provisions for ADA, military, and overseas voters to ensure accessibility for those unable to participate in person on election day. Security measures for any mailed ballots must be employed to every possible extent. As stated above,

public access to reports for auditing purposes is also of utmost importance, such as voter rolls, poll books, signature verification, chain of custody documentation, and registration documentation, to name a few.

To meet the Gold Standard, each of these four cornerstone principles must be rigorously applied across all phases of the election process: voter registration, voter validation, vote tabulation, and election reporting. By implementing these principles, we can build a system that not only meets the security, transparency, and accessibility needs of our elections but also restores the public's faith in the integrity of the entire process.

V. Hand-counted, hand-marked ballot election system

The four cornerstones determining the **Gold Standard** can be achieved with a **hand-counted, hand-marked paper ballot election system**. Hand-counting is the longstanding bedrock of trust for reliable elections. We need to return to the basics. A simple system that is local (precinct-based), in which the voter casts his vote in secret by hand-marking a paper ballot with bipartisan teams counting these ballots in public, is the most preferred solution. Doing so with a live video feed (only after the polls have closed) provides the ultimate transparency and accessibility.

This classic process with a few modern twists saves time and money and cements the confidence that our elections are accurate and trustworthy. For this paper balloting system to work, precinct sizes must be small—no larger than 1,500 registrants. Turnout for most primaries is low, around 20-30%, and general elections around 50%. Even a major presidential election would expect no more than a 65-70% turnout. Given these numbers, hand-counting is realistically accomplished and would reduce costs dramatically in the long run.

Pros/cons of a hand-marked, hand-counted "paper ballot" system

Pros	Cons
Reduces the threat of connectivity — internet, cell, modem, etc.	Some people may prefer the machines.
Less complex	May need to recruit more people as counting can be tedious if done for hours on end without breaks
Saves time—no prep, testing, programming, maintenance of machines	
Anyone can understand and verify the process.	
Allows citizens to count their votes instead of private companies or the government counting their votes	
Removes an entire slate of uncontrolled vulnerabilities currently associated with our existing systems	
Hand-counting statutes require fewer updates due to technological changes.	
Results easily audited/verified—transparent (can replay video)	
Removes the possibility of programming and reporting mistakes	
It gives power back to citizens and officials at the local level.	
No interruptions to the voting process compared to electronic systems, which are vulnerable to down machines, technical glitches, or power outages	
Counting can be done in the same location where votes are cast.	
Complex user manuals and technicians are not required.	

Below, we summarize our recommended methods, costs, materials, and results for hand-marked, hand-counted paper ballot tests conducted around the United States over the past year. Many lessons were learned, and we are confident that our recommended methods and procedures will be enlightening and informative for election officials and voters alike.

Multiple tests were conducted to understand best how to optimize the efficiency of the hand-counting process. Two methods were investigated: 1) the hand count tally method using paper tally sheets, and 2) the "calculator method." This paper primarily focuses on the tally method. See *Exhibit 9, Summary of Test Findings,* for a summary of the various tests conducted for both methods over the last year.

A. The Tally Method

for more detailed info, see https://uscase.org/

The tally method described below was conducted with 4-person teams using paper, pens, and people. Test volunteers were able to consistently count each race in 50 ballot batches in roughly 2 minutes. Further, a pilot test with 250 ballots was conducted with 11 races, and all were successfully counted in approximately two and a half hours. We estimate that if precincts are kept to a maximum of 1,500 registrants and turnout is approximately 65% or roughly 1,000 ballots, three teams could count the precinct in approximately three hours, including breaks. Total costs are far less than purchasing and maintaining the electronic voting systems. (*See Appendix Exhibit 1 SD Machine vs Hand Count*.) Most importantly, if the entire process is recorded, the people can fully observe, verify, and confirm that their vote count is legitimate.

Methodology

Each team consists of four people per station. The more people, the more stations, and the quicker one can count the ballots. For the room setup, comfort and space are key; having a large enough table for four people to sit on comfortable cushioned chairs, proper lighting, and a relatively quiet atmosphere helps enhance productivity. Teams should be kept as far apart as possible so that the talliers (persons who tally the votes) can hear the callers (persons who call out the name of the vote recipient).

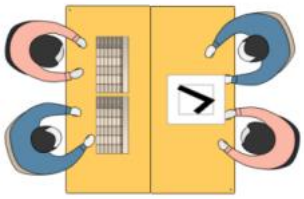


Image from *Missouri Elections: Return to Hand Counting* by Linda Rantz, Copyright Linda Rantz, Used with Permission, https://handcounting.com/eManual

Ideally, there should be four election judges or clerks per table, two from each party. The callers- 2 representatives, one from each party review the ballots and take turns calling out the name of the winner of each race on the ballot.

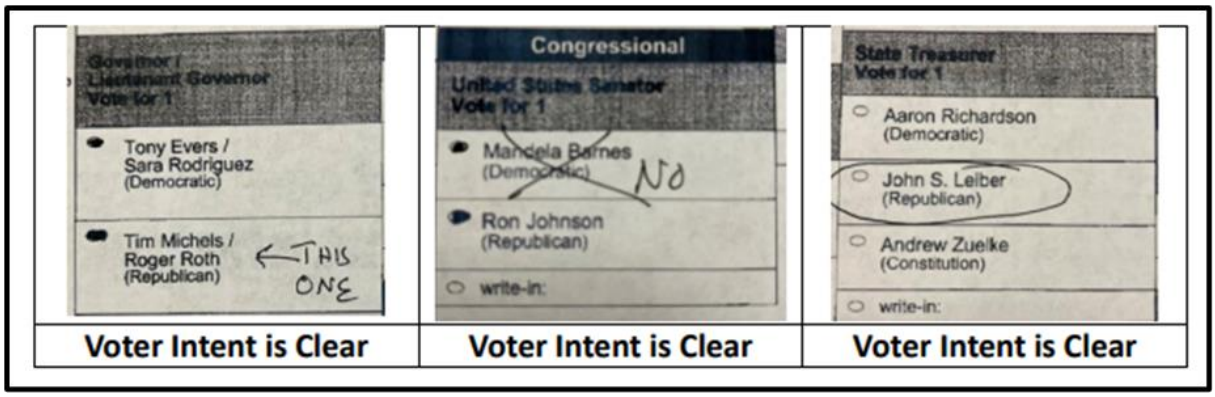
The other two election judges/election workers from each party will mark their tally sheets with a slash for the candidate receiving the vote.

Note: It is recommended that each race be called separately. So, work through all the ballots for one race before moving to the next. This method was the most efficient.

Voter Intent is a big deal when assessing the actual vote on a ballot. This is handled differently nationwide, depending on state laws and rules.

An acceptable distinguishing mark for a vote can be defined in three ways – 1) a mark in the oval adjacent to the name, 2) a mark beside the name/referendum, or 3) a circled preference.

Here are some examples of voter intent the machines would miss.

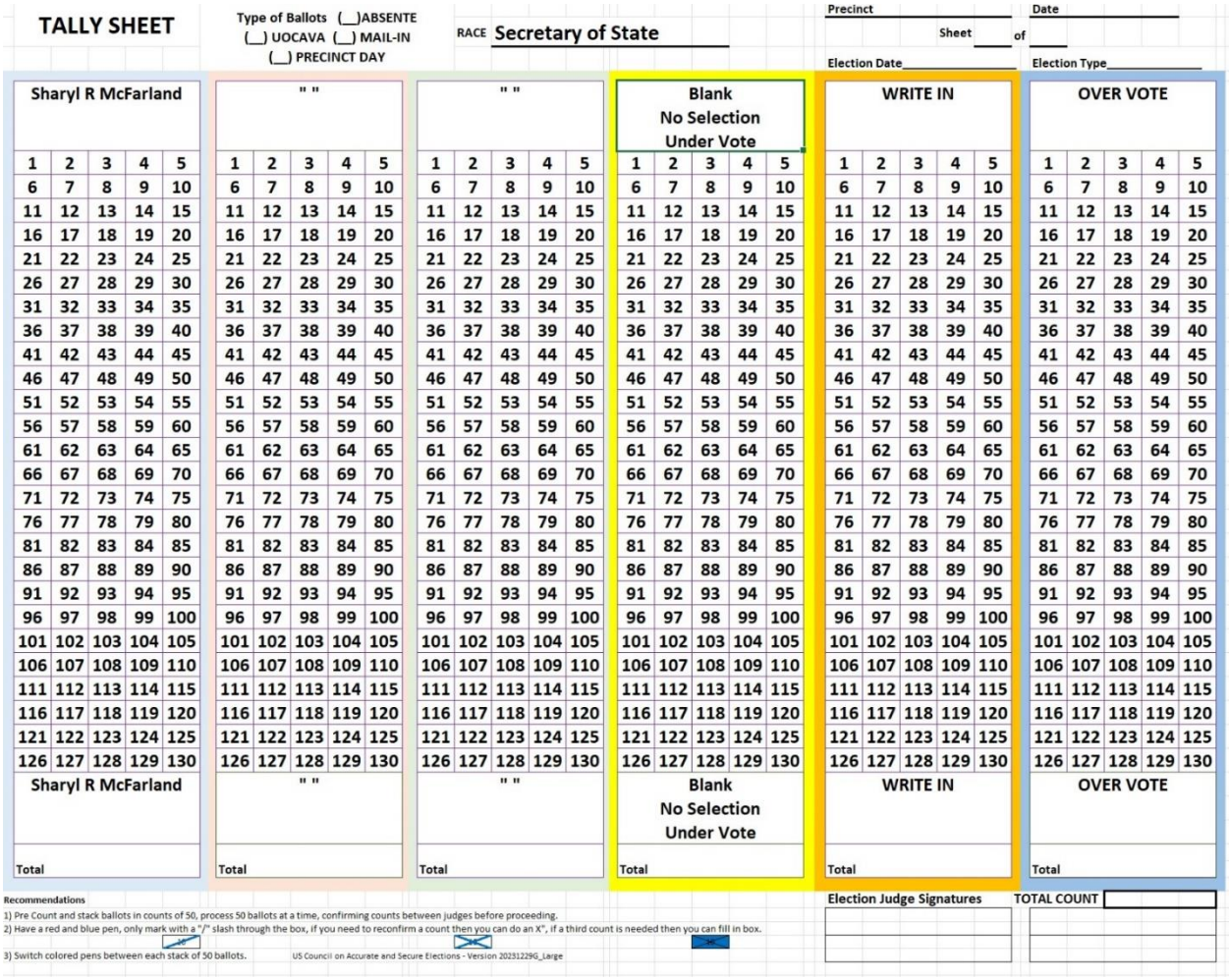


Tally Method Steps:

1) Fill out the election information, the seal number, and the judge/poll worker information in the "Official Election Results Workbook" (*see Appendix Exhibit 3*). *Note ballots should already be pre-sorted by precinct and perhaps ballot style*.

