Test Report for EAC 2005 VVSG 1.0 Certification Testing MicroVote EMS 4.41 Voting System

EAC Project Number: MVTEMS441

Version: 02

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SIGNATURES

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REVISIONS

Revision	Description	Date
00	Initial Release	08/25/2020
01	Updated to resolve EAC comments	08/28/2020
02	Final Version with highlights removed	09/04/2020

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1.0   INTRODUCTION

The purpose of this Test Report is to document the procedures that Pro V&V, Inc. followed to perform certification testing during a system modification campaign for the MicroVote EMS 4.41 Voting 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. Certification testing of EMS 4.41 was performed to ensure the applicable requirements of the EAC VVSG 1.0 and the EAC Testing and Certification Program Manual, Version 2.0 were met. Additionally, all EAC Request for Interpretations (RFI) and Notices of Clarification (NOC) relevant to the system under test were incorporated in the test campaign.

Prior to submitting the voting system for testing, MicroVote submitted an application package to the EAC for certification of the EMS 4.41 Voting System. The application was accepted by the EAC and the project was assigned the unique Project Number of MVTEMS441.

The EMS 4.41 EAC-approved test plan, which is available for viewing on the EAC's website at www.eac.gov, was utilized as the guiding document during test performance. Since test plan approval, and as testing progressed, minor system modifications, such as revised system documentation, were incorporated. This test report reflects all of the testing completed and details the final versions of all technical documentation and system components and supersedes the approved test plan.

Unless otherwise annotated, all testing was conducted at the Pro V&V test facility located in Huntsville, AL, by personnel verified by Pro V&V to be qualified to perform the test.

1.1   Description and Overview of EAC Certified System Being Modified

EMS 4.41 is a modification to a previously certified system and has not yet been fielded. The EMS 4.41 software functionality is divided by activity, based on each stage of the election. These activities are further divided into five modes, all building on each other to complete the election process: Administration, Election Setup, Ballot Setup, Programming & Printing, and Vote Tabulation. These modes combined, working together capture:

- Creating and maintaining default preferences and settings for a specific jurisdiction.

- Creating and maintaining preferences and settings for an election.

- Creating and maintaining security clearances for all users of EMS.

- Creating primary, general or both types of elections or municipal elections.

- Creating offices and filing candidates.

- Creating and maintaining all objects appearing on the ballot.

- Printing ballots.

- Programming voting devices.

- Printing reports of election data.

- Tallying election results.

- Generating reports of election results for state reporting systems, media displays, or printing.

- Creating and restoring backup files of election databases for archival purposes

The Administration mode is the system setup stage. This mode includes: Preferences, Political Parties, Vote Types, Precincts, Ballot Text, Ballot Graphics, Equipment, Equipment Assignment, and Security. Election Setup Reports reflecting each form are also available.

The Election Setup, Ballot Setup, and Programming & Printing modes are all pre-election activities. The Election Setup includes entering offices, filing candidates, creating secondary vote lockouts. In Ballot Setup, users create and edit ballots, build activations, and assign precincts. Programming & Printing includes programming voting machines and Smart Cards, previewing and printing ballots, and assigning voting panels to locations.

Phonetics, text-to-speech, option is built into EMS. All pronunciation of words, names or phrases can be altered for better listening comprehension. Reports are available for Election and Ballot setup for further election setup auditing.

EMS 4.41 includes support for an optional Voter Verifiable Printed Audit Trail (VVPAT) printer to be attached to the MicroVote Infinity voting panel. The EMS user can set the number of allowed voter voids (1-5) during the voting session and optional QR code printed on each ballot which contains ballot header information and ballot selections.

The Vote Tabulation mode is the final mode during which all tabulations and final results are produced. Election Night Reporting mode reports reflect the results as they are tabulated.

The EMS software supports the MicroVote Infinity voting panel with optional VVPAT printer attached. This panel is a direct recording electronic (DRE) device, and is connected to EMS via a serial port. Data/Vote tabulations exchange between the EMS and the Infinity machine is done directly through the serial port or via a Smart Card programmed for each election. OMR Ballot Cards, sometimes referred to as Absentee Cards, are optically scanned by a Chatsworth ACP 2200 reader.

