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Test Plan for State of Colorado Certification Testing
Clear Ballot Group ClearVote 2.1 Voting System

Version: 00 (Initial Release)

Date: 12/16/2019

SIGNATURES

Approved by: Michael Walker — 12/16/2019

Michael Walker, VSTL Project Manager — Date

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REVISIONS

Revision	Description	Date
00	Initial Release	12/16/2019

1.0 INTRODUCTION

The purpose of this Test Plan is to document the procedures that Pro V&V, Inc. will follow to perform certification testing of the Clear Ballot Group ClearVote 2.1 System to the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG), Version 1.0 and the voting systems requirements set forth by the State of Colorado.

At test conclusion, the results of all testing performed as part of this test campaign will be presented in a final report.

1.1 Scope

The scope of this testing event will incorporate a sufficient spectrum of physical and functional tests to verify that certain ClearVote 2.1 features and applications, which have been modified from the previously certified baseline system, conform to the applicable EAC 2005 VVSG 1.0 and the State of Colorado Requirements. Specifically, the testing event has the following goals:

- Verify that the ClearVote 2.1 System meets the applicable Colorado-specific requirements for voting systems
- Evaluate the ClearVote 2.1 System to the applicable requirements of the FEC 2002 VSS *(Note: Testing was performed per the EAC 2005 VVSG, which encompasses the requirements for the evaluation of voting systems set forth in the FEC 2002 VSS; therefore, systems tested to the EAC 2005 VVSG will satisfy the requirements of the FEC 2002 VSS).*
- Ensure the ClearVote 2.1 System provides support for all Colorado election management requirements (i.e. ballot design, results reporting, recounts, etc.).
- Simulate pre-election, Election Day, absentee, recounts, and post-election activities on the ClearVote 2.1 System and corresponding components of the EMS.
- Source Code Review, Compliance Builds, and Build Documentation Review
- Physical Configuration Audit (PCA), including System Loads and Hardening
- Functional Configuration Audit (FCA)
- System Integration Testing, including Accuracy Testing and Regression Testing
- Security Testing

Clear Ballot Group has identified the following modifications from the baseline system:

ClearDesign

- Enhancements:
  - The string "::Preview::" has changed to "Report" in the margin headers when printing reports.
  - ClearDesign now invalidates card layouts when the controlling contest for straight-party voting changes.
  - The controlling contest for straight-party voting now displays only the parties of candidates which appear on that individual ballot.
- Code-maintenance upgrades
- Fixed Defects:
  - You can now directly change the value of the Straight Party Type field from Exclusive to One Touch. Previously, if the value of the Straight Party field was Exclusive, you had to change it to another value before changing it to One Touch.
  - Bulleted and numbered lists in ballot elements, such as headers and contests, now appear the same on the screen and in print. Previously, lists appeared differently on the screen and in print.
  - The entity styles for Choice: Candidates no longer override the entity styles for Voter Groups.
  - The PrecinctReportingName and PrecinctName fields now export in the appropriate order in the ballot definition file (BDF).

ClearAccess

- Enhancements:
  - Conditional straight-party voting—only parties that have a candidate represented on a given ballot style are represented in the straight-party contest.
- Fixed defects
  - The Back button now works correctly on the Select Vote Center screen.

- Previously, when you were logged in as an Election Administrator, a Change Vote Center button appeared on the No Election Loaded screen. Clicking this button did not accomplish anything. This button no longer appears.

- In the System Log for ClearAccess, the header cell Valid has changed to Validate.

ClearCount

- Enhancements:

  - For straight-party contests, jurisdictions can set up ballots that list only the candidates who have a specified party affiliation. This feature is called *conditional straight party voting* (SPV).

    - Reports correctly list the vote totals by style for straight-party contests. Reports indicate that a party does not have an oval by showing 0 votes for that party.

    - The Card Resolutions tool no longer allows users to show parties that do not have party ovals on a particular ballot style.

    - The XML output reflects these changes. If a style or geography does not have a vote oval for a party, the XML indicates 0 votes for that party.

  - Allow manually resolved ovals to show on the Vote Visualization page:

    - Users can now toggle between showing automatically adjudicated ovals, manually adjudicated ovals, or both.

    - A border with a dashed line indicates a manually resolved oval.

  - The Card Resolutions tool contains the following enhancements:

    - Visual indicators enable users to differentiate between implicit and explicit votes in the Card Resolutions tool and Vote Visualization tool. This change affects both primary preference and straight-party contests.

    - When a user saves a card in the Card Resolutions tool and no ovals have changed, ClearCount displays a message. This message has changed.

    - When a user reopens a card in the Card Resolutions tool that was visually resolved as Multiple, the Card Resolutions tool shows how the card was resolved.

    - Users can deselect an implicitly overridden choice.

- Add support for write-in name assignment:
    - A new database table was added to support write-in names.
    - All contests with write-ins have a default ‘Invalid’ write-in name.
    - This release implements a back end for the contests with write-ins filter.
    - There is a new Contents with Write-ins report that lists all contests that have write-in candidates and the total number of write-ins, assigned write-ins, and unassigned write-ins. User access this page from the report menu.
    - There is a new Write-in Candidates by Contest report page that lists all the write-in candidates, their number of assignments, and total votes.
    - The Election Log records when WIT candidate names are added, changed, deleted and when assignments are made.
    - There is a new Write-in Assignments tool that displays the write-ins and allows the user to assign the write-in to a write-in name. Users access this page by using the hyperlink values on the Contents with Write-ins report.
- ClearCount no longer uses Flash. Menus that previously used Flash look different, but retain all previous options.
- ClearCount switched from the 'c' compile twain library to the pytwain library.
- ClearCount no longer supports Firefox.
- Unused precinct variables have been removed from the XML generation code.