2) Count the number of ballots in the container or box provided, stacking them in groups of 25 or 50, and then enter the total amount of ballots received in the "Official Election Results Workbook"; for an example of a completed worksheet, see *Appendix Exhibit 6 Example Totals Worksheet*

3) Enter the races and candidates in the Excel spreadsheet provided (*Appendix Exhibit 4 Excel Spreadsheet to Generate Tally Sheets*) so that the tally sheets can be printed out before counting; note that there is a section for Under Vote (no vote was marked), Over Vote (too many votes were marked), and "Write in." For an example of a completed tally sheet, See *Appendix Exhibit 5 Treasurer Race for Dodge County WI 2022*



TALLY SHEET

Type of Ballots (__)ABSENTE (__) UOCAVA (__) MAIL-IN (__) PRECINCT DAY

RACE **Secretary of State**

Precinct _____ Sheet ____ of ____ Date _____

Election Date _____ Election Type _____

Sharyl R McFarland					" "					" "					Blank No Selection Under Vote					WRITE IN					OVER VOTE				
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
6	7	8	9	10	6	7	8	9	10	6	7	8	9	10	6	7	8	9	10	6	7	8	9	10	6	7	8	9	10
11	12	13	14	15	11	12	13	14	15	11	12	13	14	15	11	12	13	14	15	11	12	13	14	15	11	12	13	14	15
16	17	18	19	20	16	17	18	19	20	16	17	18	19	20	16	17	18	19	20	16	17	18	19	20	16	17	18	19	20
21	22	23	24	25	21	22	23	24	25	21	22	23	24	25	21	22	23	24	25	21	22	23	24	25	21	22	23	24	25
26	27	28	29	30	26	27	28	29	30	26	27	28	29	30	26	27	28	29	30	26	27	28	29	30	26	27	28	29	30
31	32	33	34	35	31	32	33	34	35	31	32	33	34	35	31	32	33	34	35	31	32	33	34	35	31	32	33	34	35
36	37	38	39	40	36	37	38	39	40	36	37	38	39	40	36	37	38	39	40	36	37	38	39	40	36	37	38	39	40
41	42	43	44	45	41	42	43	44	45	41	42	43	44	45	41	42	43	44	45	41	42	43	44	45	41	42	43	44	45
46	47	48	49	50	46	47	48	49	50	46	47	48	49	50	46	47	48	49	50	46	47	48	49	50	46	47	48	49	50
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121	122	123	124	125	121	122	123	124	125	121	122	123	124	125	121	122	123	124	125	121	122	123	124	125	121	122	123	124	125
126	127	128	129	130	126	127	128	129	130	126	127	128	129	130	126	127	128	129	130	126	127	128	129	130	126	127	128	129	130
Sharyl R McFarland					" "					" "					Blank No Selection Under Vote					WRITE IN					OVER VOTE				
Total					Total					Total					Total					Total					Total				

Recommendations

1) Pre Count and stack ballots in counts of 50, process 50 ballots at a time, confirming counts between judges before proceeding.

2) Have a red and blue pen, only mark with a "/" slash through the box, if you need to reconfirm a count then you can do an "X", if a third count is needed then you can fill in box.

3) Switch colored pens between each stack of 50 ballots.

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Election Judge Signatures

TOTAL COUNT

4) Counting is conducted one race at a time. Two judges review the ballots on one side of the table. They will take turns calling out the office or issue by name for that race until they finish the votes. The other two judges will put a slash mark on the Tally Sheet on the first available number for that candidate. They should start with one particular color, say a blue pen for the first 50, switch to another color, say a red pen for the next 50, and then continue to alternate blue/red color pens for each set of 50. Note: some precincts prefer to sort ballots into stacks of 25 instead of 50; try both to see what makes sense for your county/state/polling location.

https://www.youtube.com/watch?v=Y2WCL1fcEus

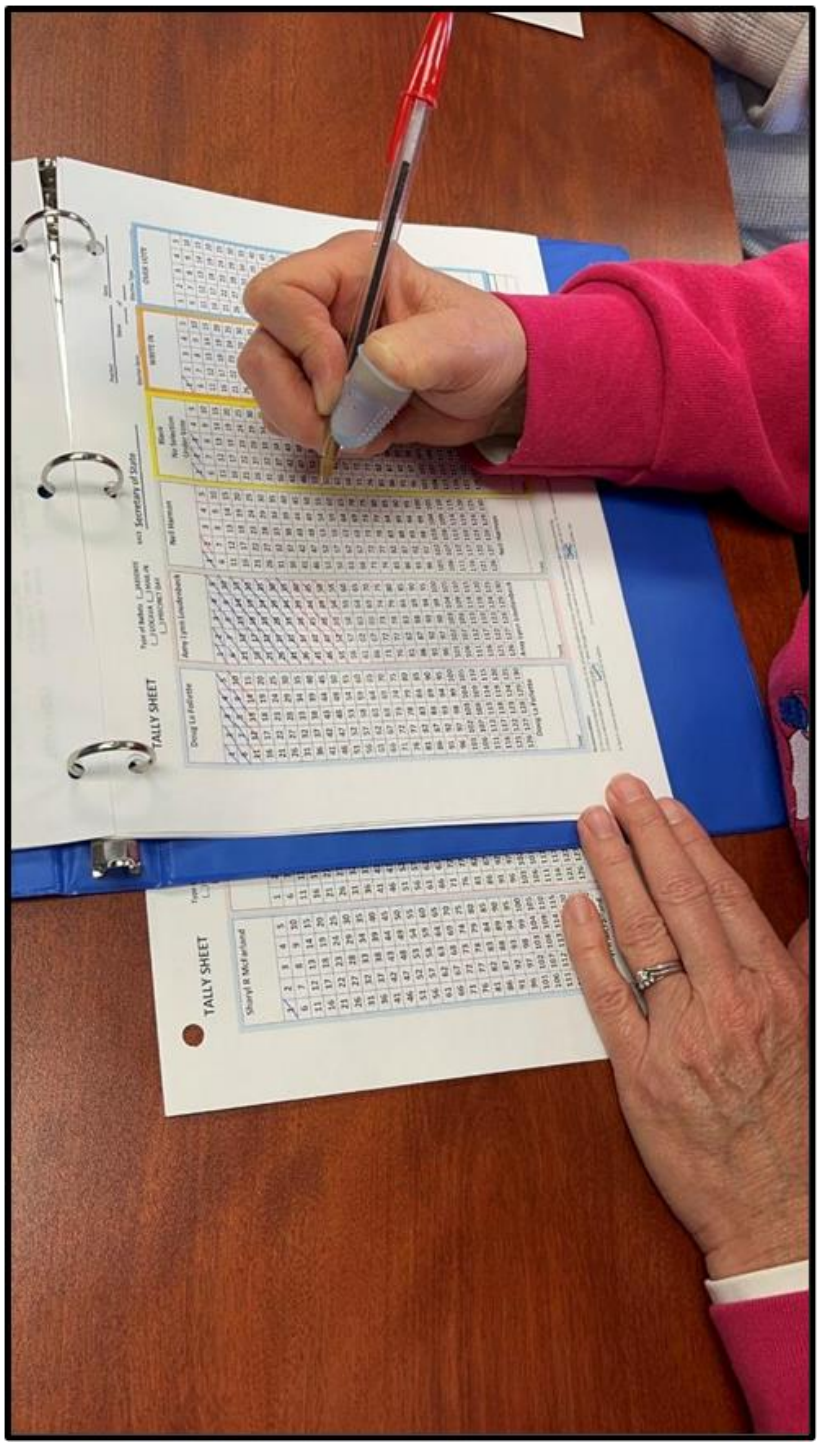
5) Once the first batch of ballots is reviewed and tallied, the judges with the Tally Sheets should compare numbers/totals. If there are any discrepancies, recount the race from those ballots, then make any corrections as needed. Instead of using a slash mark, an X can be made through the current race tally being recounted. Fill the box entirely with either color pen if a third count is required for the same race. Each team can choose the ink color for a third recount to enhance reporting clarity.

Note: Multiple tally sheets may be needed for each race. So, if the talliers start to run out of room on the sheet, ***both talliers*** should move to the next tally sheet. Totals will be reconciled across all sheets at the end of the counting for that race. Sheets should be numbered consecutively and consistently between talliers.

6) Once done with the counting of the ballots, write the totals for each race in the boxes at the bottom of the page for each Tally Sheet, then add the totals from the boxes of the Tally Sheet races together and then record grand totals on the "Official Election Results Workbook."

7) Start with a set of new Tally Sheets for each race. Note: for ease of counting and to save time, have several copies of the tally sheet for each race based on the number of ballots you are counting sequentially placed in the binder with the "Official Results Worksheet" at the back of these sheets. This will allow the counters to move quickly from batch to batch and race to race. For races that require two tally sheets due to the number of candidates, you can place them beside each other while tallying.

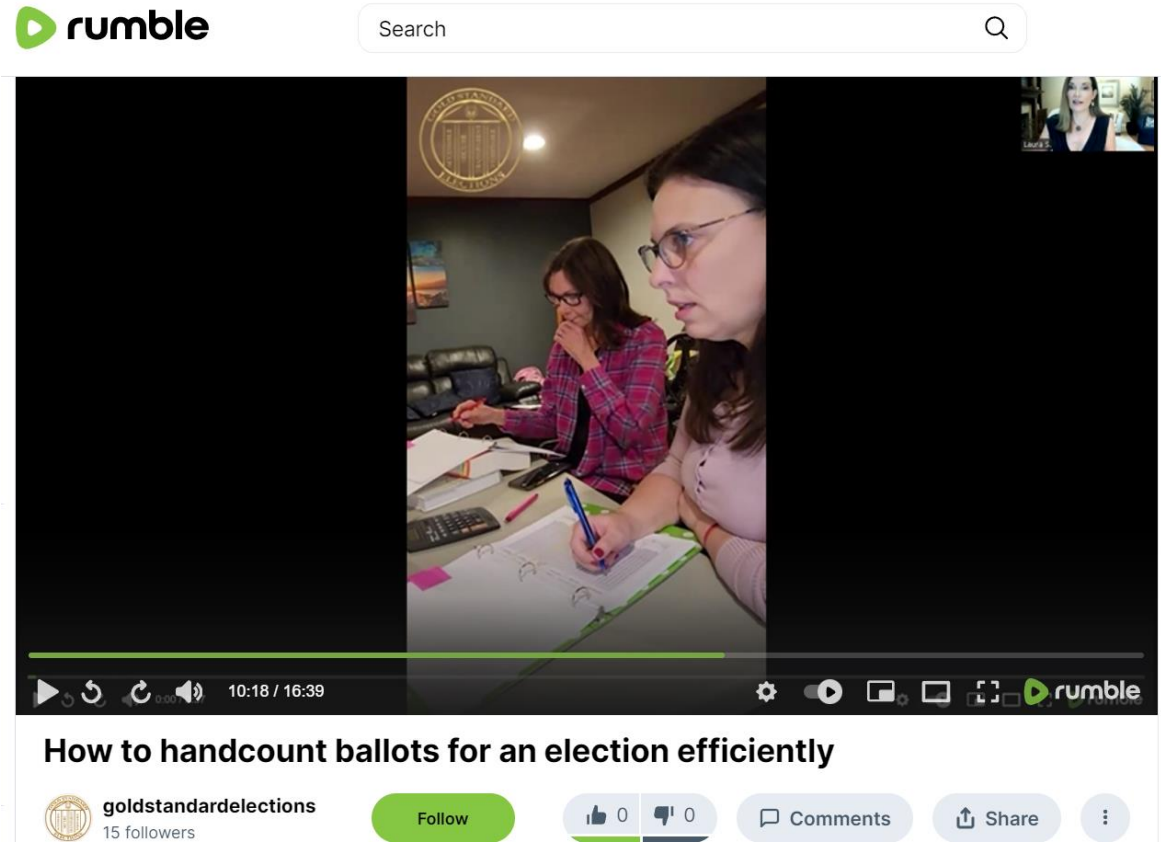
See Exhibit 5, Example Treasurer Race for Dodge County WI 2022, and Exhibit 6, Example Totals Sheet



8) Talliers and the poll clerk/judge sign the Tally Sheets and the "Official Election Results Workbook."

