NYSBOE Lot II Final Test Report

Report Number V-NY-DVS_Seq-Lot2-TR01

Sequoia Voting Systems

Dominion Voting Systems

Democracy Suite 2.0

Incorporating:

EMS Core System, Application Server, Database Server, Election Event Designer, Results Tally & Release, and ImageCast Precinct Ballot Marker Plan B

Final Test Report Rev 3.0

Friday, February 22, 2008

Prepared for:

STATE OF NEW YORK
STATE BOARD OF ELECTIONS

Prepared by:

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NVLAP LAB CODE 200733-0

SysTest Labs is an accredited Voting System Test Lab (VSTL), Accredited by the National Institute of Standards and Technology (NIST) National Voluntary Lab Accreditation Program (NVLAP), and accredited by the Election Assistance Commission (EAC) for VSTL status.

In addition to VSTL accreditation, SysTest Labs was accredited for and still holds accreditation as an EAC Interim Independent Test Authority (ITA). EAC Lab Code: 0601, Issued August 2006

Revision History

Release	*Author*	*Revisions*
Rev 1.0	R. Himelgrin	Final test report submitted to the NYSBOE for review and acceptance
Rev 2.0	R. Himelgrin, J. Garcia, R. Reed	Minor changes, corrections, and enhancements
Rev 3.0	R. Himelgrin, J. Garcia, R. Reed	Added test results to Appendix C and Appendix D

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The final test results reported herein must not be used by the NYSBOE to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

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Any opinions or interpretations included in this report shall be marked as such; starting with "It is SysTest Labs' opinion/interpretation…" OR "An EAC interpretation was applied to this test effort (describe)…" OR "There are no opinions or interpretations included in this report.".

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1 Introduction

The New York State Board Of Elections (NYSBOE) has contracted with SysTest Labs Incorporated to perform testing on Ballot Marking Devices (BMD) for all approved applicants, to the Help America Vote Act (HAVA) section 301 requirements. The purpose of this limited testing is to provide a minimal level of satisfaction to the NYSBOE that all Ballot Marking Device (BMD) and Election Management Systems (EMS) meet the HAVA 2002 301 requirements and 2005 Voluntary Voting System Guidelines (VVSG) Volume 1 Section 3 Usability and Accessibility Requirements. The BMD testing is commonly referred to by the NYSBOE and throughout this document as Lot II testing.

SysTest Labs is submitting this test report as a summary of the BMD testing effort for the NYSBOE on the BMD voting system from Sequoia Voting Systems / Dominion Voting Systems; consisting of the Democracy Suite 2.0 EMS Core System:

- Application Server
- Database Server
- Election Event Designer
- Firmware on the ImageCast Ballot Marker PLAN B.

This document provides an overview of the test effort and the findings of all HAVA testing completed by SysTest Labs.

This document does not grant any certification of the system.

All testing was performed at the SysTest Labs compliance testing facilities in Denver, Colorado.

1.1 References

1. Election Assistance Commission Voluntary Voting System Guidelines (EAC VVSG), 2005 Version 1.0. Volumes I and II.
2. NIST NVLAP Handbook 150: 2006.
3. NIST NVLAP Handbook and 150-22: 2005.
4. EAC Testing and Certification Program Manual, United States Election Assistance Commission, 2006
5. SysTest Labs Quality System Manual, Revision 1.0.1, prepared by SysTest Labs, dated October 2007.
6. HAVA 2002, Section 3.01
7. NYSBOE BMD requirements as stated in the NYSBOE draft document "BMD_v8.1_+references_101007"

1.2 Document Overview

This document contains the following sections:

- The Introduction discusses the purpose of Lot II testing and defines the Voting System tested
- The Scope section defines the scope of the Lot II test effort