- Fixed defects
    - In Google Chrome, Print Table for long reports is now larger to improve readability.
    - In Google Chrome, the bottom line of drop-down list was previously missing in the Allow Display of Vote Totals dialog. This issue is fixed.
    - With single-row cross-endorsement, when the bottom choice in the Card Resolutions tool wrapped, the height of Contest Editor previously did not adjust correctly. This issue is fixed.

The Colorado Requirements Matrix was reviewed to determine the scope of this testing. All required tests identified in the matrix will be evaluated against the ClearVote 2.0 federal test campaign to determine which tests were met. In cases where federal testing does not cover state requirements, specific testing will be conducted.

To evaluate the test requirements, each section of the EAC 2005 VVSG will be analyzed, along with the Colorado Requirements Matrix, to determine the applicable tests. The EAC 2005 VVSG Volume I Sections, along with the strategy of evaluation, are described below:

Section 2: Functional Requirements
The requirements in this section shall be tested during the FCA, Accuracy, and System Integration Test. This evaluation will utilize baseline test cases as well as specifically designed test cases and will include predefined election definitions for the input data.

Section 3: Usability and Accessibility Requirements
The requirements in this section shall be tested during the Usability and Accessibility Testing. This evaluation will utilize baseline test cases as well as specifically designed test cases and will include predefined election definitions for the input data.

Section 4: Hardware Requirements
The requirements in this section will not be tested during this state certification effort as results shall be re-used from previous test campaigns.

Section 5: Software Requirements
The requirements in this section shall be tested utilizing a combination of review and functional testing during the Source Code Review, TDP Review, and FCA.

Section 6: Telecommunications Requirements
The requirements in this section will not be tested during this test campaign.

Section 7: Security Requirements
The requirements in this section shall be tested during the Source Code Review, Security Tests, and FCA.

Section 8: Quality Assurance Requirements
The requirements in this section will not be tested during this state certification effort as results shall be re-used from previous test campaigns.

Section 9: Configuration Management Requirements
The requirements in this section will not be tested during this state certification effort as results shall be re-used from previous test campaigns.

As testing is performed, the Colorado Requirements Matrix will be updated to reflect that each requirements is being met and which campaign (Federal or State) the requirements was addressed in.

1.2 References

- Colorado Secretary of State Election Rules [8 CCR 1505-1] Rule 21
- Clear Ballot ClearVote Colorado Requirements Matrix dated December 9, 2019.
- Federal Election Commission (FEC) 2002 Voting Systems Standards (VSS)
- Election Assistance Commission 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, Volume I, "Voting System Performance Guidelines", and Volume II, "National Certification Testing Guidelines"
- Election Assistance Commission Testing and Certification Program Manual, Version 2.0
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 2.0
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2016 Edition, "NVLAP Procedures and General Requirements (NIST Handbook 150)", dated July 2016
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, "Voting System Testing (NIST Handbook 150-22)", dated May 2008
- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Pro V&V, Inc. Quality Assurance Manual, Revision 7.0
- EAC Requests for Interpretation (RFI) (listed on www.eac.gov)
- EAC Notices of Clarification (NOC) (listed on www.eac.gov)
- Clear Ballot Group's Technical Data Package *(A listing of the ClearVote 2.1 documents submitted for this test campaign is listed in Section 4.6 of this Test Plan)*

1.2 Terms and Abbreviations

This subsection lists terms and abbreviations relevant to the hardware, the software, or this Test Plan.

"ADA" – Americans with Disabilities Act 1990

"CM" – Configuration Management

"COTS" – Commercial Off-The-Shelf

"DRE" – Direct Record Electronic

"EAC" – United States Election Assistance Commission

"EMS" – Election Management System

"FCA" – Functional Configuration Audit

"HAVA" – Help America Vote Act

"ISO" – International Organization for Standardization

"NOC" – Notice of Clarification

"PCA" – Physical Configuration Audit

"QA" – Quality Assurance

"RFI" – Request for Interpretation

"TDP" – Technical Data Package

"UPS" – Uninterruptible Power Supply

"VSTL" – Voting System Test Laboratory

"VVSG" – Voluntary Voting System Guidelines

1.3 Testing Responsibilities

All testing will be conducted under the guidance of Pro V&V by personnel verified by Pro V&V to be qualified to perform the testing. The examination shall be performed at the Pro V&V, Inc. test facility located in Huntsville, AL.

1.3.1 Project Schedule

The Project Schedule for the test campaign is located in Appendix A – Project Schedule. The dates on the schedule are not firm dates but planned estimates based on the anticipated project work flow.

1.3.2 Test Case Development

To verify that the system meets the applicable requirements, Pro V&V will utilize baseline test cases augmented with supplemental test cases designed specifically for the system being evaluated in this test campaign.

2.0 TEST CANDIDATE

The following sections contain a product description and an overview of the design methodology of the ClearVote 2.1 Voting System, as taken from the Clear Ballot Group technical documentation.

2.1 System Overview

The ClearVote 2.1 Voting System is a paper-based optical scan voting system consisting of the following major components: ClearDesign (ballot design and EMS), ClearCount (central count, tabulation, and reporting), and ClearAccess (accessible voting and ballot marking device).