9) Follow your state's additional instructions for placing the materials in the secure box or container provided with a new seal that you would document for chain of custody reasons.

Expected timing: After several trials to optimize the process, we found that it takes about 2 minutes to count each batch of 50 ballots. We consistently counted 250 ballots in roughly 2.5 hours with one team of 4 people. The following are some quick videos that demonstrate our method:



https://rumble.com/v5api6c-how-to-handcount-ballots-for-an-election-efficiently.html

Here is another longer video for you to practice with a total of 126 ballots for a governor's race:

https://www.youtube.com/watch?v=Y2WCL1fcEus&t=396s

Materials:
It is recommended to have the following items:

1) Gel pens with at least three colors—have multiple pens on hand in case some run out of ink (Red, Blue, Purple)
2) 2 – 3 Ring Binders – 1" wide per station (place tally sheets in binder)
3) Silicone fingertips mixed sizes, surgical gloves, or SORTKWIK fingertip moistener to aid in flipping ballots or tally sheets
4) Pre-Printed Tally Sheets in Color
5) 2 Pre-Printed "Official Election Results Workbooks" – each for box and auditor
6) Cameras, laptops, and tripods to video record ballots and
7) overall workspace with comfortable chairs and a large enough desk to fit the team.

Here is a helpful video that reviews all the materials:
https://www.youtube.com/watch?v=Ba6FYAxshYw&t=7s

B. The Calculator Method-

For more detailed information on this method, see handcountusa.com

While hand counting ballots with paper and pen on a Tally Sheet has been a longstanding, acceptable method for counting ballots, other methods have emerged that may also offer transparency, verifiability, security, and accuracy and allow every citizen to personally verify that their ballot is counted correctly.

One such method is the use of hand counting calculators that are limited to the functionality of adding one or subtracting one when the person doing the counting presses the button on the calculator. The calculator includes an LED display that shows the number of votes when the hand-counting person presses the buttons associated with the vote selection.

The term "calculator" was chosen because of its similarity to traditional calculators, which add, subtract, multiply, and divide. Both types of calculators have clear functionality. Clearly, the hand count calculator has much less functionality than a 4-function calculator. Like traditional calculators, an LED display shows the numbers when pushing a plus-one or minus-one button. The hand count calculator does not need certification because it is not a voting system.

The two LED displays on the hand count calculators must be large enough so that every citizen can view and count the votes from a video recording posted on the county election department's website the day after the election. The video recording is made by two high-resolution cameras. Each of the two cameras is suspended above the calculator stations and the ballots so that the citizens may have 100% transparency and trust in the election results. One camera focuses solely on the ballot, while the other focuses on the entire counting station. Room cameras are recommended but not required. Using a video recording, which documents and memorializes the counting process, allows anyone, anytime and anywhere, to recount the entire election or a particular race for themselves. This level of transparency, verifiability, and security is exceptional. Minimizing the opportunity to cheat and or maximizing the opportunity to correct an honest mistake with the video cameras increases vote count accuracy and, most importantly, TRUST in the election results.

After numerous tests and election simulations, the calculators offer remarkable scalability and efficiency. The throughput rate (man-hours per ballot or race) is impressive for many reasons. Each station or counting team only requires two people, leaving little to no wasted downtime during a counting session. Counting by pairs (candidates, under-votes, over-votes, propositions, etc.) simplifies the process, allowing counting people to move through the selections faster. Pushing a button seems to be faster than making a

tally mark or dot on a piece of paper; however, the speed can be affected by external factors common to all methods (dexterity, distractions, endurance).

The hand count calculators offer an additional advantage to increasing transparency, verifiability, and security by reconciling the vote count in two separate ways for each count run and race. The ultimate reconciliation is with the camera recording for the public to view anytime, anywhere, at no cost to the individual viewer.

Any attempts to manipulate the vote on the video recording would be arduous and almost impossible, and even if it could be done, the paper result would contradict the result, creating a need to recount. Any attempts to manipulate the vote result by the people pushing the calculator buttons would be detected during the reconciliation processes or by the video camera viewers. This allows any candidate or interested party to independently verify the election without the cost of a recount or the sometimes difficult task of acquiring information from election officials. This will provide the maximum trust in our elections. Note that this method requires fewer people than the tally method: two rather than four people.

See Exhibit 11 – Video Demonstration of the Calculator Method

VI. The Four Phases of the Election Process:

Recommendations to attain the Gold Standard

While we highlighted the method for hand-counting hand-marked ballots above, the election process has four phases. The four cornerstones of secure elections must be optimized for all of these phases to attain the gold standard for secure elections. Our recommended solutions below address each phase with specific recommendations. The four phases are:

1. **Voter Registration**: Controls who and how many ballots are issued
2. **Voter Validation**: Controls the legitimacy of ballots eligible for tabulation
3. **Vote Tabulation**: Controls when/where/how the votes are counted
4. **Election Night Results Reporting**: Controls what results are ultimately reported and certified in a timely manner.

A. Phase 1. Voter Registration

To ensure voter registration meets the four cornerstones of safe elections, we recommend the following:

SECURE: States should withdraw from third-party companies like ERIC and BPro, which share data with external organizations. Voter registration should be managed internally by county election offices, with cross-referencing to state databases. Registrations should only be done in person, with sworn affidavit applications. It is nearly impossible to verify and secure a registration if other agencies like the Department of Motor Vehicles are allowed to connect and transfer data electronically with voter registration databases.

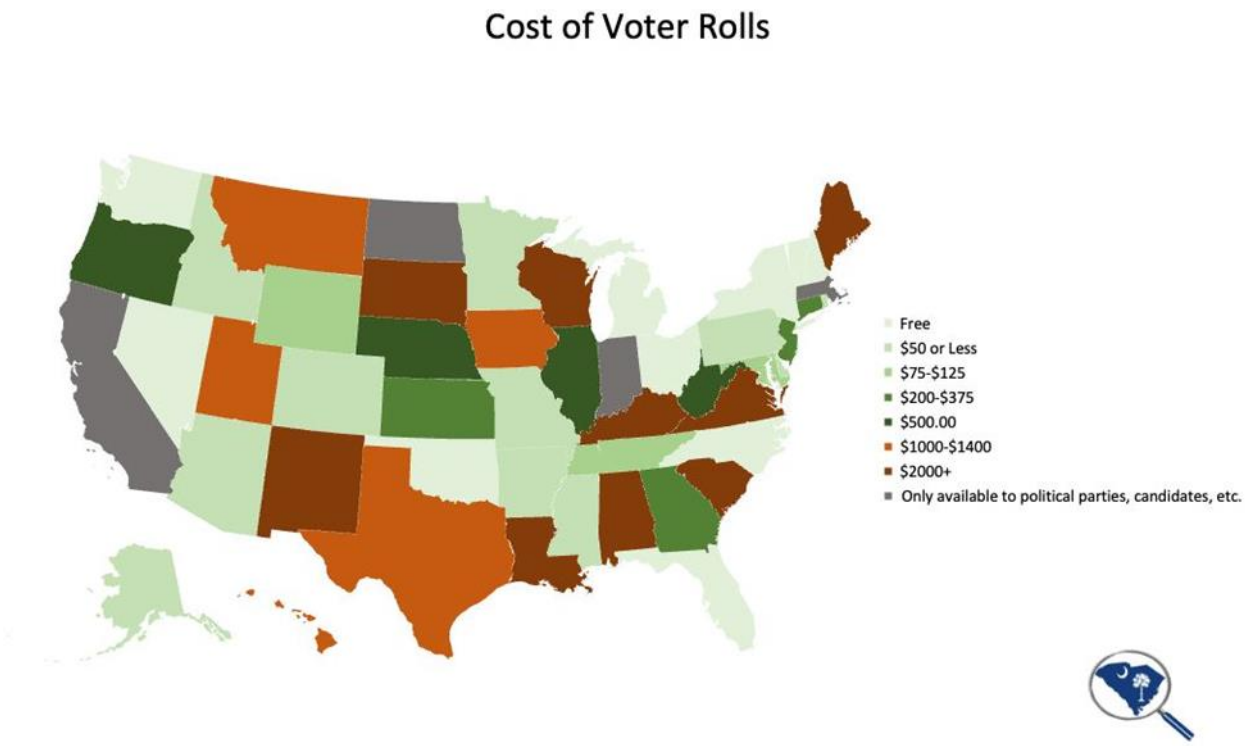
TRANSPARENT: All voter rolls must be free to the public and published online. Information that could be used for identity theft, such as social security numbers (SSNs), must not be disclosed. However, the registrant's Date of Birth (DOB) and address must be included so that the public can thoroughly and accurately analyze the voter roll. Department of Motor Vehicle data (after redacting Personal Identifying Information such as SSN) should also be made available to the public to show who has received new licenses or relinquished their old. States should require proof of citizenship (passport or birth certificate) when issuing state IDs or driver's licenses. Non-citizens should be noted on state-issued IDs and driver's licenses so they can easily be blocked from registering in the voter registration database.

VERIFIABLE: Deceased people should be immediately removed from the rolls. Voters no longer residing in their original state should be deleted from their original state's voter registration database. The legitimacy of the voter domicile should be confirmed. Voter registration cards signed by the registrant must be used as a validating component at the precinct level on election day. Every four years, people should re-register or confirm their current address. In addition to the voter registration cards, a state-issued ID or driver's license must be shown before the voter can vote.

All counties should share read-only versions of their voter rolls with other counties and the state. Programmatically, voter rolls can be easily cross-referenced among counties for duplicate entries. Each County and Secretary of State budget should have adequate funding for verifying their voter registration databases with state intra-agency information as well as the Social Security Master Database and other state agencies' records such as the DMV. Things to check should include, but not be limited to, invalid

addresses, date of registration prior to the date of birth, registrations of citizens over the age of 90, or registrations well before eligibility. Database programs and queries to look for these anomalies may expedite this process. States should work with other states to check for duplicate voter names and share NCOA analysis and Social Security information.