- The System Identification specifies hardware and software for the BMD voting system
- The System Overview discusses the functionality of the BMD voting system software and firmware
- The Lot II Test Results Summary provides an overview of the testing effort and contains the following:
    - Review Of Prior ITA Work Artifacts
    - Review Of Prior And Current SysTest Labs Work Artifacts
    - Requirements Gap Analysis of NYSBOE BMD Requirements
    - Preliminary Review Of User And Jurisdictional Documentation
    - Evaluation Of Functional Testing as it relates to HAVA 301
    - Discrepancies
- The Findings section contains the final analysis of the testing effort.
- The Appendices contain functional test results and an index of attachments:
    - Appendix A: Test Methodology
    - Appendix B: Index of Attachments
    - Appendix C: HAVA and VVSG Trace
    - Appendix D: NYSBOE BMD Trace
- The attachments contain the TDP documents and discrepancy report.
    - Attachment A: TDP Documents
    - Attachment B: Discrepancy Report

2 Scope

The NYSBOE contracted with SysTest Labs to perform limited testing of HAVA requirements on a number of Ballot Marking Device voting systems. The purpose of this limited testing is to provide a minimal level of satisfaction to the NYSBOE that certain Ballot Marking Device (BMD) and Election Management Systems (EMS) meet federal HAVA 2002 301requirements.

2.1 In-Scope

The primary task of this test effort (internally named Lot II) was the verification that the ballot marking device system, consisting of the BMD, printer and EMS software only, satisfies the HAVA 2002 301 requirements.

Given the time constraint for the completion of the Lot II test effort, only the following tasks were considered in-scope and executed by SysTest Labs:

- Review of prior ITA work artifacts to determine any HAVA compliance testing already completed
- Review of prior or current SysTest Labs certification and/or test reports to determine any HAVA compliance testing already completed
- Acceptance of the Vendor Technical Data Package (TDP), and review of the Package to verify that all required documents for Lot II HAVA testing were included.
- A preliminary review of user and jurisdictional documentation
- Receipt of five (5) Vendor BMD systems, test lab setup, and hardware configuration
- Development of functional test case BMD01 which was modified from SysTest Labs VSTL test case GEN03 to create a general election for the purpose of testing HAVA requirements only
- Modification of test case BMD01 to include Vendor specific requirements and support
- One pass through functional test case BMD01 to test for HAVA requirements only, using a test election and ballot created by SysTest Labs, based on the NYSBOE specifications
- Regression testing, as required, for the verification of discrepancy fixes from the Vendor
- The verification of five (5) languages supported by the NYSBOE:
    - English, Cantonese, Korean, Mandarin, Spanish
- A requirements gap analysis and trace of the NYSBOE BMD requirements to document the NYSBOE requirements verified by previous testing and/or the execution of test case BMD01
- Written weekly status reports forwarded to the NYSBOE via email and participation in a weekly status and progress meeting with the NYSBOE via teleconference
- Daily issue and discrepancy reports forwarded to the NYSBOE via email
- Daily discrepancy reports forwarded to the Vendor via email
- Final test report (this document) to document the findings of the test effort

2.2 Acronyms and Abbreviations

The following acronyms and abbreviations are used throughout this document:

Table 1 – Terms and Abbreviations

Acronym or Abbreviation	*Description*
ADA	Americans with Disabilities Act
BMD	Ballot Marking Device
EAC	Election Assistance Commission
EED	Election Event Designer
EMS	Election Management System
HAVA	Congressional Help America Vote Act of 2002
IPT	ImageCast Precinct Tabulator
ITA	Independent Test Authority
NIST	National Institute Of Standards And Technology
NVLAP	National Voluntary Laboratory Accreditation Program
NYSBOE	New York State Board Of Elections
NYSTEC	New York State Technology Enterprise Corporation
VVSG	Voluntary Voting System Guidelines (Current version is 2005)

3 System Identification

The Dominion Voting Systems Democracy Suite 2.0 was submitted for Lot II testing with the hardware and software listed below. See subsections 3.1 and 3.2 respectively. No other products were included in this test effort.