ClearDesign

ClearDesign is an Election Management System consisting of an interactive set of applications which are responsible for all pre-voting activities necessary for defining and managing elections. This includes ballot design, ballot proofing, ballot layout, and ballot production. The ClearDesign system consists of the physical components listed below. All of the components are unmodified COTS that are connected via a wired, closed, and isolated network not connected to any other systems or the internet.

- DesignServer: A laptop or desktop computer running the ClearDesign software and hosting its election database and the web server that serves its election reports.

- DesignStation(s): One or more laptop or desktop computers used to connect to the DesignServer. A browser is used to perform the necessary tasks. A user with administration privileges will be able to define users and manage the elections.
- Network Switch: Used to connect the DesignStations to the DesignServer using a wired, closed Ethernet.

ClearCount

ClearCount is a central, high-speed, optical scan ballot tabulator coupled with ballot processing applications. The ClearCount software runs on unmodified COTS laptop or desktop computers running the Windows operating system and supports specific models of scanners. The ClearCount central-count system consists of the physical components listed below. All of the components are unmodified COTS that are connected via a wired, closed, and isolated network not connected to any other systems or the internet.

- ScanServer: A laptop or desktop computer running the ClearCount software and hosting its election database and the web server that serves its election reports.
- ScanStation(s): One or more laptop or desktop/scanner pairs used to scan and tabulate ballots.
- Network Switch: Used to connect the ScanStations to the ScanServer using a wired, closed Ethernet.
- Election Administration Station and/or Adjudication Station: One or more Windows laptop or desktop computers installed with browser software, linked by a wired Ethernet connection to the ScanServer using the network switch. This station can serve multiple uses: user administration, election administration, adjudication, and reporting.

All files that make up the ClearCount software reside on a single ScanServer that is shared by all client ScanStations. The Tabulator software is executed by the ScanStations at run-time from files that reside on the ScanServer. The only software programs that have to be installed on ScanStations, apart from the Windows operating system, are the software and drivers required by the scanner hardware.

The ClearCount software consists of the following components:

- Tabulator: The Tabulator application handles ballot tabulation. The Tabulator software is stored on the ScanServer and an instance of Tabulator runs on each ScanStation. The Tabulator program analyzes the incoming images and transfers them to the local output folder named CBGBallotImages. The ScanServer retrieves the images from the folder and uploads them into the Election database.
- Election Database: A centralized election database that resides on the ScanServer and collects the output of each Tabulator.
- Election Reports: A browser-based suite of reports that provides election results and analysis and allows election officials to review individual ballot images. A web server on the ScanServer serves the reports.
- Card Resolutions tool: A web application that allows election officials to review and appropriately resolve unreadable voted ballots.

- User and Election Database Management through browser-based applications: On the User Administration dashboard, the administrator can add, rename, or delete users, assign permissions, and change user passwords. On the Election Administration dashboard, the administrator can create or delete an election, set an election as active, and backup or restore an election.

ClearAccess

ClearAccess is an accessible touchscreen ballot marking device (BMD) used for the creation of paper ballots that can be scanned and tabulated by ClearCount. The ClearAccess software runs on unmodified COTS laptop computers / tablets running a Windows operating system and supports specific models of accessible input devices.

2.2 Block Diagrams

The system overview of the submitted voting system is depicted in Figures 1-1 and 1-2.