ACCESSIBLE: Make voter rolls accessible to all people without charging a fee. (See the chart below for current costs to attain voter rolls by state). Any digital database must be READ-ONLY. It can only be created/updated by registration cards. Counties must publish their voter rolls in a common data format and central location so that all other counties, citizens, and groups can access them. Proper data management practices should be employed, such as using a consistent method of assigning registration numbers. Election officials should partner with the public to help easily clean up incorrect or improper registrants. For example, the state of Ohio does this. Here is their site.[20]



B. Phase 2. Voter Validation

To ensure voter validation aligns with the four cornerstones of safe elections, we recommend the following:

SECURE: Only eligible pre-registered voters should be allowed to vote on a regular ballot; all others may vote on a provisional ballot. Freeze the poll book 30 days before the election to allow time for confirming voter eligibility. To further ensure the security and integrity of the vote, felony legislation that mandates fines and jail time for people who knowingly vote fraudulently should be implemented. As a deterrent against this behavior, these fraudulent voters should be prohibited from voting for a significant period of time in future elections.

TRANSPARENT: Use paper poll books with voter name, DOB, address, precinct number, ballot style, and ID number. The voter's signature must be recorded upon eligibility confirmation. Periodically archive images of poll books. Include an Omissions List for any eligible voters missed in the poll book. The voter must provide a valid photo ID, which must be verified before the voter may vote. Voters who are not eligible to vote may vote on a provisional ballot. A separate Vote Roster will be used for the provisional voter.

VERIFIABLE: Reconcile votes and voter counts hourly to ensure accuracy. Post voter totals at the polling place every 2 hours. Poll books should be made public post-election

ACCESSIBLE: Poll books must be available for free public access via FOIA requests and easy for voters to sign. Signatures should be protected to prevent viewing of others' details.

C. Phase 3. Marking & Counting the Ballots

To ensure marking and counting of ballots meet the four cornerstones, we recommend:

SECURE: Deliver ballots under lock and seal with the chain of custody form completed (this is especially important for early votes that are counted). Counting should ideally occur at the precinct level as chain of custody issues are minimized. Ballots should contain security features so that they cannot be copied.

TRANSPARENT: After the polls are closed**,** all ballots will be viewed by bipartisan teams and the public and counted by several people, and the process will be video recorded for easy auditing, including video surveillance of the entire room if feasible. Election results must be posted on the door at the precinct where the ballots were counted.

VERIFIABLE:

Video recording of counting provides an easy pathway to successful auditing and can be followed in real-time. Enough counting teams must be hired to finish counting the ballots in 4 hours.

ACCESSIBLE: The public should have access to view the counting as long as they do not interfere with the process. We strongly encourage a live feed as well to ensure transparency. They must also have access to the video recording once it is available.

1. BALLOT PRINTING - To ensure marking and counting of ballots meet the four cornerstones, we recommend:

SECURE: All ballots should be inventoried. Strong chain of custody procedures and documentation must be utilized, tracked, and monitored. The ballots could also be printed on paper employing reasonable anti-copy features such as watermarks, micro-letters, guilloches, UV ink, and integrated security holograms, etc.

TRANSPARENT: Ballots should be visible on video recordings.

VERIFIABLE: Ballots should have strict chain of custody procedures and reconciliation procedures to ensure that all ballots are accounted for--voted, spoiled and unused. Every precinct and voting center should fill these reports out promptly and thoroughly.

ACCESSIBLE: All ballots should be printed in a format that is easily readable and easily marked by the voter. Visually impaired voters should have multiple options for marking the ballots via the election clerk, driver, or a friend or family member.

2. EARLY VOTING (EV)

a. Voting in person:

SECURE: Ideally, we recommend one day for voting; however, this goal may not be realistic for some. If early voting cannot be eliminated, it must be constrained to a single voting period, not to exceed 1 week, with no gap between early voting and election day. A reduced timeframe for early voting minimizes many potential avenues for manipulation and fraud: chain of custody lapses when delivering ballots to and from voting locations when ballot boxes overflow; intel about voter turnout data which gets released to the public, revealing enough voter information to predict what the election results are at that point in time; and early tabulation of vote results opening windows of opportunity for election result leaks or vote manipulation, just to name a few.

TRANSPARENT: Early voting gives more time for a bad actor to act and, therefore, does not benefit transparency in our elections, especially when it is not precinct only. Limiting early voting to "precincts only" enhances transparency because decentralizing the vote location makes counting the votes more manageable and observable.

VERIFIABLE: Multiple days of early voting make verifying vote results much more difficult for the same concerns listed above about increased potential vulnerabilities. It is recommended that Early Voting is limited to no more than a week; strict chain of custody documentation must be employed; tabulation must not begin until after the polls close on election night; and the early voting ballots must be counted at the same place in the same manner as election day ballots. Limiting early voting to precincts provides ultimate verifiability because decentralizing the vote makes auditing much more manageable.

ACCESSIBLE: In-person early voting, if done, should ideally be limited to "precinct-only" voting where people don't have to travel far from their homes to vote. The locations must be the same as election day locations for maximum accessibility and familiarity. Voting at the County Seat or Board of Elections may also be considered as long as strict security measures are in place. Curbside voting is also available throughout the voting period for those unable to stand in line or have other physical disabilities.

b. Voting by mail/dropbox

SECURE: Voters must mail or deliver absentee ballot packets directly to their county election offices. They can be hand-counted like the "in-person" ballots at the county offices, but we prefer that they be sorted for verification and counting at the precinct. Absentee ballot outer envelopes should be printed on sequentially numbered envelopes, including precinct number and ballot style. Tracking and reconciliation are crucial with absentee ballots to document the number of applications requested/sent/received and counted. It is also strongly recommended that the county or the Secretary of State have a website where voters can track their ballots. Ballots should be sorted by precinct but remain at the County under extreme surveillance and perhaps even 24/7 in-person guards. Ideally, absentee ballots should be due the day before the day of the election, so that on election day at the county seat, the absentee ballots could be sorted and delivered to the precincts in a timely fashion. Absentee ballots should be securely transported to the precincts for inspection and counting, where practicable.

To transport the unopened absentee ballots (with secrecy ballots), optimal chain of custody would consist of a double lock/double seal with paper documentation, which includes seal numbers. Either bi-partisan election judge or Sheriff deputy transfers and documentation should prove that no changes were made to the seals/locks and that people who sent/received/were involved in the transfer are noted. Detailed logs are to be kept at every step and reconciled.

*Note that the envelope and ballot are separated to ensure anonymity. The signature verification team should do signature verification without opening ballots. Positioning the verification signature line over the edge of the secret envelope's sealed flap is recommended to discourage tampering. The ballots will be counted once the signature is approved and sorted in the same manner as the election day ballots, ideally after the polls close. The appropriate election official(s) would do any adjudication under a camera and in complete observation from the public

TRANSPARENT: People physically showing up to the polls maximizes transparency and makes it easier to verify ID. Thus, we recommend strictly limiting absentee voting to the following:

- You will be out of town on election day or
- You have a religious observance that prevents you from voting in person or
- You have a physical disability, hospitalization, or illness that prevents you from voting in person or
- You have an employment commitment or must care for an adult or child during the entire time polls are open *or*
- You are confined in a penal institution for a conviction of a misdemeanor or while awaiting trial or
- You are a member of the "State" Address Confidentiality Program or are protected by a Domestic Violence Protective Order

Documentation via a signed affidavit and witnessed under penalty of perjury explaining why the individual cannot vote in person should be required before a specified deadline for the presentation of documentation. In addition, thirty days before the election, there should be a freeze of the registered voter database, with no new registrations allowed until post-election. Verification of the voter should be done both when absentee is requested and again when it is returned.

Following the election, all absentee ballots and envelopes should be publicly available along with their serial number and precinct location. A public site must also track which of the absentee ballots were returned.

All absentee ballots requested, sent, received, voted, and counted for auditing purposes will be available to the public at no charge via information requests. It is recommended that the precinct number and ballot style be printed on the carrier (outside envelope) and the privacy envelope. Poll watchers must be allowed to be close enough to see the signatures. Video recording should be audible and easily visible, which can be tested and verified for visibility in advance.

VERIFIABLE: All absentee ballot envelopes must be accounted for by sequential numbers and reconciled with the public list before being sent out. When the ballot is returned, a second verification must be done to ensure that the correct person has voted and that the registration has not already been used. This verification must take place on election day. Only trained teams will verify signatures under a

video camera and record them for future auditing and verification by the public. Signature verification could be live-streamed where feasible.

ACCESSIBLE: Absentee voting should be available to legally eligible citizens, but absentee voting methods (like drop boxes) can introduce chain-of-custody issues and should be eliminated. Unattended drop boxes should be discouraged and, if used, secured at the election office.

Note: All early and absentee voting forms increase vulnerabilities in the election ecosystem.

Essential considerations for Early Voting via absentee ballots

If any voting is done which is not in person, the following procedures should be in place:

Recommended Absentee Voting Procedures

1. Absentee ballots must be requested individually for each election, with a valid excuse, notarization, or third-party verification. Voter identity must be checked before sending the ballot.
2. All absentee ballots must be placed into an envelope with sequential serial numbers.
3. The County must post the precinct and serial number of each absentee ballot sent on their website.
4. The envelope with absentee ballots must be sent sequentially; any mistakes require spoiling the incorrect ballot with the envelope to ensure accurate tabulation.
5. The County website must be updated when an absentee ballot is returned.
6. Absentee ballots must be securely stored until counting begins.
7. On election day, the published list of serial numbers and precincts must be reconciled with the ballot envelopes before opening.
8. Voter identity must be rechecked to confirm the correct voter has submitted the ballot, with the envelope remaining sealed.
9. A separate team removes and stacks the ballots from the envelopes.
10. The ballots are then tabulated in the same manner as in-person ballots.

3. Other:

Provisional balloting: See Exhibit 7
ADA Voting: See Exhibit 8

D. Phase 4. Election Night Reporting

SECURE: All ballot counting is recorded on camera, with one over the ballots and one over the counting station. Video evidence ensures vote results cannot be altered. Results are reported to the county and state, and ballots are secured for 24 months.

TRANSPARENT: Counting begins only after polls close. Results are not posted until after voting ends; no third parties may report results. Results are posted on the polling place door and reported to election authorities.

VERIFIABLE: Vote results reported by the county should match vote results reported by the state. Similarly, the sum of the precinct vote results should match the total that the county

reports. The vote results shall be posted on the county and state website within 24 hours of completion of the count.

ACCESSIBLE: Results are posted on the polling place door immediately after counting and on the county or state website within 24 hours. All election records are available to the public, free of charge, 2 days after counting is complete.

VII. Summary of Recommendations:

While the primary focus of this paper is to propose solutions and procedural recommendations for the physical process of voting and counting ballots, the other goals of this document are to reduce the unnecessary complexity of the current system and minimize the potential for maladministration and fraud. The validity of the vote results depends upon overhauling the entire election system. The following is a summary list of the recommendations we provided above, which are necessary to ensure a safe and secure election process.