The TDP User/Owner manuals that would be part of a certified system delivered to a purchaser of the system are as follows:

System Maintenance Procedures:

- Democracy Suite 2 9 Imagecast System Maintenance Procedures
- Democracy Suite 2 8 EMS System Maintenance Procedures

System Operation Procedures:

- ImageCast Ballot Marker Operator Manual PLAN B
- Democracy Suite EMS Election Event Users Guide Release 1.5.0
- Democracy Suite 2 8 Imagecast Precinct Operations Procedures
- Democracy Suite EMS Results Tally and Reporting Users Guide
- BMD Quick Reference Guide

System Overview:

- Democracy Suite 2 2 Configuration Overview
- Democracy Suite 2 3 EMS System Functional Description

Other Documents:

- Dominion Voting Systems Imagecast Printing Specification
- Democracy Suite 2 10 Personnel Deployment and Training Requirements

SysTest Labs is satisfied that the Vendor's TDP package is complete.

3.1 Software and Firmware

Items identified in the tables below reflect all software and firmware tested in Lot II. All items listed were part of the test effort.

Dominion Voting Systems provides the required Democracy Suite 2.0 Software. It is up to the purchasing jurisdiction to acquire their own computer and servers with the required COTS software, or have Dominion supply the computer and server with the COTS and Dominion software pre-loaded.

Table 2 – Matrix of Required Software and Firmware Provided by Sequoia / Dominion

Application(s)	Manufacturer	Version	Description
Firmware for Image Cast Ballot Marker PLAN B	Dominion Voting System	2.0 The 2.0 version is comprised of: 1.9.2 loader 3.2.0 operating system ucLinux 90, 0 or 90,8 LCD software 1.18.4 Image Cast Precinct Tabulator firmware 0.18 ITX Ballot Marker Device firmware DVS-017-R016-HW1 invisible hand (guides blank paper into printer) DVS-020-R018 Smart Switch (port for ADA device attachment)	Image Cast Ballot Marker PLAN B is the ballot marker device used by those voters requesting an ADA session. This is a single unit that is also comprised of an Image Cast Precinct Tabulator attached to the ballot box with an enclosed attached laser printer and outlets for attaching the ADA compliant devices.
Election Event Designer	Dominion Voting System	1.5.2951.37066	Election Event Designer This is the software that handles election project definition, political divisioning management, election event definition including ballot design, configuration and programming of Imagecast tabulators' flash cards and magnetic security keys.
EMS Application Server	Dominion Voting System	1.5.2951.37004	This hosts a Set of DLL libraries providing interface between the client applications and back-end system components and handles the ballot rendering.
EMS Document Management Server (EMS DMS)	Dominion Voting System	1.0.2895.24274	Created election project backup package file can be accessed using the EMS Document Management Server
EMS Audio Studio Client (EMS AS)	Dominion Voting System	1.6	Application used to record and preview files for the audio ballots

Table 3 – Matrix of Required COTS Software Provided by Sequoia / Dominion

Application(s)	Manufacturer	Version	Description
Wire Driver	Maxim Integrated Products	N/A	Allows the use of the magnetic security keys.
Microsoft Windows Server 2003 R2	Microsoft	2003 R2	Operating System
Enterprise Edition Service Pack 2	Microsoft	SP2	Service Pack from Microsoft
Microsoft Internet Information Services	Microsoft	6.0.3790.395	Server software
ucLinux	Arcturus Networks	3.2.0	Operating system on the ImageCast Precinct Tabulators
MSXML 6.0 Parser	Microsoft	6.0	Editing program
Microsoft Visual J# 2.0 Redistributable Package	Microsoft	2.0	Allows developers to use Java-language syntax to build applications and services on the .NET Framework.

Application(s)	Manufacturer	Version	Description
Microsoft SQL Server VSS Writer	Microsoft		Database Software
Microsoft SQL Server Setup Support Files (English)	Microsoft		Database Software
Microsoft SQL Server Native Client	Microsoft		Database Software
Microsoft Office 2003 Web Components	Microsoft	2003	Component Object Model (COM) controls for publishing spreadsheets, charts, and databases to the Web.
Microsoft SQL Server 2005	Microsoft	2005	Database Software
Microsoft SQL Server 2005 Backward Compatibility	Microsoft	2005	Database Software
Microsoft .NET Framework	Microsoft	2.0	Microsoft software component
Adobe Reader	Adobe Acrobat	7.0.9	Allows the election creator to view the ballot while it is being created.
RedMon - Redirection Port Monitor	University of Wisconsin and it is free and open source software		Redirect document (PDF ballot) to Acrobat and print it to file (PCL file) using the 6940 printer driver.