Several COTS hardware items and software are used with the EMS software. EMS is designed to be used with Microsoft Windows 10 Pro X86/X64, and is installed on a Dell computer desktop and/or laptop. The database software is SQL Server 2017 Express. There is a COTS DOUBLETALK LT text-to-speech converter box attached to the Infinity machine. There are also COTS Smart Cards and Smart Card readers/writers. All OMR/Absentee ballot cards are optically scanned by the ACP 2200 reader.

1.1.1 Baseline Certified System

The EAC Certified System that is the baseline for the submitted modification is described in the following subsections. All information presented was derived from the previous Certification Test Report, the EAC Certificate of Conformance and/or the System Overview.

The EAC-certified system that is the baseline system for this modification is the EMS 4.4 Voting System. The tables below describe the certified equipment and firmware versions. Detailed descriptions of the EMS 4.4 test campaign are contained in Pro V&V Report No. TR-01-01-MVT-002-01.01, which is available for viewing on the EAC's website at www.eac.gov.

Table 1-1. EMS 4.4 System Components

EMS 4.4 SYSTEM SOFTWARE	
Firmware/Software	**Version**
Proprietary	
Election Management Software (EMS)	4.4
Infinity Panel Rev. D	4.30
Infinity Panel Rev. E	4.40
COTS	
Microsoft Windows 10 Professional	1909
Microsoft Visual Studio 2017 Professional	15.9
ComponentOne Ultimate 2014	1
Advanced Installer	16.4.1
Advanced Installer Extension for Visual Studio 2017	16.5
EMS 4.4 SYSTEM HARDWARE	
Component	**Serial Number**
Proprietary	
Infinity Voting Panel (Rev D) w/Power Supply	11588
Infinity Voting Panel (Rev E) w/Power Supply	14009, 14010
VVPAT (Rev A) w/Power Supply	001011, 001100
COTS	
Tripp Lite Portable Surge Protector (TRAVELCUBE)	[MVT-TC-001], [MVT-TC-002]
Minuteman UPS (EP1000LCD)	AK11190890004

Table 1-1. EMS 4.4 System Components (continued)

Component	Serial Number
APC Back-UPS Pro (BN1100M2)	3B1925X63177, 3B1925X63227
Dell Latitude 5580 Laptop w/Power Supply	51LG8H2, 5DL1RN2
USB Smart Card Reader (PC USB TR PIV) w/Stand (HWP109380 B)	113101316600170
EMS Download Cable	CC06789-06, [MVT-DC-001]
USB-RS232 Converter	USA000106043, USA000155787
Seiko Instruments Printer (DPU-3445) w/Power Supply	2008922A
DoubleTalk LT	[MVT-DT-001]
Hamilton Buhl (PRM100B)	[MVT-HB-001]
Chatsworth Data (ACP-2200)	CDT021901537, CDT121901544
Head Stick	[MVT-HS-001]

1.2   References

- Election Assistance Commission 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, Volume I, "Voting System Performance Guidelines"

- Election Assistance Commission 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, 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, "NVLAP Procedures and General Requirements (NIST Handbook 150-2016)", 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

- Election Assistance Commission "Approval of Voting System Testing Application Package" letter dated August 24, 2020

- EAC Requests for Interpretation (RFI) (listed on www.eac.gov)

- EAC Notices of Clarification (NOC) (listed on www.eac.gov)

- MicroVote EMS 4.41 Technical Data Package *(A listing of the EMS 4.41 documents submitted for this test campaign is listed in Section 3.1 of this Test Report)*

- MicroVote TDP Section 2.13 System Change Notes, Election Management System, Version 1.18, dated 11/07/2019

1.3   Terms and Abbreviations

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

"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

"NIST" – National Institute of Standards and Technology

"NOC" – Notice of Clarification

"NVLAP" – National Voluntary Laboratory Accreditation Program

"PCA" – Physical Configuration Audit

"QA" – Quality Assurance

"RFI" – Request for Interpretation

"TDP" – Technical Data Package

"VSTL" – Voting System Test Laboratory

"VVPAT" – Voter Verifiable Paper Audit Trail

"VVSG" – Voluntary Voting System Guidelines

2.0   CERTIFICATION TEST BACKGROUND

EMS 4.41 is a modification of a previously certified system (EMS 4.4).

Pro V&V performed an evaluation of results from the previous test campaign to determine the scope of testing required for certification of the EMS 4.41. Based on this evaluation, Pro V&V

determined that testing from the previous test campaign would establish the baseline and that the focus of this test campaign would be on the documented system updates.