- **Clean Voter Rolls**: Ensure voter rolls are limited to legitimate, registered U.S. citizens, with proof of ID and citizenship required.
- **Timely Roll Maintenance**: Counties must promptly remove deceased individuals and those who have moved or become inactive or ineligible from the voter rolls.
- **Public Access to Voter Rolls**: Voter rolls must be accessible online free of charge for public scrutiny.
- **Fixed Voter Registration**: There should be no changes to voter registration within 30 days of an election.
- **Paper poll books & Voter Rosters**: Use paper poll books, supplemented by a handwritten Voter Roster, accessible via public records requests.
- **Hand-marked paper ballots:** Ensure they are accounted for with a robust chain of custody
- **Anti-Copy Features on Ballots**: Ballots should be printed with features that prevent duplication and are visible on camera
- **Limited Absentee Ballots**: Strict signature verification and comprehensive tracking for absentee ballots.
- **Controlled Early Voting**: Limit early voting with no gap between early voting and Election Day.
- **ADA & Curbside Voting**: Provide accessible options for voters with disabilities or special needs.
- **Hand Counted Paper Ballots**: Begin hand counting immediately after polls close, ensuring accuracy and transparency.
- **Visible Vote Results**: Post results at precinct doors and report them directly to the County Elections Department.
- **Precinct-Only Voting**: Ideally, voting should be limited to precincts, where practical, to ensure manageable and accurate ballot handling.
- **Bipartisan Counting & Public Observation**: Use bipartisan teams and ensure public oversight throughout the counting process.
- **Video Surveillance**: Record ballot counting and provide additional cameras in counting rooms for transparency.
- **Publicly Accessible Video**: Post video footage of ballot counting on the County's website within 24 hours of polls closing.

- **Open Election Records**: Make election records available to the public within two days of Election Day.
- **Ongoing Public Education**: Continuously educate the public on voting procedures, deadlines, and process changes.

These reforms will streamline the voting process, promote transparency, and restore public trust, ensuring elections are secure and accessible for all eligible voters.

VIII. Conclusions:

The four cornerstones of safe elections—security, transparency, verifiability, and accessibility—are the foundation of a trustworthy electoral process. Unfortunately, the current electronic voting system fails to meet these standards, leaving room for inefficiency and doubt. However, we've shown that hand-counting hand-marked ballots is cost-effective and can be done swiftly, with results reported before the end of Election Day. This approach ensures prompt, accurate results and saves counties and states millions of dollars. We can restore public confidence by optimizing every phase of the election process to align with these core principles. With a more secure, transparent, and accessible system, voters will again trust that their voices are heard and their votes are counted fairly.

How can we confidently transition to a new, more trustworthy voting paradigm? To ensure a successful shift, the following steps are critical:

- **Raise Awareness & Educate**: Clearly communicate the simplicity and effectiveness of this new voting method, ensuring everyone understands its advantages.
- **"Train the Trainer":** Empower key advocates to demonstrate the system's ease and benefits, enabling them to educate local communities and election officials.
- **Mobilize Volunteers**: Engage passionate volunteers to champion this reform and assist in implementing it at the county level.
- **Pass Legislative Support**: Advocate for laws that allow for pilot programs, and once proven effective, expand this transformative process nationwide.
- **Provide Support & Resources**: Offer comprehensive training, guidance, and resources to counties committed to reforming their election systems.

Now is the time to make this change before the erosion of public trust leads to widespread voter disengagement. The greatest threat to our nation is voter apathy, fueled by a lack of trust in the election system.

We are at a critical crossroads. The need for a secure, transparent, and accessible election process has never been greater. We hope this guide inspires action and look forward to your feedback and questions.

Together, we can build a new election process that every American can believe in. Let's embrace the **Gold Standard for Election Excellence**, ensuring elections are indeed by the people, for the people.

IX. Appendix

Exhibit 1 Cost Savings South Dakota Machine vs Hand Count-2024
Exhibit 2 Risk and Remediation Matrix
Exhibit 3 Official Election Resource Workbook
Exhibit 4 Excel Spreadsheets to Generate Tally Sheets
Exhibit 5 Example (Treasurer Exhibit Race for Dodge County, WI 2022)
Exhibit 6 Example Totals Sheet
Exhibit 7 Provisional Ballots
Exhibit 8 ADA voting
Exhibit 9 Summary of Test Findings
Exhibit 10 Estimate of Costs of Tally Method Hand-counting
Exhibit 11 Video demonstration of the Calculator Method /Estimated Costs
Exhibit 12 Checklist for Emergency Marking and Counting of the ballots

Exhibit 1 Cost Savings SD Machine vs Hand Count - 2024

SD Machine vs Hand Count - 2024

- South Dakota
  - Tabulators (central count, not precinct) 2017-2019 $3,170,155
  - Maintenance Est. 2019-2022 $ 934,800
  - Reporting (Laptop & Software Maint. Est.) 2019-2022 $2,336,000
  - **Total** **$6,440,955**

- Hand Count 2020 & 2022 Primary and General Elections

Year	Election	Ballots Cast	Precincts	Ave Ballots Precinct	250 Ballots Teams	Per Table	PrecSup	Total People	Time	Pay/Hr	Total Per Precint	Total Statewide Cost
2020	Pri	154342	667	232	1	4	1	5	3	$ 30.00	$ 450.00	$ 104,400.00
2020	Gen	427529	693	617	3	4	1	13	3	$ 30.00	$ 1,170.00	$ 721,890.00
2022	Pri	186896	679	276	2	4	1	9	2.5	$ 30.00	$ 675.00	$ 186,300.00
2022	Gen	354670	687	517	2	4	1	9	3	$ 30.00	$ 810.00	$ 418,770.00
											Hand Count Costs	**$ 1,431,360.00**
Live Feed Costs (Live Stream to YouTube Channel)												
Precincts	iPad Mini/Wifi/Cell		Cell Sub	Mini-Stand	Teams(2024)	Supplies (Pens, Fingers, Binders, Paper)						
693	$649		$ 60	$80	3		$ 15.00					**$1,671,516**
											Hand Count with Live Stream	**$ 3,102,876.00**

Exhibit 2 Electronic Voting System Risk & Mitigation Matrix
Here is a more comprehensive list of potential risks in the current electronic election process:

Area	Risk/Issue/concern	Can it be mitigated? Y/N/Maybe	Remediation
Voter Rolls/Registration	• DMV data sent to ERIC or other 3rd party vendors • Deceased and "moved out of state" voters not removed from voter rolls. • Non-citizens included in the voting process • States that use ERIC receive left-wing funding and share data with left-leaning nonprofit organizations for vote targeting/ballot stuffing. • Too many vendors/in-house support involved in data (adds complexity)	Maybe Y Y Y Y	Discontinue use of ERIC and analyze/clean rolls in-house; Create a separation of databases (active, inactive, archived) Remove non-citizens/have stricter ID requirements to confirm citizenship. Transparency and free access to voter rolls for validation Minimize the number of people/vendors with access to the data.
Early Voting	• It informs potential nefarious actors about the magnitude of data manipulation needed to overcome actual election results.	Y	Go to 1 day of voting and start the counting only after the polls are closed.
Voter Validation	• Validation is not part of the certification process • Connected to the internet/network, so there is a risk of infiltration	Y Y	Go to 1 day voting and utilize paper poll books at the precincts on election day as in European countries.
Voting -BMDs -Tabulators -E poll books Electionware	• Hacking risks – USB, Internet • There is no transparency regarding voting & security processes, no access to slogs, poll tapes, audit logs, or CVRs • Vendor-provided flash drives could contain malware and be used to compromise "air-gapped" systems. • Poor chain of custody	**N biggest RISK** Y/N N	Hand-marked, hand-counted paper ballots are the best option. Need CVRs, audit logs, and poll tapes – free, ongoing access to this data. Note that these reports can be faked and subverted, which is why hand-counting, hand-marked ballots are ideal.

Area	Risk/Issue/concern	Can it be mitigated? Y/N/Maybe	Remediation
	• Potential internet connectivity (Albert sensors) • Requires trust factor with corporations, federal gov, and the state • Federal involvement is concerning	Y Maybe	Transparency is needed around election officials' USB hygiene practices, SOP (Standard Operating Procedure) for chain of custody, training, and other election processes. Remove Albert Sensors & ANY network connectivity to election infrastructure. Allow for independent monitoring (note that can also create a false sense of security as manipulation can occur that independent monitoring can't capture) Detailed information is needed on 3rd party vendor security architecture, secure SDLC (Systems Development Life Cycle), penetration testing results, certification reports, and contracts. Build trust through greater transparency. Control of state elections should remain in the state.
Election Night Reporting	• Many Foreign (SCTYL) or closely held corporations involved	Y	Reporting should be managed locally and never by a foreign-owned company; why is it essential to get this information to the media?

Area	Risk/Issue/concern	Can it be mitigated? Y/N/Maybe	Remediation
			If we hand count results, they will be completed at night's end and reported promptly.
Personnel	• Lack of technical training/IT/IS	Y	Get technical people on the county boards of elections & election commissions. Centralize training and ensure it is robust and consistent. Provide training manuals with operating procedures, etc.
Ancillary equipment	• Commercial off-the-shelf (COTS) components –foreign-made	Y	Hand count paper Ensure scanners, printers, and COTS (Commercial Off the Shelf components) are made in the USA.
Programming	• Mistakes or "by design." • Voters cannot validate barcodes.	Not unless you go to hand-counted, hand-marked ballots	Secure SDLC (software development life cycle), complete source code testing and review; ballot style reviews; check CVRs (Cast Vote Records) for L&A logic and accuracy tests; Risk limiting and hand count audits across all precincts. Note: Most citizens don't understand and cannot read source code, so software should not be used as the primary means of voting The best move is to go to hand-marked, hand-counted paper ballots.

Area	Risk/Issue/concern	Can it be mitigated? Y/N/Maybe	Remediation
Opaque corporations and third-party involvement	• Most states outsource elections to 3rd parties/corporations	Y Y	You can save money and reduce this risk with hand-marked, hand-counted paper ballots or improve transparency as described above and below.
Lack of participation by people/candidates who don't trust the system	• We need to enhance transparency so that people have less suspicion regarding the process.	Y/N	Hand-marked, hand-counted paper ballots are the best solution. Complete transparency is needed from all vendors – financial, technical, and contractual.