3.2 Hardware Equipment

Equipment identified in the table below reflects all of the hardware used in performing system testing. All items listed were part of this test effort. All equipment was provided by Dominion Voting Systems. Dominion Voting Systems' BMDs are designed such that firmware updates are usually completed by their technicians, thus; when required, SysTest Labs contacted Dominion for assistance with the upload of all executables and installs. All voting systems remained under the strict control of SysTest Labs throughout the test effort.

Dominion Voting Systems can provide the required computer and servers. The purchasing jurisdiction has the option to acquire its own computer and servers with the required COTS software, or have Dominion supply the computer and server with COTS and Dominion software pre-loaded.

Table 4 – Matrix of Hardware

Hardware and Identifier (Serial Number)	Manufacturer	Model #	Version/ Rev #	Condition	Description
Generic Server capable of running Microsoft Windows Server 2003 R2	Built in house by Dominion	N/A		Undamaged, fully functional	The server was delivered by Dominion with all required software already installed.

Hardware and Identifier (Serial Number)	Manufacturer	Model #	Version/ Rev #	Condition	Description
ImageCast Ballot Marker 18000028	Dominion Voting Systems	PLAN B	Firmware version 1.18.4	SmartSwitch was replaced prior to testing	This is a single unit that is comprised of an Image Cast Precinct Tabulator attached to the ballot box with an enclosed attached laser printer and outlets for attaching the ADA compliant devices.
ImageCast Ballot Marker 18000030	Dominion Voting Systems	PLAN B	Firmware version 1.18.4	Undamaged, fully functional	This is a single unit that is comprised of an Image Cast Precinct Tabulator attached to the ballot box with an enclosed attached laser printer and outlets for attaching the ADA compliant devices.
ImageCast Ballot Marker 18000031	Dominion Voting Systems	PLAN B	Firmware version 1.18.4	Undamaged, fully functional	This is a single unit that is comprised of an Image Cast Precinct Tabulator attached to the ballot box with an enclosed attached laser printer and outlets for attaching the ADA compliant devices.
ImageCast Ballot Marker 18000032	Dominion Voting Systems	PLAN B	Firmware version 1.18.4	ImageCast Precinct device non-functional, replaced prior to testing	This is a single unit that is comprised of an Image Cast Precinct Tabulator attached to the ballot box with an enclosed attached laser printer and outlets for attaching the ADA compliant devices.
ImageCast Ballot Marker 18000033	Dominion Voting Systems	PLAN B	Firmware version 1.18.4	ImageCast Precinct device non-functional, replaced prior to testing	This is a single unit that is comprised of an Image Cast Precinct Tabulator attached to the ballot box with an enclosed attached laser printer and outlets for attaching the ADA compliant devices.
10 Single Action Foot Pedals	Kinesis Corporations	Part Number:FS0 05MP-G	No firmware	Undamaged, fully functional	Foot pedals used for ADA voting sessions
5 Y-Adaptor	Orbyx Electronics	Model Number 2740375B	No firmware	Undamaged, fully functional	The Y adaptor plugs into the ATI outlet labeled Sip/Puff. Two of the foot pedals plug into each adaptor.
5 Sip and Puff Devices	Origin Instruments	Model: Air Voter TM	No firmware	Undamaged, fully functional	Devices used for used for ADA voting sessions; each with 2 mouth pieces and connecting tubing and power cords