No prior non-VSTL testing of the EMS 4.41 modifications were considered for this test campaign.

2.1 Revision History

The table below details the version history of the EMS 4.41 System:

Table 2-1. EMS 4.41 System Revision History

System Version	Certification Type	Baseline System	Certification Number
EMS 4.0	New System	--- (Original System)---	MVTEMS4
EMS 4.0B	Modification	EMS 4.0	MVTEMS40B
EMS 4.1	Modification	EMS 4.0B	MVTEMS41
EMS 4.2	Modification	EMS 4.1	MVTEMS42
EMS 4.4	Modification	EMS 4.2	MVTEMS44
EMS 4.41	Modification	EMS 4.4	MVTEMS441*

*Upon grant of certification by the EAC

2.2 Scope of Testing

The scope of testing was limited to the modifications made to the previously certified EMS 4.4 Voting System. Prior to test initiation, Pro V&V performed an evaluation of the results from the previous test campaign along with the changes made to the system to determine the scope of testing required for certification of the EMS 4.41. Based on this evaluation, Pro V&V determined that testing from the previous test campaigns would establish the baseline and that the focus of this test campaign would be on the system updates.

It was determined the following tasks would be required to verify compliance of the modifications:

- Technical Data Package (TDP) Review

  A limited TDP Review was performed to ensure that all submitted modifications were accurately documented and that the documents met the requirements of the EAC 2005 VVSG.

- Physical Configuration Audit (PCA)

  A PCA was performed to compare the voting system submitted for certification testing to the manufacturer's technical documentation.

- Source Code Review, Compliance Build, Trusted Build, and Build Document Review

  A source code review was performed based on the source code changes made since the previous system was certified. To perform the source code review, Pro V&V reviewed the submitted source code to the EAC VVSG 1.0 and the manufacturer-submitted coding

standards. Prior to initiating the software review, Pro V&V verified that the submitted documentation was 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.

- EMS and System Functional Regression Testing

Functional Regression Testing was conducted on the EMS to establish assurance that the modifications had no adverse impact on the compliance, integrity, or performance of the system. As part of this area of testing, a smoke test was performed by executing an election utilizing every component of the previously certified equipment.

2.2.1 Modification Overview

The submitted modification for the EMS 4.41 test campaign is a source code modification to the baseline EMS 4.4 system EMS software. This modification (V4.4.7.0 -> V4.4.8.0) allows the system to display running precinct count in addition to running batch count. Revising the frmOMR.vb module in EMS V4.4.7.0 improves batch processing for scanning large numbers of mail-in absentee ballots by displaying running total of precinct ballots scanned in addition to running total for current batch of ballots being scanned. This change will make it easier to break up large numbers of received ballots to scan into smaller batches for processing while still displaying the overall number of ballots scanned for each precinct. *Note: This modification is documented in MicroVote ECN 127, which was submitted for review following final certification of EMS 4.4.*

2.2.2 System Overview

The MicroVote EMS 4.41 Voting System is comprised of the following components: EMS Software Version 4.4, Infinity Panel Rev. E, Infinity Panel Rev. D, and optional VVPAT, as described in Section 1.1 of this report. The materials identified by the manufacturer as materials deliverable to the end user for the EMS 4.41 system are identified below

Table 2-2. EMS 4.41 System Deliverables

Material	Version	Description
EMS Software	4.4	Election Management Software
Infinity Panel	Rev E	DRE precinct count/accessible voting station
Infinity Panel	Rev D	DRE precinct count/accessible voting station
VVPAT	Rev A	Voter Verifiable Paper Audit Trail