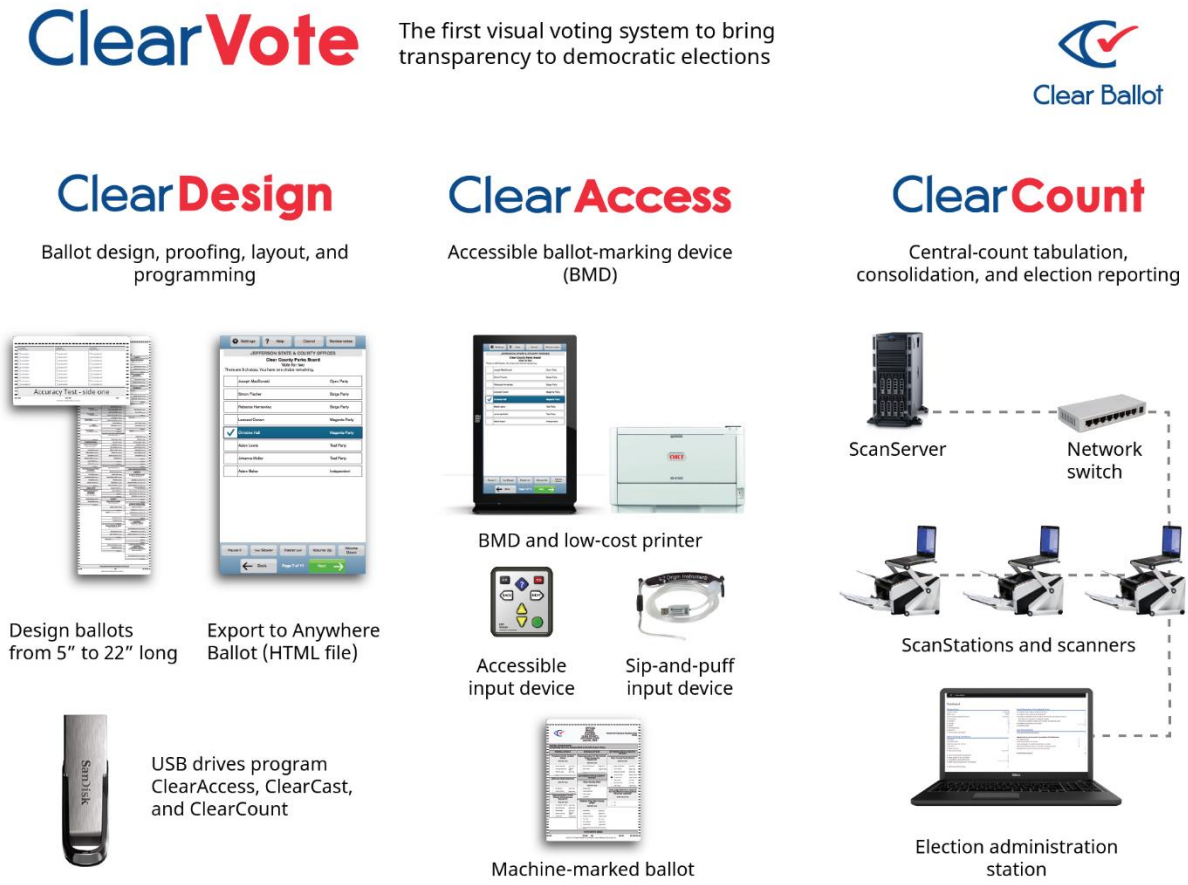

Figure 1-1. ClearVote 2.1 product family

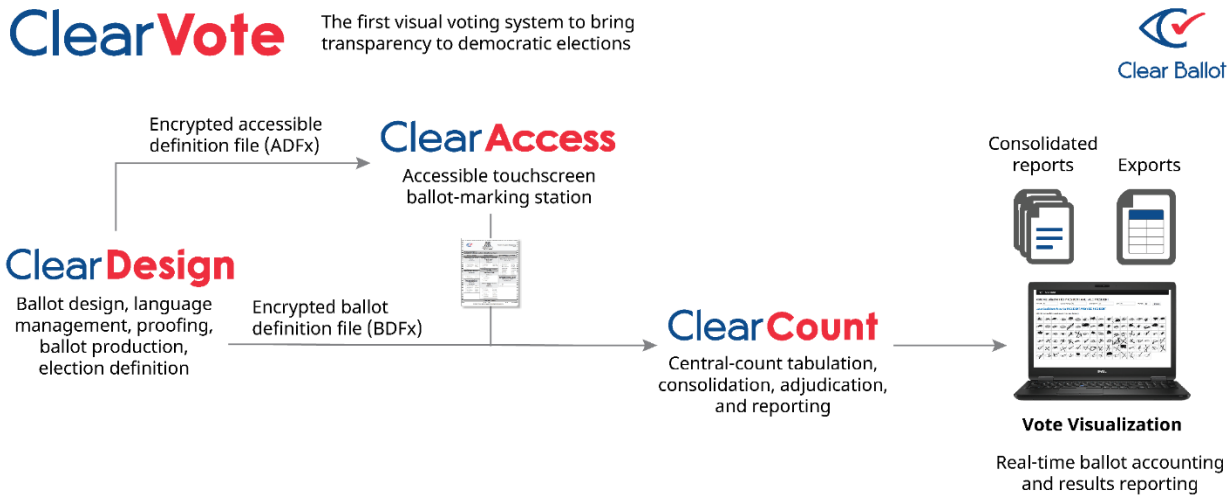

Figure 1-2. ClearVote 2.1 component relationship

2.3 Test Configuration

The testing event will utilize one setup of the ClearVote 2.1 System and its components. The following is a breakdown of the ClearVote 2.1 System components and configurations for the test setup:

Standard Testing Platform:

The standard testing platform will consist of one ClearVote 2.1 System in a standalone configuration. In the pre-election phase of testing, ballots will be created utilizing ClearDesign, the EMS component of the ClearVote 2.1 System. Ballot styles will then be imported into ClearAccess for ballot marking. Once ballots are marked and the polls are closed, ballot reconciliation procedures will be performed and the ballots will be tabulated by ClearCount, the central count tabulation and reporting component of the ClearVote 2.1 System.

3.0 MATERIALS REQUIRED FOR TESTING

The following sections list all materials needed to enable the test engagement to occur.

The materials required for testing of the ClearVote 2.1 Voting System include all materials to enable the test campaign to occur. This includes the applicable hardware and software as well as the TDP, test support materials, and deliverable materials, as described in the following subsections.

3.1 Software

This subsection lists the proprietary and COTS software to be provided by the manufacturer as part of the test campaign. The individual components are compiled to create the ClearVote 2.1 Voting System.

Table 3-1. ClearVote 2.1 Voting System Software

Firmware/Software	Version
ClearDesign Components, Version 2.1	
Windows	10 Pro 1607
Google Chrome	55.0.2883.87
Ubuntu	18.04.1 LTS
MySQL	5.7.26
Apache	2.4.18
libapache2-mod-fcgid	2.3.9
PhantomJS	1.9.8
Unzip	6.0.21
Samba	4.7.6
Python PIP	9.0.1
Zip	3.0.11