Hardware and Identifier (Serial Number)	Manufacturer	Model #	Version/ Rev #	Condition	Description
1 iButton Device	Daisemi	DS1402D-DR8+ 0641A MW354618 AAA	No firmware	Undamaged, fully functional	Used to program magnetic security keys
7 magnetic keys	Unknown	None	No firmware	Undamaged, fully functional	Used to set BMD into Audio (ADA) Session
1 Compact Flash Card Reader	SanDisk	Model: SDDR-92 Part: 20-90-03039	No firmware	Undamaged, fully functional	Used to transfer data from the EED to the flash cards
6 Headsets	Pro-Luxe	N/A	No firmware	Undamaged, fully functional	Used for Audio (ADA) Voting Session
5 Audio Tactile Interface (ATI) units with attached yellow cords labeled ETHERNET.	Dominion Voting Systems	Dominion Voting ATI #073067-1-1 and GGI071107 J	No firmware	Undamaged, fully functional	Used for ADA Voting Session

3.3 Test Materials

Items identified in the table below reflect test materials used in system tests.

Table 5 – Matrix of Test Materials

Item(s)	Provided By	Manufacturer	Details
10 Compact Flash Memory Cards	Dominion Voting Systems	SanDisk	Used to transfer election programming from the EED to the BMD
5 rolls Thermal paper	Dominion Voting Systems	Unknown	Used for printing poll open, poll interrupt, poll closing, and audit logs.
1 partial ream of 22” ballot paper	Dominion Voting Systems	Unknown	Used for printing ballots one at a time

3.4 Proprietary Data

SysTest Labs has indicated sections of this report considered proprietary information to Sequoia Voting Systems / Dominion Voting Systems.

Proprietary information is submitted in a separate attachment, and labeled “Proprietary” in the file name.

4 System Overview

The Dominion Democracy Suite Voting System consists of the following software packages:

- Election Management System – Election Event Designer Client
- Election Management System – Results Tally and Reporting Client (not used in Lot 2 Testing)
- Election Management System – Central Count Tabulator (not used in Lot 2 Testing)
- Election Management System – ImageCast Precinct Tabulator Firmware
- Election Management System – Application Server
- Election Management System – Database Server

The Dominion Democracy Suite Voting System consists of the following hardware:

- ImageCAST™ Ballot Marker PLAN B

Election Event Designer Client

Democracy Suite EMS EED client application is hosted on the Application server and is used by election officials to define election projects. This includes the definition of all election parameters. This is used to create paper (and optionally audio/ visual) ballot designs and election files for programming of the Imagecast Precinct tabulation devices – which are a component of the PLAN B Ballot Marking Devices.

The software is also used to link the audio and pdf files in the supported languages to the ballots for ADA presentation.

ImageCast Precinct Tabulator

The Imagecast Precinct devices are deployed at polling locations. This machine is an optical scan paper ballot tabulator designed to be used at the polling location during election activities. It allows the voter to scan the ballot, review the ballot, receive an undervote or overvote warning, and cast or reject the ballot.

Poll workers use the touchscreen on the IPT and a pre-programmed magnetic security key to set a BMD into the correct mode to handle an ADA voting session.

The ballot is inserted into the IPT for immediate tabulation. Both sides of the ballot are scanned at the same time using a high-resolution image-scanning device that produces ballot images that are decoded by a proprietary recognition engine. The IPT in turn provides a set of results files, log files, and scanned ballot images which are acquired by, or transmitted to, the Democracy Suite EMS RTR client application instances, where Election Results Operators and their designees preview, validate, tally, audit, report and publish election results.

The IPT's internal thermal printer allows the poll worker to print zero reports, log reports, and polling place totals upon the official closing of the polls.

Ballot Marker Device

The BMD is used by a voter who has requested an ADA session during the election. It allows a voter to mark and review a ballot in any of the supported languages (English, Spanish, Korean, Mandarin, and Cantonese) via the provided ADA equipment; audio tactile interface, headphones, sip-n-puff device, or foot pedals.

The BMD treats the marking of a ballot and the scanning of a ballot as two completely separate functions. By default, all selections made by the voter as to font display, contrast, audio volume, and audio rate are reset to default values between the marking and the scanning of a ballot, and between ADA sessions.