2.2.2.1 System Diagram

The system overview of the EMS 4.41 voting system is depicted in Figure 1-1.
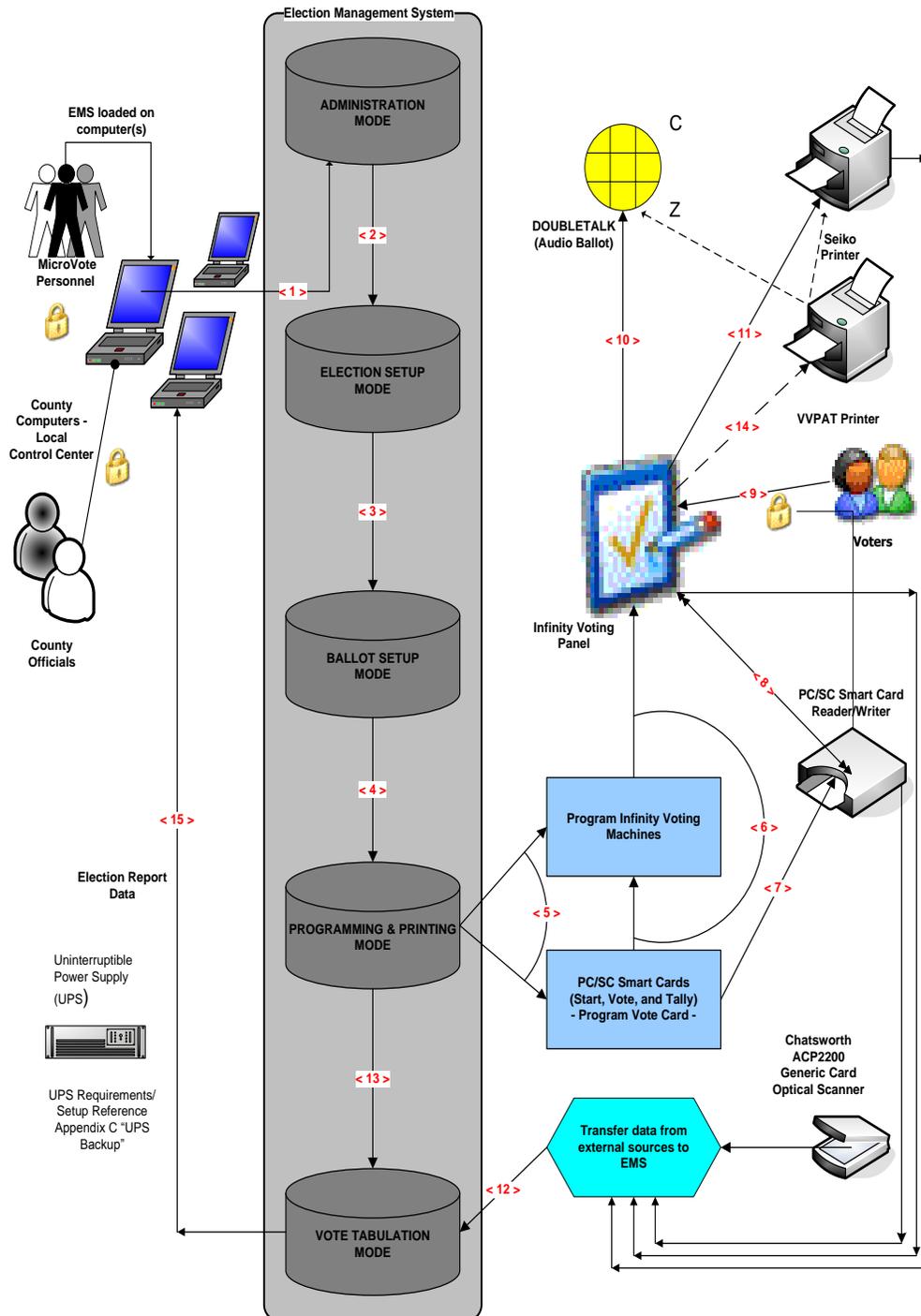

Figure 1-1. EMS 4.41 System Overview

2.2.2.2 Supported Functionality

There were no changes made to the supported functionality of the voting system. The supported functionality for the submitted voting system remains unchanged from the previously certified version.

- General Election
- Closed Primary
- Open Primary
- Partisan/Non-Partisan Offices
- Write-In Voting
- Primary Presidential Delegation Nominations
- Split Precincts
- Vote for N of M
- Provisional/Challenged Ballots
- Straight Party Voting
- Cross-party Endorsement

2.2.2.3 Supported Languages

The following languages are supported by EMS 4.41:

- English
- Spanish
- optional third language, including pictographic

Support for each stated languages was verified. Both English and Spanish language ballots were cast during the performance of functional testing. Additionally, one character based language (Chinese) was tested during System Integration Testing.