Table 3-1. ClearVote 2.1 Voting System Software *(continued)*

Firmware/Software	Version
Pyinstaller	3.2.1
Python JSMIN	2.2.1
Python	2.7.15
Python webpy	0.38
Python MySQL DB	1.3.10
SQLAlchemy	1.3.3
Python Pillow	5.1.0
Python Flup	1.0.2
Python DBUtils	1.3
Python XLRD	1.2.0
Python FontTools library	3.41.0
Python RTF	0.2.1
OpenSSL (FIPS)	2.0.10
OpenSSL	1.0.2g
DataTable	1.10.16
DataTable-Buttons	1.4.2
DataTable-Buttons-JSZip	2.5.0
DataTable-Buttons-Pdfmake	0.1.32
DataTablePlugins	1.10.16
bootstrap	3.0.0
jquery	2.2.4
jquery-impromptu	6.2.3
jquery-qrcode	1.0
jquery-splitter	0.27.1
jquery-ui	1.12.1
jscolor	1.4.2
tinymce	4.1.9
libmp3lame	0.5.0
jszip	3.2.0
papaparse	4.6.0
jsmin	12/4/2003
ClearAccess Components, Version 2.1	
Windows	10 Pro 1607
Google Chrome	61.0.3163.100
nsis	3.01
PyInstaller	3.2
Python	2.7.10

Table 3-1. ClearVote 2.1 Voting System Software *(continued)*

Firmware/Software	Version
webpy	0.38
Python-future	0.15.2
pefile	2018.8.8
pywin	223
jquery	1.10.2
DataTables	1.10.16
jsmin	2003-12-04
Zebra scanner driver	3.04.0011
ClearCount Components, Version 2.1	
Windows	10 Pro 1607
Google Chrome	55.0.2883.87
Ubuntu	18.04.1 LTS
Apache	2.4.29
libapache2-mod-fcgid	2.3.9
Python(part of Ubuntu)	2.7.15
MySQLdb (part of Ubuntu)	5.7.26
PyInstaller	3.2.1
PollyReports	1.7.6
python-lxml	4.2.1-1ubuntu0.1
DataTable-Buttons	1.5.6
DataTable-Buttons-JSZip	2.5.0
DataTable-Buttons-Pdfmake	0.1.36
OpenSSL	1.1.0g
OpenSSL FIPS Object Module	2.0.10
JavaScript Bootstrap library	2.3.2
JavaScript Chosen library	1.8.7
JavaScript jQuery library	1.10.2
J JavaScript jQuery-migrate library	1.2.1
JavaScript DataTables library	1.10.18
JavaScript FixedHeader library	3.1.4
JavaScript hotkeys library	0.8
JavaScript tooltip library	1.3
JavaScript pep library	1.0
JavaScript LESS library	1.3.3
Fujitsu fi-6400/fi-7800	PaperStream 1.30.0
Fujitsu fi-6800/fi-7900	PaperStream 10.10.710
Fujitsu fi-7180	PaperStream 1.4.0
Aptitude	0.8.10-6ubuntu1

Table 3-1. ClearVote 2.1 Voting System Software *(continued)*

Firmware/Software	Version
auditd	2.8.2
debconf	1.5.66
pmount	0.9.23
Samba	4.7.6
udisks	2.7.6

3.2 Equipment

This subsection lists the proprietary and COTS equipment provided by the manufacturer as part of the test campaign.

For COTS equipment, every effort will be made to verify that the COTS equipment has not been modified for use. This will be accomplished by performing research using the COTS equipment manufacturer's websites based on the serial numbers and service tag numbers for each piece of equipment. Assigned test personnel will evaluate COTS hardware, system software and communications components for proven performance in commercial applications other than voting. For PCs, laptops, and servers, the service tag information will be compared to the system information found on each machine. Physical external and internal examination will also be performed when the equipment is easily accessible without the possibility of damage. Hard drives, RAM memory, and other components will be examined to verify that the components match the information found on the COTS equipment manufacturer's websites.

Table 3-2. ClearVote 2.1 Voting System Equipment

Component	Model	Serial Number
ClearDesign Components		
Dell Latitude Laptop (client)	5580, 5590, 5500	CF3L3G2, B5TD1N2, 3C3M9Y2
Dell OptiPlex (client)	7440, XE3 SFF	JXDFHH2
Dell Precision Tower (client)	T3620	GSKRMV2 & GSKSMN2
Dell PowerEdge Server (server)	T130, T140, T440, R440, T630	5G0YLN2, 8BFH3W2, H6JZLN2, GCHLHL2
Dell 27 inch Monitor	P2717H and P2719H	CWKZRS2 3MK2RS2
Dell 24 inch Monitor	SE2416H	FVWV5G2
Dell 22 inch Monitor	E2216HV	36765D2 & 90665D2
Dell 22 inch Monitor	P2217H and P2219H	FV8C8W2 DLV88W2
Cisco 8-Port Switch	SG250-08	PSZ21451MLJ
LG DVD Burner	GP65NB60	LG-DVD-001
Anker 10 port USB 3.0 Hub	AK-68ANHUB-B10A	22XGHFWC, 22XGHGKX