The Ballot Marking Device (BMD) is a single unit that is comprised of an Image Cast Precinct Tabulator locked to a secure ballot box. Attached to the side of the BMD is an enclosed and secured printer that prints the marked ballot such that it is indistinguishable from a hand marked ballot. Each BMD contains an Uninterruptable Power Supply (UPS) and an AC adaptor.

Attached to the top of the BMD, on a swing arm, is an LCD monitor that is only active during an ADA session. This monitor displays the ballot in both English and in any other supported language depending on the ballot identification number keyed in by the poll worker.

Dominion Voting Systems supplies privacy panels that can be attached to the LCD monitor to preserve the privacy of the voter. They also supply secrecy sleeves that can be used to receive the printed ballot generated by the BMD to preserve the secrecy of the ballot as it is moved from the printer to the scanner.

On the front on the printer enclosure are zoom and contrast adjustment buttons labeled in the supported languages.

Once an ADA session starts, the voter is given the option to skip the audio and visual instructions of how to use the Audio Tactile Interface (ATI), the sip-n-puff device, and the foot pedals.

The image of the ballot is presented to the viewer, first in full-face and then zoomed-in contest by contest. The voter has the option (audio and visual) to review the ballot and accept it or reject the ballot as voted. If the voter accepts, the scanner drops the ballot into the interior of the BMD. If the voter rejects the ballot, either by using the ATI or by pressing the “Return” button on the ImageCast Precinct Tabulator, the ballot is returned out of the scanner. In the case of the rejection, the counter on the touchscreen is correctly not incremented.

The voter has the option to select a preferred language. All audio directions are given in the alternate language and in English. The ballots are displayed in whichever language code was keyed in by the poll worker.

Audio does not state "Vote for one" or "Vote for three" which is in the visual display on the LCD monitor. However, Dominion BMD firmware was created in compliance with the New York contract and will not allow an overvote. The focus will not move automatically to the next contest until the voter has completed a 1 of 1 or N of N selection, which prevents an undervote from happening accidentally. If the voter does choose to deliberately undervote, the system warns the voter of the undervote while reviewing the voter’s choices before printing. After the voter prints and scans the ballot the independent review also shows and announces an undervote.

A voter cannot de-select a choice until the review of the ballot.

The Dominion Voting System BMD does not allow the voter to go back to a previous contest. The voter cycles through the entire election to vote or change a vote for a particular contest.

The Dominion Voting System BMD does not announce that a contest is fully voted. By default, it moves to the next contest.

While making selections; if the voter pauses (does not interact with the BMD) for 20 seconds, the screen displays a message “Are you there? Press the (icon of down blue arrow key is displayed)”. The audio states the same in the selected language.

At the end of the voting cycle; if the system detects an undervote, a warning appears prior to offering a review. There is also an undervote warning at the end of an undervoted contest. After the voter makes a selection, an audio and visual review is offered. The voter can decline the review and print the ballot. If the voter selects to review, both the front and the back of the ballot is shown briefly in full view and then the system zooms in on the first contest. During this review; if the voter opted to "write-in" a selection, that selection is displayed in clear text and read letter by letter through the headphones. During the review; if the system detects a contest for which no selection has been made, a warning appears and the audio announces "You have selected no selections."

The voter has the option to make changes to the votes selected, in which case the review is automatically offered again. After the review is complete, the voter is offered a choice to accept and print or make changes.

After the voter chooses to print the ballot from the BMD, a warning is announced in the headphones and displayed on the LCD monitor that it will take up to 2 minutes to print the ballot. The ballot is printed face first. As that side is finishing the ballot protrudes from the printer—into a secrecy sleeve if one is used – and is then pulled back into the printer for the back of the ballot to be printed.

The printed ballot is ejected from the BMD into the secrecy sleeve.

After the BMD prints the ballot, it is inserted into the IPT for scanning and another review. This gives the voter an independent opportunity to correct the ballot before it is cast and counted. Ballots were loaded and scanned correctly in all 4 orientations. If the voter rejects the ballot, it is ejected. If the voter accepts the ballot and casts the vote, the IPT drops the ballot into the secure ballot box and increments the ballot counter.