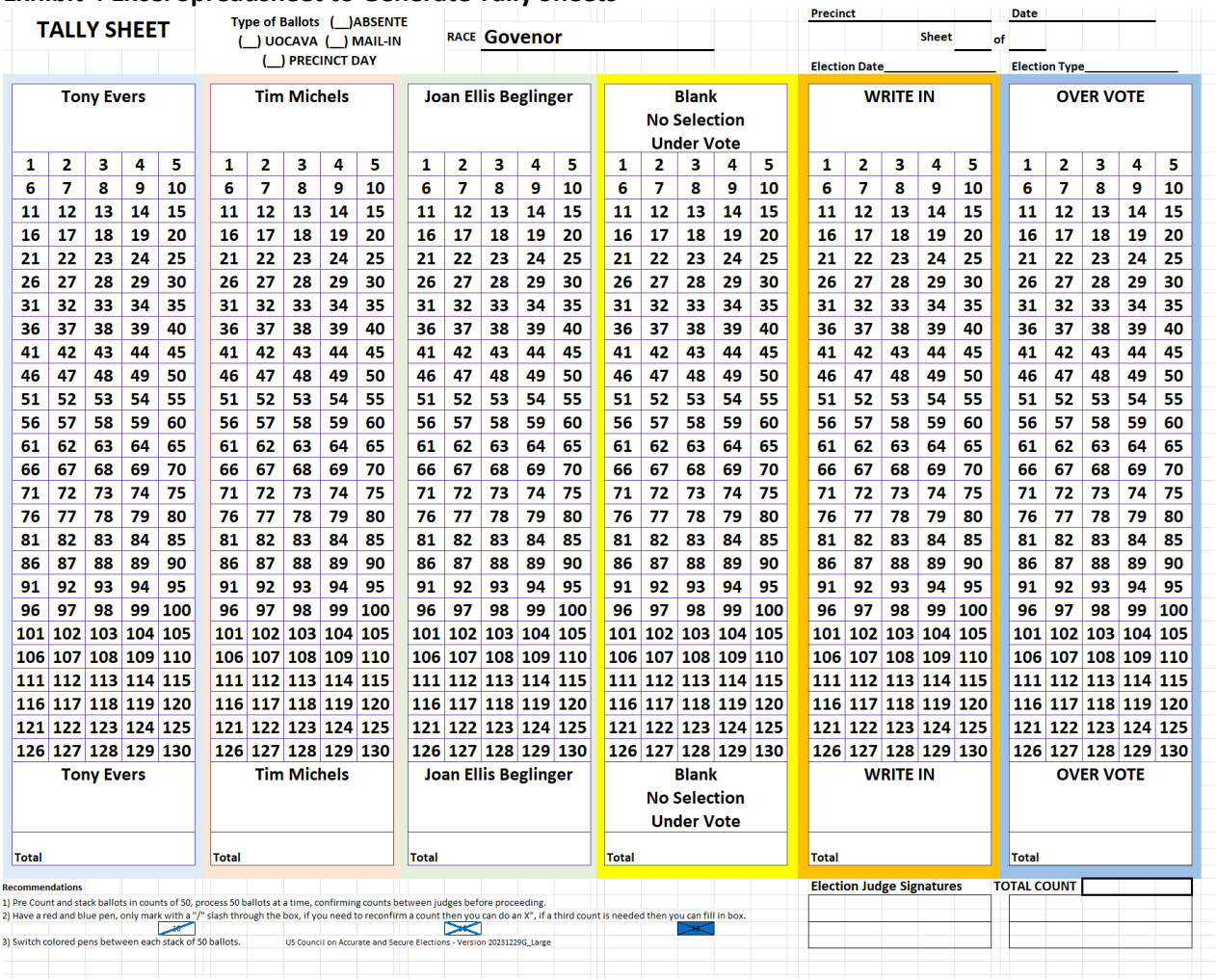
As you can see from the above mitigation matrix, much of the risk can be reduced, if not eliminated, by moving to an actual paper system of hand-marked, hand-counted ballots.

Exhibit 3 Official Results Workbook

County	Dodge County	Precinct	Clyman		Election	General		Election Date		Nov 8th, 2022		Today's Date		Nov 8th, 2022
Official Election Results WorkBook				Seal Number(s)							Number of Ballots Received			
Race	Candidate	Tally 1	Tally 2	Tally 3	Tally 4	Tally 5	Tally 6	Tally 7	Tally 8	Tally 9	Tally 10	Tally 11	Tally 12	Grand Total (1-12)
Gov	Tony Evers													
	Tim Michels													
	Joan Ellis													
	Write-in													
	Blank													
	Over Vote													
												Total Ballots		
AG	Josh Kaul													
	Eric Toney													
	Write-in													
	Blank													
	Over Vote													
												Total Ballots		

- https://img1.wsimg.com/blobby/go/a490ef07-664f-4244-b734-db8ab9a64e8d/downloads/USCASE_Master_OfficialElectionResultsWorkBook.xlsx?ver=1707086437480

Exhibit 4 Excel Spreadsheet to Generate Tally Sheets



TALLY SHEET

Type of Ballots (__)ABSENTE (__) UOCAVA (__) MAIL-IN (__) PRECINCT DAY

RACE **Govenor**

Precinct _____ Date _____

Sheet ____ of ____

Election Date_____ Election Type_____

Tony Evers					Tim Michels					Joan Ellis Beglinger					Blank No Selection Under Vote					WRITE IN					OVER VOTE				
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
6	7	8	9	10	6	7	8	9	10	6	7	8	9	10	6	7	8	9	10	6	7	8	9	10	6	7	8	9	10
11	12	13	14	15	11	12	13	14	15	11	12	13	14	15	11	12	13	14	15	11	12	13	14	15	11	12	13	14	15
16	17	18	19	20	16	17	18	19	20	16	17	18	19	20	16	17	18	19	20	16	17	18	19	20	16	17	18	19	20
21	22	23	24	25	21	22	23	24	25	21	22	23	24	25	21	22	23	24	25	21	22	23	24	25	21	22	23	24	25
26	27	28	29	30	26	27	28	29	30	26	27	28	29	30	26	27	28	29	30	26	27	28	29	30	26	27	28	29	30
31	32	33	34	35	31	32	33	34	35	31	32	33	34	35	31	32	33	34	35	31	32	33	34	35	31	32	33	34	35
36	37	38	39	40	36	37	38	39	40	36	37	38	39	40	36	37	38	39	40	36	37	38	39	40	36	37	38	39	40
41	42	43	44	45	41	42	43	44	45	41	42	43	44	45	41	42	43	44	45	41	42	43	44	45	41	42	43	44	45
46	47	48	49	50	46	47	48	49	50	46	47	48	49	50	46	47	48	49	50	46	47	48	49	50	46	47	48	49	50
51	52	53	54	55	51	52	53	54	55	51	52	53	54	55	51	52	53	54	55	51	52	53	54	55	51	52	53	54	55
56	57	58	59	60	56	57	58	59	60	56	57	58	59	60	56	57	58	59	60	56	57	58	59	60	56	57	58	59	60
61	62	63	64	65	61	62	63	64	65	61	62	63	64	65	61	62	63	64	65	61	62	63	64	65	61	62	63	64	65
66	67	68	69	70	66	67	68	69	70	66	67	68	69	70	66	67	68	69	70	66	67	68	69	70	66	67	68	69	70
71	72	73	74	75	71	72	73	74	75	71	72	73	74	75	71	72	73	74	75	71	72	73	74	75	71	72	73	74	75
76	77	78	79	80	76	77	78	79	80	76	77	78	79	80	76	77	78	79	80	76	77	78	79	80	76	77	78	79	80
81	82	83	84	85	81	82	83	84	85	81	82	83	84	85	81	82	83	84	85	81	82	83	84	85	81	82	83	84	85
86	87	88	89	90	86	87	88	89	90	86	87	88	89	90	86	87	88	89	90	86	87	88	89	90	86	87	88	89	90
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106	107	108	109	110	106	107	108	109	110	106	107	108	109	110	106	107	108	109	110	106	107	108	109	110	106	107	108	109	110
111	112	113	114	115	111	112	113	114	115	111	112	113	114	115	111	112	113	114	115	111	112	113	114	115	111	112	113	114	115
116	117	118	119	120	116	117	118	119	120	116	117	118	119	120	116	117	118	119	120	116	117	118	119	120	116	117	118	119	120
121	122	123	124	125	121	122	123	124	125	121	122	123	124	125	121	122	123	124	125	121	122	123	124	125	121	122	123	124	125
126	127	128	129	130	126	127	128	129	130	126	127	128	129	130	126	127	128	129	130	126	127	128	129	130	126	127	128	129	130
Tony Evers					Tim Michels					Joan Ellis Beglinger					Blank No Selection Under Vote					WRITE IN					OVER VOTE				
Total					Total					Total					Total					Total					Total				

Recommendations

1) Pre Count and stack ballots in counts of 50, process 50 ballots at a time, confirming counts between judges before proceeding.

2) Have a red and blue pen, only mark with a "/" slash through the box, if you need to reconfirm a count then you can do an X", if a third count is needed then you can fill in box.

3) Switch colored pens between each stack of 50 ballots.

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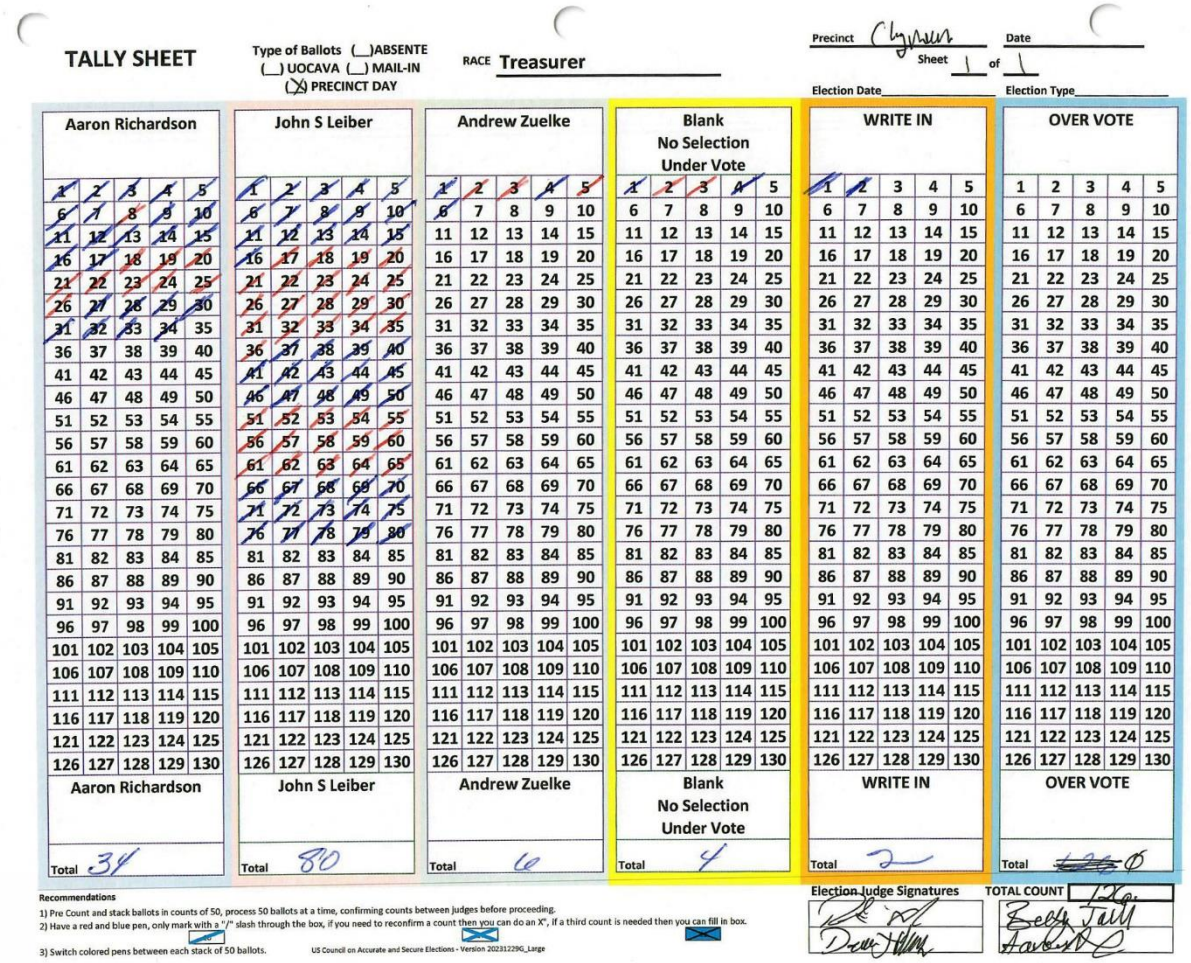
Election Judge Signatures