Testing of the Chinese language was accomplished through the creation and execution of both a primary and general election verifying the translations could be used by Chinese minority language voters. The translations themselves were taken from an online translator (Google Translate). The translations were then copied and pasted into the qualified EMS ballot text fields using Windows Notepad. In order for the Infinity Panel to recognize the Chinese characters, a number of special reserved ballot text objects were activated, as covered in MicroVote TDP *Appendix B: Third Language Support of the EMS User Manual*.

2.2.2.4 System Limits

There were no changes to the system limits. The system limitations supporting EMS 4.41 are provided in the table below:

Table 2-3. EMS 4.41 System Limitations

Characteristic	Limiting Component	Evaluated	Manufacturer Calculated		
			EMS	Infinity	ACP 2200
Maximum Ballot Positions	Ballot Design Form	300	600	600	402
Maximum Precincts in Election	Precinct Number	600	9,999	9,999	9,999
Maximum Contests in Election	Contests in Ballot Style * Ballot Styles/Election	100	300,000	2,999,700	2,009,799
Maximum Candidates/ Counters in Election	Precinct Counters * Total Precincts	300	5,989,401	5,989,401	4,019,598
Maximum Candidates/ Counters in Precinct	Ballot Design Form	300	599	599	402
Maximum Candidates/ Counters in Activation	Ballot Design Form	300	599	599	402
Maximum Ballot Styles in Election	Ballot Style Number	300	1000	9999	1000
Maximum Contests in a Ballot Style	Ballot Design Form	100	300	300	201
Maximum Candidates in a Contest	Ballot Design Form	300	599	599	401
Maximum Count for any Precinct Element	Transact-SQL Bigint	600	*Note 1*	65,000	*Note 1*
Maximum Ballot Styles in a Precinct	Precinct Style Assignment Form	1	1	1	1
Maximum Activations per Ballot Style	Build Activations Form	25	99	30	99
Maximum Activations per Election	Act/Ballot Style * Ballot Style/Elec	1500	99,000	299,970	299,970
Maximum Number of Parties	Party Code Combinations	10	50,653	598	400
Maximum Vote For in Contest	Office Vote Limit	60	99	64	99

Note 1: 9,223,372,036,854,770,000

2.2.3 VVSG

The EMS 4.41 Voting System was evaluated against the relevant requirements contained in the EAC 2005 VVSG, Volumes I and II.

2.2.4 RFIs

There are no RFIs released by the EAC as of the date of this Test Report that pertained to this test campaign that were not in effect at the time of the baseline system certification.

2.2.5 NOCs

There are no NOCs released by the EAC as of the date of this Test Report that pertained to this test campaign that were not in effect at the time of the baseline system certification.

3.0 TEST FINDINGS AND RECOMMENDATIONS

EMS 4.41 was evaluated against the relevant requirements contained in the EAC 2005 VVSG, Volumes I and II. The focus of this test campaign was on the modification to the voting system EMS software source code. All requirements that were excluded from the previous test campaign (EMS 4.4), were also deemed not applicable to this test campaign due to the submitted modification not impacting the specific requirements.

The summary findings and recommendations for each area of testing are provided in the following sections.

3.1 Summary Findings and Recommendation

Summary findings for the System Level Testing (FCA), PCA, and Source Code Review are detailed in the relevant sections of this report. In addition to these areas of testing, a limited TDP Review was performed, as described below.

Technical Documentation Package (TDP) Review

In order to determine compliance of the modified TDP documents with the EAC VVSG 1.0, a limited TDP review was conducted. This review focused on TDP documents that have been modified since the certification of the baseline system. The review consisted of a compliance review to verify that each regulatory, state, or manufacturer-stated requirement had been met based on the context of each requirement.

Results of the review of each document were entered on the TDP Review Checklist and reported to the manufacturer for disposition of any anomalies. This process was ongoing until all anomalies were resolved. Any revised documents during the TDP review process were compared with the previous document revision to determine changes made, and the document was re-reviewed to determine whether subject requirements had been met. A listing of all documents contained in the EMS 4.41 TDP is provided in Table 3-1.