5 Lot II Test Results Summary

5.1Review of Prior ITA Work Artifacts

SysTest Labs reviewed test cases that were developed by the previous ITA to determine if any HAVA compliance testing was performed that could be leveraged for this test effort, and the detail to which HAVA requirements were tested.

The Sequoia Voting Systems / Dominion Voting Systems' BMD voting system was not previously submitted for HAVA compliance testing, thus there is no testing and no artifacts to leverage for the Lot II test effort.

5.2 Review of Prior And Current SysTest Labs Work Artifacts

SysTest Labs has reviewed prior certification reports and prior test cases developed and executed by SysTest Labs for Sequoia Voting Systems / Dominion Voting Systems to determine if any HAVA compliance testing was performed that could be leveraged for this test effort. In addition, SysTest Labs has reviewed current HAVA compliance testing being conducted by SysTest Labs for the Vendor's federal certification testing that may also be leveraged.

- No prior HAVA compliance testing has been performed for Sequoia Voting Systems / Dominion Voting Systems by SysTest Labs, thus there is no testing and no test artifacts to leverage for the Lot II test effort.

5.3 Requirements Gap Analysis of NYSBOE BMD Requirements

SysTest Labs has conducted a requirements gap analysis and trace of the NYSBOE BMD requirements to document the NYSBOE requirements that were verified by the execution of test case BMD01.

The results of this gap analysis are included in Appendix D: NYSBOE BMD Trace

5.4 Preliminary Review of User and Jurisdictional Documentation

A preliminary review of the following Sequoia Voting Systems / Dominion Voting Systems' user and jurisdictional documentation was conducted by SysTest Labs. The Vendor documentation was utilized as a guide for hardware setup and configuration, creation of the test election, operation of the BMD system and accessibility devices, and execution of the test election. A full review of all Vendor documentation will be performed as part of the Lot I test effort.

- ImageCast Ballot Maker Operator PLAN B February 14 2008
- Democracy Suite EMS Election Event Designer Users Guide Release 1.5.0
- Democracy Suite 2 8 Imagecast Precinct Operations Procedures

  BMD Quick Reference Guide

5.5 Functional Test Summary

SysTest Labs executed Functional Test BMD01 for the Dominion Voting Systems's BMD and Democracy Suite 2.0. The testing was conducted on the equipment provided by Dominion Voting Systems, listed in Table 4 – Matrix of Hardware. The application was tested for the validation of HAVA requirements only.

Functional Test BMD01 provides step-by-step procedures for each HAVA requirement to be tested. Each step in the test case is assigned a test step number. This number, along with critical test data, test procedure information, and pass/fail information, was documented in the test case for the recording of test results.

Prior to the commencement of Functional System testing, an inventory was performed to verify the voting equipment received contained the hardware and software elements as defined in the TDP. A Physical Configuration Audit (PCA) was conducted to verify that the system could be configured using the Vendor system operations manuals.

Throughout the testing effort, test procedures were marked as follows:

- **Accept –** Test is accepted as successful.
- **Reject** – Test is rejected as unsuccessful.
- **NT –** Not Testable is used for test procedures that cannot be followed. For example, if failure of one test procedure failure precludes attempting subsequent test procedures, the latter will be marked as **NT**. Also, for expected functionality that is not implemented the test procedure will be marked as **NT**.
- **NS** – Not Supported is used for requirements not supported in the tested configuration.
- **NA** – Not Applicable - If a test procedure is not applicable to the current test effort it will be marked as NA. The NA designation would also be entered for any subsequent step that is not applicable.

Test results marked as Reject, NT, and NA include comments by the Tester explaining the reason for the result.

Issues encountered during review and testing are documented in the Issues and Discrepancy Log.

Reference **Appendix C: HAVA and VVSG Trace** for a list of the HAVA and VVSG requirements verified in test case BMD01, and the pass/fail result of each.