Table 3-2. ClearVote 2.1 Voting System Equipment *(continued)*

Component	Model	Serial Number
SySTOR Multiple USB Duplicator	SYS-USBD-11	ES-27095
Corsair Flash Padlock 3 32 GB	Secure USB 3.0 Flash Drive	CMFPLA3B-32GB
SanDisk Extreme Go 64 GB USB	3.1 USB Drive	SDCZ800-064G-G46
SanDisk Ultra Flair 32 GB USB	3.0 Drive	SDCZ73-032G-A46, SDCZ73-032G-G46
ClearAccess Components		
ELO 15 inch AIO	E-Series (ESY15E2)	L17C014810 & A18C004080
Dell OptiPlex AIO	5250	HCGMGK2
Oki Data Laser Printer	B432dn	AK5B007647A0 & AK91021454C0
ELO 20 inch AIO	X-Series (ESY20X2)	D18Q000334, D18Q000335, B18Q001601, B18Q001599 & B18Q000597
Oki Data Laser Printer	B432dn-B	AK8C017016C0, AK8C017022C0
Dell Inspiron 15”	7573	80S1YD2
Clear Ballot Transport Case	CV-1022-2.0	Case-001
Clear Ballot UPS Transport Case	CV-1157-2.0	UPS-Case-001
Micrologic Tray Kit	B432TrayKit	CBG-MTK-001
Zebra Technologies Bar Code Scanner and cable	DS457-SR, CBL-58926-05	18059000501984, 18059000501981, 18095000500487, 18095000500491
Storm EZ Access Keypad	EZ08-22201, EZ-08-22301	15000005, 19040072
Origin Instruments Sip/Puff Breeze with Headset	AC-0300-MU	CBG-SP-001, 002, 003
Samson Over-Ear Stereo Headphones	SASR350	SR350J8G390 & SR350J8G396
Clear Ballot Privacy Screen	CB-1097-1.5	CBG-PVS-001
Ergotron Neo-Flex	Widescreen Lift Stand	33-329-085
Corsair Flash Padlock 3 32 GB	Secure USB 3.0 Flash Drive	CMFPLA3B-32GB
SanDisk Extreme Go 64 GB USB	3.1 USB Drive	SDCZ800-064G-G46
SanDisk Ultra Flair 32 GB USB	3.0 Drive	SDCZ73-032G-A46, SDCZ73-032G-G46
Wurth	742-711-32, 742-712-22, 742-717-22	FRT021 through FRT025

Table 3-2. ClearVote 2.1 Voting System Equipment *(continued)*

Component	Model	Serial Number
Polymide Film Tape	1" 2 mil	CV-1210-2.0
Polymide Film Tape	2" 2 mil	CV-1211-2.0
Polymide Film Tape	4" 2 mil	CV-1212-2.0
APC Smart-UPS	SMT2200C	AS1809160852
Lifetime 4-Foot Folding Table	4428	FT-001
LG DVD Burner	GP65NB60	LG-DVD-002
CyberPower Smart App UPS	PR1500RT2U	PY3HZ2002933, PY3HZ2003000
ClearCount Components		
Dell Latitude Laptops (ScanStation)	5580, 5590, 5500	2F3L3G2, 9W5D1N2, JV3WXY2
Dell Precision Tower (Election Administration)	T3620	GSKQMN2
Dell Latitude Laptops (Election Administration)	5580, 5590, 5500	C9S22G2, 5M5D1N2
Dell PowerEdge Server (ScanServer)	T130, T140, T330, T440, R440	5G0ZLN2, 8BFJ3W2, FHV9RD2, H6J5MN2, 55FDB03
Dell OptiPlex (Election Administration)	7440, XE3 SFF	JXDFHH2, 93XDB03
Fujitsu Scanner	fi-7180	A20DC10302 & A20D000798
Fujitsu Scanner	fi-6800	A9HCA00737 & A9HCC00543
Fujitsu Scanner	fi-6400	AKHCC00362 & AKHCC00609
Fujitsu Scanner	fi-7800	C39C000034
Fujitsu Scanner	Fi-7900	C30C000270
Fujitsu Scanner Imprinter	CG01000-531101	Imprinter-001
LG DVD Burner	GP65NB60	LG-DVD-003
Western Digital 4 TB External HD	WDBFJK0040HBK-NESN, WDBBGB0040HBK-NESN	WCC7K7YF11ZD
Western Digital 8 TB External HD	WDBFJK0080HBK-NESN, WDBBGB0080HBK-NESN	75H4PXJD
Netac Keypad Encryption Portable Hard Disk	K390 (86024554)	R4JT22619T
Dell 27 inch Monitor	P2717H and P2719H	CWKZRS2 3MK2RS2
Dell 24 inch Monitor	P2415Q	3TZSJ92

Table 3-2. ClearVote 2.1 Voting System Equipment *(continued)*

Component	Model	Serial Number
Dell 22 inch Monitor	P2217H and P2219H	7818672, FV8C8W2 DLV88W2
Cisco 8-Port Switch	SG250-08	PSZ21451MYX
Cisco 26-Port Switch	SG250-26	DNI203400A6 & DNI203400AW
Corsair Flash Padlock 3 32 GB	Secure USB 3.0 Flash Drive	CMFPLA3B-32GB
SanDisk Extreme Go 64 GB USB	3.1 USB Drive	SDCZ800-064G-G46
SanDisk Ultra Flair 32 GB USB	3.0 Drive	SDCZ73-032G-A46, SDCZ73-032G-G46
Anker USB Hub	AK-68ANHUB-B10A	22XGHFWC, 22XGHGKX
APC Smart-UPS	SMT-1500C	3S1831X12280
WorkEZ Executive Scanning Shelf	WEEs (661799222990), WEEb (661799222983)	CBG-EZ-001, 002,003, & 004
StarTech 4-Port VGA KVM Switch w/Hub	SV431USB	G73011TG80247
Brother Laser Printer	HL-L2340DW	U63879M4N62861
Brother Laser Printer	HL-L2350DW	U6496A8N238333

3.3 Technical Data Package

A listing of all documents contained in the ClearVote 2.1 TDP is provided in Table 3-3.