Table 3-1: EMS 4.41 TDP Documents

Section	Description	Version
---	Technical Data Package (TDP) TABLE OF CONTENTS Election Management System	1.1
2.1	SCOPE Election Management System	1.2
2.2	SYSTEM OVERVIEW Election Management System	1.16
2.3	SYSTEM FUNCTIONALITY DESCRIPTION Election Management System	1.3
2.4	SYSTEM HARDWARE SPECIFICATION Election Management System	1.4
2.5	SOFTWARE DESIGN AND SPECIFICATION Election Management System	2.11
2.6	SYSTEM SECURITY SPECIFICATION Election Management System	1.10
2.7	SYSTEM TEST AND VERIFICATION SPECIFICATION Election Management System	1.3
2.8	SYSTEM OPERATION PROCEDURES Election Management System	1.3
2.9	SYSTEM MAINTENACE PROCEDURES Election Management System	1.4
2.10	PERSONNEL DEPOYMENT AND TRAINING REQUIREMENTS Election Management System	1.1
2.11	CONFIGURATION MANAGEMENT PLAN Election Management System	1.7
2.12	QUALITY ASSURANCE PROGRAM Election Management System	1.4
2.13	SYSTEM CHANGE NOTES Election Management System	1.18
---	Appendices TABLE OF CONTENTS Election Management System	1.9

3.1.1 Source Code Review

Pro V&V reviewed the submitted source code to the EAC VVSG 1.0 and the manufacturer-submitted coding standards. Prior to initiating the software review, Pro V&V verified that the submitted documentation was 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.

A combination of Automated Source Code Review and Manual Source Code Review methods were used to review the changes in the source code from the previously certified EMS 4.4 voting system. In addition, 10% of the source code comments will be manually reviewed.

- Automated Source Code Review: The Automated Source Code Review was performed during the EMS 4.41 Compliance and Trusted Builds. No source code issues were found during the Automated Source Code review.

- Manual Source Code Review: The Manual Source Code review was performed on 10% of the comments for compliance to VVSG Volume Section 5.2.7. No source code issues were found during the Manual Source Code review.

- Trusted Build: The trusted build consisted of inspecting customer submitted source code, COTS, and third-party software products and combining them to create the executable code. This inspection followed the documented process from the "United States Election Assistance Commission Voting System Test Laboratory Program Manual" Section 5.5 – 5.7. Performance of the trusted build includes the build documentation review. The Trusted Build was performed following the completion of the Functional Configuration Audit.

3.1.2 Physical Configuration Audit (PCA)

The Physical Configuration Audit (PCA) compares the voting system components submitted for qualification to the manufacturer's technical documentation, and shall include the following activities:

- Establish a configuration baseline of software and hardware to be tested; confirm whether manufacturer's documentation is sufficient for the user to install, validate, operate, and maintain the voting system

- Verify software conforms to the manufacturer's specifications; inspect all records of manufacturer's release control system; if changes have been made to the baseline version, verify manufacturer's engineering and test data are for the software version submitted for certification

- If the hardware is non-COTS, Pro V&V shall review drawings, specifications, technical data, and test data associated with system hardware to establish system hardware baseline associated with software baseline

- Review manufacturer's documents of user acceptance test procedures and data against system's functional specifications; resolve any discrepancy or inadequacy in manufacturer's plan or data prior to beginning system integration functional and performance tests

- Subsequent changes to baseline software configuration made during testing, as well as system hardware changes that may produce a change in software operation are subject to re-examination

<u>Summary Findings</u>

During execution of the test procedure, the components of the EMS 4.41 system were documented by component name, model, serial number, major component, and any other relevant information needed to identify the component. For COTS equipment, every effort was made to verify that the COTS equipment had not been modified for use. Additionally, each technical document submitted in the TDP was recorded by document name, description, document number, revision number, and date of release. At the conclusion of the test campaign, test personnel verified that any changes made to the software, hardware, or documentation during the test process were fully and properly documented.

3.1.3 System Level Testing

System Level Testing was implemented to evaluate the complete system. System Level Testing for this campaign included the evaluations of the following test areas: EMS and System Functional Regression Testing. This testing included all proprietary components and COTS components (software, hardware, and peripherals) in a configuration of the system's intended use.

For software system tests, the tests were designed according to the stated design objective without consideration of its functional specification. The system level software test cases were prepared independently to assess the response of the software to a range of conditions. Pro V&V reviewed the manufacturer's program analysis, documentation, and module test case design and evaluated the test cases for each module with respect to flow control parameters and entry/exit data. As test cases were utilized throughout the test campaign and were designed based on the manufacturer's design specifications and the relevant technical requirements set forth by the VVSG. Test cases were examined based on the following aspects of the voting system: Software module test case design and data, Software functional test case design, and System level test case design.