TOTAL COUNT

— Clyman WI 2022 General Election Example in Excel

https://img1.wsimg.com/blobby/go/a490ef07-664f-4244-b734-db8ab9a64e8d/downloads/USCASE_HAVA_Top_Down_Tally_20231229_RaceTopan.xlsx?ver=1706929587932

Exhibit 5 Example (Treasurer Race for Dodge County WI 2022)



TALLY SHEET

Type of Ballots (__)ABSENTE (__) UOCAVA (__) MAIL-IN (X) PRECINCT DAY

RACE Treasurer

Precinct Clyman Date

Sheet 1 of 1

Election Date Election Type

Aaron Richardson					John S Leiber					Andrew Zuelke					Blank No Selection Under Vote					WRITE IN					OVER VOTE				
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
6	7	8	9	10	6	7	8	9	10	6	7	8	9	10	6	7	8	9	10	6	7	8	9	10	6	7	8	9	10
11	12	13	14	15	11	12	13	14	15	11	12	13	14	15	11	12	13	14	15	11	12	13	14	15	11	12	13	14	15
16	17	18	19	20	16	17	18	19	20	16	17	18	19	20	16	17	18	19	20	16	17	18	19	20	16	17	18	19	20
21	22	23	24	25	21	22	23	24	25	21	22	23	24	25	21	22	23	24	25	21	22	23	24	25	21	22	23	24	25
26	27	28	29	30	26	27	28	29	30	26	27	28	29	30	26	27	28	29	30	26	27	28	29	30	26	27	28	29	30
31	32	33	34	35	31	32	33	34	35	31	32	33	34	35	31	32	33	34	35	31	32	33	34	35	31	32	33	34	35
36	37	38	39	40	36	37	38	39	40	36	37	38	39	40	36	37	38	39	40	36	37	38	39	40	36	37	38	39	40
41	42	43	44	45	41	42	43	44	45	41	42	43	44	45	41	42	43	44	45	41	42	43	44	45	41	42	43	44	45
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51	52	53	54	55	51	52	53	54	55	51	52	53	54	55	51	52	53	54	55	51	52	53	54	55	51	52	53	54	55
56	57	58	59	60	56	57	58	59	60	56	57	58	59	60	56	57	58	59	60	56	57	58	59	60	56	57	58	59	60
61	62	63	64	65	61	62	63	64	65	61	62	63	64	65	61	62	63	64	65	61	62	63	64	65	61	62	63	64	65
66	67	68	69	70	66	67	68	69	70	66	67	68	69	70	66	67	68	69	70	66	67	68	69	70	66	67	68	69	70
71	72	73	74	75	71	72	73	74	75	71	72	73	74	75	71	72	73	74	75	71	72	73	74	75	71	72	73	74	75
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86	87	88	89	90	86	87	88	89	90	86	87	88	89	90	86	87	88	89	90	86	87	88	89	90	86	87	88	89	90
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96	97	98	99	100	96	97	98	99	100	96	97	98	99	100	96	97	98	99	100	96	97	98	99	100	96	97	98	99	100
101	102	103	104	105	101	102	103	104	105	101	102	103	104	105	101	102	103	104	105	101	102	103	104	105	101	102	103	104	105
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121	122	123	124	125	121	122	123	124	125	121	122	123	124	125	121	122	123	124	125	121	122	123	124	125	121	122	123	124	125
126	127	128	129	130	126	127	128	129	130	126	127	128	129	130	126	127	128	129	130	126	127	128	129	130	126	127	128	129	130
Aaron Richardson					John S Leiber					Andrew Zuelke					Blank No Selection Under Vote					WRITE IN					OVER VOTE				
Total 34					Total 80					Total 6					Total 4					Total 2					Total ~~126~~ 0				

Recommendations

1) Pre Count and stack ballots in counts of 50, process 50 ballots at a time, confirming counts between judges before proceeding.

2) Have a red and blue pen, only mark with a "/" slash through the box, if you need to reconfirm a count then you can do an X", if a third count is needed then you can fill in box.

3) Switch colored pens between each stack of 50 ballots.

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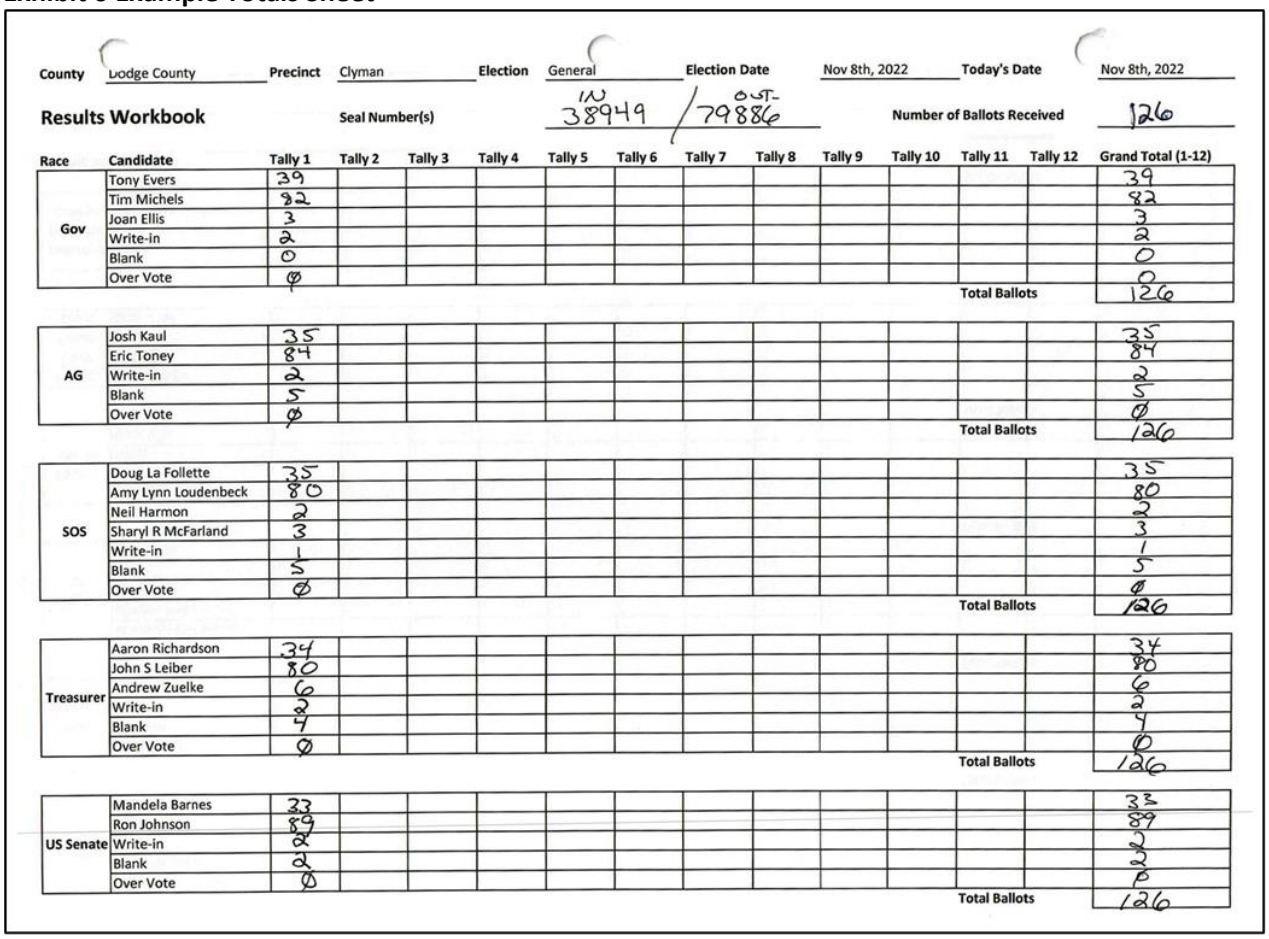
Election Judge Signatures

TOTAL COUNT 126

Exhibit 6 Example Totals Sheet



County Dodge County Precinct Clyman Election General Election Date Nov 8th, 2022 Today's Date Nov 8th, 2022

Results Workbook Seal Number(s) IN 38949 / OUT- 79886 Number of Ballots Received 126

Race	Candidate	Tally 1	Tally 2	Tally 3	Tally 4	Tally 5	Tally 6	Tally 7	Tally 8	Tally 9	Tally 10	Tally 11	Tally 12	Grand Total (1-12)
Gov	Tony Evers	39												39
	Tim Michels	82												82
	Joan Ellis	3												3
	Write-in	2												2
	Blank	0												0
	Over Vote	Ø												0
												Total Ballots		126
AG	Josh Kaul	35												35
	Eric Toney	84												84
	Write-in	2												2
	Blank	5												5
	Over Vote	Ø												Ø
												Total Ballots		126
SOS	Doug La Follette	35												35
	Amy Lynn Loudenbeck	80												80
	Neil Harmon	2												2
	Sharyl R McFarland	3												3
	Write-in	1												1
	Blank	5												5
	Over Vote	Ø												Ø
												Total Ballots		126
Treasurer	Aaron Richardson	34												34
	John S Leiber	80												80
	Andrew Zuelke	6												6
	Write-in	2												2
	Blank	4												4
	Over Vote	Ø												Ø
												Total Ballots		126
US Senate	Mandela Barnes	33												33
	Ron Johnson	89												89
	Write-in	2												2
	Blank	2												2
	Over Vote	Ø												Ø
												Total Ballots		126

Exhibit 7 Provisional Ballots

A provisional ballot records a vote when there are questions about a voter's eligibility, which must be resolved before the vote can be counted. A provisional ballot is issued when the voter's name doesn't appear on the rolls, their eligibility cannot be verified, the voter lacks proper photo ID, or their information is outdated or incorrect.

If this is the case, adjudication should be done publicly, or the voter should be contacted to cure their ballot. If the state conducts ballot hearings after election day, these should be video recorded, and the public can observe. Provisional ballots should be reported and reconciled as a separate category on the state website by county and precinct.

Exhibit 8 ADA Voting

The ADA requires state and local governments and their election officials to ensure that people with disabilities have a full and equal opportunity to vote in all elections. This includes federal, state, and local elections and involves all phases of the process: voter registration, selection of polling place locations, and voting---whether on election day or during early or absentee voting. Registration may require assistance from a special administrator. All county offices and agencies that provide voter registration forms must provide this support.