Table 3-3. TDP Documents

Document Number	Description	Version
ClearVote Documents		
100101-10017	ClearVote 2.1 Approved Parts List	1.2
100067-10017	ClearVote 2.1 Ballot Stock and Printing Specification	1.0.12
100057-10017	ClearVote 2.1 Configuration Management Plan	1.0.17
100069-10017	ClearVote 2.1 Glossary	1.0.11
100058-10017	ClearVote 2.1 Personnel Deployment and Training Plan	1.0.12
100059-10017	ClearVote 2.1 Quality Assurance Program	1.0.13
100086-10017	ClearVote 2.1 Security Policy	1.0.13
100071-10017	ClearVote 2.1 System Overview	1.1.1
100073-10017	ClearVote 2.1 Test and Verification Specification	1.0.13

Table 3-3. TDP Documents *(continued)*

Document Number	Description	Version
100128-10017	ClearVote 2.1 Change Notes	1.0.1
ClearDesign Documents		
100011-10017	ClearDesign 2.1 Acceptance Test Checklist	1.0.7
100062-10017	ClearDesign 2.1 Administration Guide	1.0.10
100133-10017	ClearDesign 2.1 Accessible Definition File Guide	1.0.1
100131-10017	ClearDesign 2.1 Ballot Definition File Guide	1.0.1
100083-10017	ClearDesign 2.1 Build Procedures	1.0.8
100103-10017	ClearDesign 2.1 Database Specification	1.0.7
100046-10017	ClearDesign 2.1 Functionality Description	1.0.13
100098-10017	ClearDesign 2.1 Hardware Specification	1.0.11
100063-10017	ClearDesign 2.1 Installation Guide	1.0.24
100082-10017	ClearDesign 2.1 Maintenance Guide	1.0.11
100045-10017	ClearDesign 2.1 Security Specification	1.0.13
100072-10017	ClearDesign 2.1 Software and Design Specification	1.0.19
100074-10017	ClearDesign 2.1 System Identification Guide	1.1.1
100043-10017	ClearDesign 2.1 System Overview	1.0.15
100041-10017	ClearDesign 2.1 User Guide	2.0.12
ClearCount Documents		
100102-10017	ClearCount 2.1 Acceptance Test Checklist	1.0.11
100005-10017	ClearCount 2.1 Database Specification	1.1
100004-10017	ClearCount 2.1 Election Administration Guide	1.0.18
100006-10017	ClearCount 2.1 Election Preparation and Installation Guide	1.2.10
100021-10017	ClearCount 2.1 Functionality Description	1.0.13
100022-10017	ClearCount 2.1 Hardware Specification	1.0.13
100023-10017	ClearCount 2.1 Maintenance Guide	1.0.14
100070-10017	ClearCount 2.1 Reporting Guide	1.1.1
100013-10017	ClearCount 2.1 Scanner Operator Guide	1.1.7
100026-10017	ClearCount 2.1 Security Specification	1.0.13
100019-10017	ClearCount 2.1 Software Design and Specification	1.0.14
100047-10017	ClearCount 2.1 System Identification Guide	1.1.1

Table 3-3. TDP Documents *(continued)*

Document Number	Description	Version
100024-10017	ClearCount 2.1 System Operations Procedures	1.0.12
100025-10017	ClearCount 2.1 System Overview	1.0.13
100009-10017	ClearCount 2.1 Build Procedures	1.6.1
100130-10017	ClearCount 2.1 Quick Guide XML Report Conversion Tool	---
ClearAccess Documents		
100109-10017	ClearAccess 2.1 Acceptance Test Checklist	1.1.2
100051-10017	ClearAccess 2.1 Build Procedures	1.1.2
100049-10017	ClearAccess 2.1 Functionality Description	1.5.4
100126-10017	ClearAccess 2.1 Hardware Compliance Addendum	---
100085-10017	ClearAccess 2.1 Hardware Specification	1.5.2
100053-10017	ClearAccess 2.1 Installation Guide	1.7.6
100052-10017	ClearAccess 2.1 Maintenance Guide	1.8.2
100054-10017	ClearAccess 2.1 Poll Worker Guide	1.8.3
100050-10017	ClearAccess 2.1 Security Specification	1.4.8
100099-10017	ClearAccess 2.1 Software Design and Specification	1.5.2
100055-10017	ClearAccess 2.1 Supervisor Guide	1.8.3
100038-10016	ClearAccess 2.1 System Identification Guide	1.2.1
100044-10017	ClearAccess 2.1 System Overview	1.6.5
100056-10017	ClearAccess 2.1 Voter Guide	1.1.5

3.4 Test Support Materials

This subsection lists the test materials required to execute the required tests throughout the test campaign.

The following materials are expected to be supplied by Clear Ballot to facilitate testing:

- USB Flash Drives, 32 and 64 GB capacity
- Test Decks
- Power Cords
- Ballot Paper, 60-pound cover or 90-pound index or similar paper for results reports
- Labels
- Other materials and equipment as required

4.0 TEST PROCESS

Certification testing of the Clear Ballot Group ClearVote 2.1 Voting System submitted for evaluation will be performed to verify that the ClearVote 2.1 System conforms to the State of Colorado Requirements. The Colorado Requirements Matrix dated December 9, 2019, will be used as a guide to determine the specific tests to be performed. Pro V&V will develop test procedures designed to evaluate the system being tested against the stated requirements. The test procedures can be executed independently.

Prior to execution of the required test procedures, the system under test will undergo testing initialization. The testing initialization will seek to establish the baseline for testing and ensure that the testing candidate matches the expecting testing candidate and that all equipment and supplies are present.