Test cases provided information regarding the sequence of actions to be performed for the execution of a test, the requirements being met, the test objective, test configuration, equipment needed, special requirements, assumptions, and pass/fail criteria. Once the test cases were finalized, they were validated and published for use in the test campaign. The validation of the test case was accomplished by technical review and approval. This validation included the following: confirmation of adequate test coverage of the requirement being tested; confirmation that test case results were not ambiguous and gave objective pass/fail criteria; and confirmation that any automated test suites would produce valid results

Pro V&V defined the expected result for each test and the ACCEPT/REJECT criteria for certification. If the system performed as expected, the results were accepted. If the system did not perform as expected, an analysis was performed to determine the cause.
 If needed, the test was repeated in an attempt to reproduce the results. If the failure could not be reproduced and the expected results were not met, the system was determined to have failed the test. If the results could not be reproduced, the test continued. All errors encountered were documented and tracked through resolution.

3.1.3.1 EMS and System Functional Regression Testing

EMS and System Functional Regression Testing was performed to ensure the submitted modification did not adversely affect the EMS 4.41 system. Throughout the test campaign, Pro V&V personnel maintained a test log identifying the system and equipment under test and any records of deviations to the test plan along with the rationale for performing the deviations. Pro V&V also utilized an internal bug tracking system to record and track all issues and/or discrepancies noted during the test campaign.

3.2   Anomalies and Resolutions

When a result is encountered during test performance that deviates from what is standard or expected, a root cause analysis is performed.

Pro V&V considers it an anomaly if no root cause can be determined. In instances in which a root cause is established, the results are then considered deficiencies. No anomalies occurred during the testing of the EMS 4.41.

3.3   Deficiencies and Resolutions

Any violation of the specified requirement or a result is encountered during testing that deviates from what is standard or expected in which a root cause is established is considered a deficiency. Upon occurrence, deficiencies are logged throughout the test campaign for disposition and resolution. No deficiencies were encountered during testing.

4.0   RECOMMENDATION FOR CERTIFICATION

The EMS 4.41, as presented for testing, successfully met the requirements set forth for voting systems in the U.S. Election Assistance Commission (EAC) 2005 Voluntary Voting System Guidelines (VVSG), Version 1.0. Additionally, Pro V&V, Inc. has determined that the EMS 4.41 functioned without issue during EMS and System Functional Regression Testing. Based on the test findings, Pro V&V recommends the EAC grant the EMS 4.41 identified in Tables 4-1 and 4-2 certification to the EAC VVSG 1.0.

Table 4-1. MicroVote EMS 4.41 Software

Firmware/Software	Version
Proprietary	
EMS	4.4
Infinity Panel Rev. D	4.30
Infinity Panel Rev. E	4.40
COTS	
Microsoft Windows 10 Professional	1909

Table 4-1. MicroVote EMS 4.41 Software *(continued)*

Firmware/Software	Version
Microsoft Visual Studio Professional 2017	15.9
ComponentOne Ultimate 2014	1
Advanced Installer	16.4.1
Advanced Installer Extension for Visual Studio 2017	16.5

Table 4-2. MicroVote EMS 4.41 Hardware

Component	Serial Number
Proprietary Hardware	
Infinity Voting Panel (Rev D) w/Power Supply	11588
Infinity Voting Panel (Rev E) w/Power Supply	14009, 14010
VVPAT (Rev A) w/Power Supply	001011, 001100
COTS Hardware	
Tripp Lite Portable Surge Protector (TRAVELCUBE)	[MVT-TC-001], [MVT-TC-002]
Minuteman UPS (EP1000LCD)	AK11190890004
APC Back-UPS Pro (BN1100M2)	3B1925X63177, 3B1925X63227
Dell Latitude 5580 Laptop w/Power Supply	51LG8H2, 5DL1RN2
USB Smart Card Reader (PC USB TR PIV) w/Stand (HWP109380 B)	113101316600170
EMS Download Cable	CC06789-06, [MVT-DC-001]
USB-RS232 Converter	USA000106043, USA000155787
Seiko Instruments Printer (DPU-3445) w/Power Supply	2008922A
DoubleTalk LT	[MVT-DT-001]
Hamilton Buhl (PRM100B)	[MVT-HB-001]
Chatsworth Data (ACP-2200)	CDT021901537, CDT121901544
Head Stick	[MVT-HS-001]