Curbside voting and special equipment and access (parking, ramps) to the polling places must be available to people with disabilities. ADA-compliant machines should also be available and easily navigable within the polling place.

Here is the checklist for polling places.

https://archive.ada.gov/votingchecklist.htm

https://archive.ada.gov/ada_voting/voting_solutions_ta/polling_place_solutions.htm

Exhibit 9 Summary of Test Findings

Two methods were evaluated: a tally method and a calculator method. Each technique and summary of the test results are explained below.

Summary: Counting per ballot versus per race with the tally method.

Test Description	Variable tested	Results	Comments
Tally sheet hand-count method—two callers, two talliers	Left to right marking counting one ballot at a time; we tested 50 ballots at a time with 11 races	This test took about 50 minutes	Loud noise and distractions, as well as a learning curve
Hand-count Tally Sheet method.	Count each race at a time as opposed to one ballot; same 50 ballots, 11 races	22 minutes for 11 races	This was quicker
			Tips: Utilize binder 3-hole punch for ease of flipping tally sheets Use fingertip moistener pads or rubber fingertips. The table area must be large enough to accommodate six stacks/piles of paper (Two stacks of ballot-sized 11x14 paper for callers, two stacks each for talliers (preferably also 11x14) Tally sheets with color help with concentration and focus vs B&W
Tested top-to-bottom tally sheet versus left-to-right	The layout of the tally sheet	Talliers preferred top-down	Count ballots and pre-label all races; use gel pens of 2 different colors;

Test Description	Variable tested	Results	Comments
Felt tip markers vs pens Try dotting and slashing with marker vs pen	Type of pen	Talliers preferred gel pen	
Tested using rubber fingertips, surgical gloves, and sticky goop to turn the pages	Each caller had their preference.		Have all available for callers Callers also prefer pausing after an infrequent call—write in, over, under
Tested times and productivity of the top-down tally sheet	Call varying races with different numbers of candidates	Actual times ranged from 1:25 to 2minutes	It is beneficial to agree on how to shorten the names so they can be called out. The teams thought using a second color for the recount was better, so starting with blue and recounting in red was suggested. Then, when you get to the subsequent 50 ballots, you can switch to red and recount blue. Overall, they didn't prefer blue or black and wondered if they could do purple and green as colors that would pop more. There is a tradeoff between productivity and accuracy, and there seemed to be a nice cadence pace at around 1:45-2 minutes. If you go faster, it may lead to fatigue or inaccuracies. If it goes too fast, it can create anxiety. For more info and a video demo: https://www.scsafeelections.org/updates/notes-from-our-hand-count-workshop/

Test of Tally Method-USCASE.org- 4 person teams 2 callers, 2 talliers; see details in the appendix

Test Description	Variable tested	Results	Comments
Sort candidates for each race count in stacks of 25	Batches grouped in stacks of 25. A total of 126 ballots	15 minutes for six items/races, 12 minutes for five items, and seven items	One Democrat and one Republican were responsible for reviewing the ballots and calling out one race at a time for all of the ballots before proceeding to the next race; both election judges would review and agree on the winner and make decisions about ballot issues together, for example, voter

Test Description	Variable tested	Results	Comments
			intent issues, while the other side of the table had one Democrat and one Republican with their tally sheets in binders, where they would record the vote called out for each race and each candidate, with a "/'.
	Count per race in batches of 50 for a total of 126 ballots	7-10 minutes per race	
	Count per race in batches of 50 for a total of 126 ballots	7-8 minutes per race	
	Count per race in batches of 50 for a total of 386 ballots	21-24 minutes per race	
Virtual Hand-count test	Counted per race in batches of 50 ballots 11 races in total	Averaged approximately 1:30minutes per batch and roughly 9-10 minutes per race We finished the 11 races and all 250 ballots in roughly 2 ½ hours	Comments: Pause if a different category is mentioned that is not common, ex, Write in, Overvote, Undervote Inflection and pitch are extremely important. Use a different pitch when announcing one name or category versus another. Choose and agree on a shorter first or last name to reduce time. Write that under the formal name before you start. Determine which way you will slant the tally in the box based on whether you are left or right-handed. Move empty columns on the sheet to the right to minimize hand-eye movement Don't forget to switch pen colors every 50 ballots Races where one candidate dominates are quicker to count.

Test Description	Variable tested	Results	Comments
			Use commands such as "Start," "Match," "Switch pens," and "Last Ballot" to save time and for the whole team to hear. Minimize any casual talking; stay focused on the counting. Take a break at least every hour to an hour and a half.

Conclusions from the above test: top-down instead of left-to-right tally sheets were the most productive and had the best times. We can count 50 ballots per race in less than 2 minutes.

Summary of Calculator method test findings– conducted in Texas

Test Description	Variable tested	Results	Comments
Push button custom-made "calculator" with four buttons on each one. Two people, one Dem and one Rep, review and press what is called. One caller who can rotate	250 ballots, 21 races, 42 candidates, a batch of 50 each for five stations, ten people	On average, 250 ballots in 1 hour with the variables listed in column 2	Electricity needed; not required to be certified in TX; counting in pairs; 2 reconciliation methods; pairs within a race are counted – not the entire ballot; no paper trail for how the tally was achieved, but the camera video would show it; correcting a mistake is very easy –push the red button; training was easy in the numerous simulations done in TX; setup is simple after a couple of practices.
	Two cameras per station: one over the ballots, one over each station; a room camera would be ideal	Video can be recorded and live streamed where feasible or recorded only and posted on the county website or the party's website the next day.	Each ballot can be seen and recounted without expensive recounts; no poll watchers are needed; mistakes can be found easily by replaying the video; manipulating the footage would be astronomically mathematically impracticable, but if done, the fraudulent result would conflict with the paper result so that a recount would be done immediately.

Exhibit 10 – Estimate of Costs of Tally Method Hand-counting

Here are the costs for the materials necessary for the count. A cost analysis for South Dakota comparing the ongoing costs of an electronic system versus a hand count system is provided in Exhibit 1.

General Cost Estimates for Hand-counting

Assumptions:

- Precinct size must be kept to a maximum of 1,500
- Maximum turnout for the most significant general elections is approximately 65%
- Typical productivity, including breaks, is about 100 ballots per hour per 4-person team

Item	Per unit cost	#items needed for 1500 elector precinct 3 teams	Total cost 3 teams	Upfront cost for added transparency 3 teams
People/workers	$30/hour 3 hours	13 3 teams of 4 plus supervisor	$1,170.00	
BIC Cristal Xtra Smooth Ballpoint Pen, Medium Point (1.0mm) 10 for $1.57 on Amazon	$1.57 for 10		2.00	
Tally sheets	500 sheets of 28lb paper =$21		$21.00	
Binders 1 inch	$2.50 for 2	3	$7.50	
Tripod for overhead mount of camera(s) for video (with clamp)	$80	3		$240
Camera for video of counting/ballot	Android (refurbished) A12 $105	3		$315
Laptop for live feed (optional)	$500	3		$1500
Total ongoing			$1,200.50	
Total upfront investment				$2010

iPhone/Android holder – https://www.sweetwater.com/store/detail/CompLightKit--joby-compact-light-kit
Android - (Walmart) - https://www.walmart.com/ip/SAMSUNG-Galaxy-A12-A125U-32GB-GSM-CDMA-Unlocked-Android-Smartphone-US-Version-Black/883787164?wmlspartner=wlpa&selectedSellerId=101016675

Optional for ballot handling: Fingertip moistener or surgical gloves, etc.- optional Lee Sortkwik™ Fingertip Moistener,50% Recycled, 0.63 Oz, Pink, Pack Of 3 $6.77; Swingline Rubber Fingertips, Medium, Size 11-1/2, Finger Cots, 12 Pack (54035) $3.79

Exhibit 11 – Video Demonstration of the Calculator Method

Here is a video of Clint Curtis explaining the method in detail.

Click here to watch: https://rumble.com/embed/v4cgd0q/?pub=10a4fb

Estimate of Retail Pricing for Calculator Method

One Counting Station – 2 people

2 Calculators - $50 x 2 = $100
2 Paper Trays - $15 x 2 - $30
2 Samsung Android A12 - $100 x 2 = $200
1 Tripod with 2 Selfie Sticks - $50-$80
Power Block - $15
Clapper Cards on card stock – depends upon how many pairs of candidates and bulk pricing
Batch Totals Sheets - depends upon how many pairs of candidates and bulk pricing
Pens - $1.57 for 10
1 Laptop per precinct or location- $500
Router - $28
Power Cables for A12s - $6 x 2 = $12
Staffing – 2 per counting station – pay scale determined by County

Approximate total retail pricing for each counting station = $500.This estimate does not include personnel costs and does not include the laptop.

See the Emergency Checklist in Exhibit 12 below

Exhibit 12-Gold Standard Emergency Plan Checklist

- ☐ Train all poll workers and judges before the election to ensure they are ready to respond to an unforeseen event; ensure your election officials approve the plan.
- ☐ Confirm that emergency ballots are printed for each polling location (check your state laws)
    - Note: some states allow emergency/provisional ballots, some will enable the use of regular paper in severe emergencies
    - Consider using the ballots meant for the Ballot Marking Devices as a piece of paper voters can vote on.
- ☐ Make sure that each poll location has a backup paper roster/poll book that can be used to check voters in; some states require this.
    - These paper poll books need to be rerun each day of early voting to note those voters who voted to prevent double voting.
- ☐ Print tally sheets and other summary sheets (see Appendix)
- ☐ Have Materials ready
    - Gel pens with at least three colors—have multiple pens on hand if some run out of ink. (Red, Blue, Purple)
    - 2 – 3 Ring Binders – 1" wide per station (place tally sheets in binder)
    - Silicone fingertips mixed sizes, surgical gloves, or SORTKWIK fingertip moistener to aid in flipping ballots or tally sheets
    - Pre-Printed Tally Sheets in Color
    - 2 Pre-Printed "Official Election Results Workbooks" – each for box and auditor
    - Cameras, laptops, and tripods to video record ballots and
    - Overall workspace with comfortable chairs and large enough eight foot-table for each team of hand counters (250 ballots)
- ☐ Alert your county board or other representative in the event of an emergency
- ☐ Have voters sign the paper roster/poll books and verify their ID and or address according to your state laws
- ☐ Have the voter fill out the ballots with black ballpoint pens
- ☐ Place in sealed container(s) or box(es)
- ☐ Make sure to follow strict chain of custody rules and procedures with ballots sealed and transfers witnessed at the appropriate times.
- ☐ Once voting is over, open the boxes and count all the ballots; perform ballot reconciliation # total ballots started= # voted+ # spoiled + # blank/remaining.
- ☐ Sort ballots by precinct and separate for each team to process by precinct.
- ☐ Stack ballots in batches of 25 or 50; number each batch on your sheet and provide it to the talliers
- ☐ Remember to count each race separately.
- ☐ Proceed as in the training video provided: https://rumble.com/v5api6c-how-to-handcount-ballots-for-an-election-efficiently.html.
- ☐ Make sure to seal counted ballots in your containers after counting and do another ballot count to confirm the totals.
- ☐ Complete and sign summary total sheets and report the results to the county.

X. Notes

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