The following will be completed during the testing initialization:

- Ensure proper system of equipment. Check network connections, power cords, keys, etc.
- Check version numbers of (system) software and firmware on all components.
- Verify the presence of only the documented COTS.
- Ensure removable media is clean
- Ensure batteries are fully charged.
- Inspect supplies and test decks.
- Record protective counter on all tabulators.
- Review physical security measures of all equipment.
- Record basic observations of the testing setup and review.
- Record serial numbers of equipment.
- Retain proof of version numbers.

The evaluation areas for this test engagement are summarized in the subsections below.

4.1 Functional Configuration Audit (FCA)

Functional Configuration Audit (FCA) – This area of testing targets the specific functionality claimed by the manufacturer to ensure the product functions as documented. This testing uses both positive and negative test data to test the robustness of the system. The FCA encompasses an examination of manufacturer tests, and the conduct of additional tests, to verify that the system hardware and software perform all the functions

described in the manufacturer's documentation submitted in the TDP (such as system operations, voter manual, maintenance, and diagnostic testing manuals). It includes a test of system operations in the sequence in which they would normally be performed. These system operations and functional capabilities are categorized as follows by the phase of election activity in which they are required:

- Overall System Capabilities: These functional capabilities apply throughout the election process. They include security, accuracy, integrity, system audit ability, election management system, vote tabulation, ballot counters, telecommunications, and data retention.

- Pre-voting Capabilities: These functional capabilities are used to prepare the voting system for voting. They include ballot preparation, the preparation of election-specific software (including firmware), the production of ballots, the installation of ballots and ballot counting software (including firmware), and system and equipment tests.

- Voting System Capabilities: These functional capabilities include all operations conducted at the polling place by voters and officials including the generation of status messages.

- Post-voting Capabilities: These functional capabilities apply after all votes have been cast. They include closing the polling place; obtaining reports by voting machine, polling place, and precinct; obtaining consolidated reports; and obtaining reports of audit trails.

- Maintenance, Transportation and Storage Capabilities: These capabilities are necessary to maintain, transport, and store voting system equipment.

4.2 Accuracy

Accuracy – The accuracy test ensures that the voting system components can process ballot positions within the allowable target error rate. This test is designed to test the ability of the system to "capture, record, store, consolidate, and report" specific voter selections and absences of a selection.

4.3 System Integration

System Integration – The system level certification tests address the integration of the hardware and software. This testing focuses on the compatibility of the voting system software components and subsystems with one another and with other components of the voting system. During test performance, the system is configured as would be for normal field use.

4.4 Physical Configuration Audit (PCA)

Physical Configuration Audit (PCA) – The PCA compares the voting system components submitted for testing to the manufacturer's technical documentation.

4.5 Source Code Review

Pro V&V will review the submitted source code to the EAC 2005 VVSG and the manufacturer-submitted coding standards. Prior to initiating the software review, Pro V&V shall verify that the submitted documentation is sufficient to enable: (1) a review of the source code and (2) Pro V&V to design and conduct tests at every level of the software structure to verify that design specifications and performance guidelines are met.

4.6 Source Code Review

During the execution of this test case, the system shall be inspected for various controls and measure that are in place to meet the objectives of the security standards which include: protection of the critical elements of the voting system; establishing and maintaining controls to minimize errors; protection from intentional manipulation, fraud and malicious mischief; identifying fraudulent or erroneous changes to the voting system; and protecting the secrecy in the voting process.

5.0 CONDITIONS OF SATISFACTION

The ClearVote 2.1 voting system will be evaluated against the Colorado Requirements Matrix, which incorporates the 2002 VSS requirements and the Colorado-specific requirements in the Colorado Secretary of State Election Rules [8 CCR 1505-1] Rule 21. Throughout this test campaign, Pro V&V will execute tests, inspect resultant data and perform technical documentation reviews to ensure that each applicable requirement is met.

6.0 TEST FINDINGS

At test conclusion, a Test Report, completed Requirements Matrix, and associated test cases will be generated documenting all findings. Pro V&V will follow standard requirements for the format of the Test Report. The Recommendation section of the Test Report will follow the requirements of the NIST 150 Handbook for opinions and interpretations.

APPENDIX A – Project Schedule

TDP	**11/18/19**	**01/14/20**
Initial Review	11/18/19	12/03/19
Compliance Review	12/04/19	12/27/19
Final review	12/30/19	01/14/20
Test Plan	11/18/19	12/09/19
Test Plan Creation	11/18/19	12/03/19
Vendor Review & Comments	12/04/19	12/05/19
Approved Test Plan	12/06/19	12/09/19
Source Code	**11/18/19**	**11/26/19**
Automated Review	11/18/19	11/19/19
Source Code Review	11/18/19	11/22/19
Source Code Re-Review	11/20/19	11/21/19
Document Review	11/22/19	11/22/19
Compliance Build	11/25/19	11/26/19
System Delivery & Setup	**11/18/19**	**12/04/19**
PCA	11/18/19	11/22/19
System Setup	11/25/19	11/27/19
System Loads & Hardening	12/02/19	12/04/19
System Level Testing	**12/05/19**	**01/15/20**
FCA	12/05/19	12/20/19
Accuracy	12/26/19	12/30/19
Regression Testing	01/02/20	01/02/20
Trusted Build	01/03/20	01/07/20
System Loads & Hardening	01/08/20	01/10/20
System Integration	01/13/20	01/15/20
Test Report	**01/08/20**	**01/23/20**
Test Report Creation	01/08/20	01/21/20
Vendor Review & Comments	01/22/20	01/22/20
Approved Test Report	01/23/20	01/23/20