Reference **Appendix D: NYSBOE BMD Trace** for a list of the NYSBOE BMD requirements verified in test case BMD01, and the pass/fail result of each.

5.6Evaluation of Functional Testing

The Dominion ImageCast BMD voting system has passed all of the required test steps and requirements in Test Case BMD01.

Issues discovered during the Lot II test effort were reported to and resolved by the vendor, and regression tested by SysTest Labs.

Reference Attachment B – Discrepancy Report for a listing of all discrepancies, current status, and trace to the 2005 VVSG requirement.

Functionality was tested, as identified in the Execution column below.

The initial delivery of equipment, software, and firmware was not what was listed in the vendor's application to NYSBOE and did not work. The vendor supplied a second delivery of software and firmware, repaired hardware and replaced hardware, and updated documentation that was used for testing. A third delivery of firmware and documentation were used to verify discrepancy fixes.

Appendix A – Test Methodology contains a description of the HAVA requirements tested in Functional Test Case BMD01.

Table 6 – Functional Tests

Test Case	Test Case Rev #	Execution	Software & Firmware Versions
BMD01	01	Test execution was to consist of 18 Voters per language, and a variety of touch screen and assistive technologies against the HAVA Section 301 requirements. The following discrepancies listed in the discrepancy report were noted: **6, 7, 13, 14, 15, 16, 19, 20**	EMS Software 1.5 and Firmware 1.15.10
BDM01	02	Test execution consisted of 18 Voters per language, and a variety of touch screen and assistive technologies against the HAVA Section 301 requirements. The following discrepancies listed in the discrepancy report were noted: **1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 17, 18**	EMS Software 1.5 and Firmware 1.18.2
BDM01	03	Test execution consisted of a single voter on each of the 5 BMDs using the ATI for Cantonese, Mandarin, and Korean; Sip & Puff with English and the Foot Pedals with the Spanish ballot in order to test the correction to the firmware.	EMS Software 1.5 and Firmware 1.18.4

5.7Discrepancies

Discrepancies discovered during the Lot II test effort were reported, resolved by the vendor, and regression tested by SysTest Labs. As of the end of the Lot II test effort, there are no open or unresolved discrepancies.

All issues identified during testing were entered in the Issues and Discrepancies log. All issues were identified with an issue number, a priority, and a detailed description of the issue. The vendor was given an opportunity to respond to the issues identified. The NYSBOE was given a complete list of all issues from all of the vendors and controlled the decision where a fix would be required.

Discrepancies were prioritized as follows:

- High – there are no work arounds and will require a fix.
- Med. – There is a work around and may or may not require a fix.
- Low – There is no work around needed and may or may not require a fix.

- Informational – This is just an observation and does not require a fix.

A complete list of the discrepancies discovered throughout the Lot II test effort, and the current status of each, is included in Attachment B - Discrepancy Report.

6 Findings

SysTest Labs has completed all required testing of the Sequoia Voting Systems / Dominion Voting Systems' BMD voting system. It has been determined that the Dominion ImageCast BMD voting system successfully meets the required acceptance criteria of the New York State Board Of Elections for the HAVA 2002 section 301 A and B requirements and the 2005 VVSG Volume 1 section 3 requirements of the Lot II test effort.

Appendix A – Test Methodology

Test Detail	Test
Test Case Name	**BMD01 (Usability and Accessibility)**
Scope	A system level test case that uses the 2005 Voluntary Voting System Guidelines (VVSG) to validate required functionality and performance as guidance in order to met 2002 HAVA requirements. Testing includes ballot marking accuracy, General Accessibility, Vision, Dexterity, Mobility, Hearing, Speech, Language Proficiency, and Cognition requirements.
Objective	The object of this test case is to verify that usability, accessibility and all supported multi-lingual (English, Korean, Cantonese, Mandarin and Spanish) elections can be created for use on BMDs. All voters have the ability to vote privately and independently including using visual displays, Sip-n-Puffs, audio, or foot paddles/rockers. Ballots are marked correctly and the voter can independently verify the ballot before it is cast and counted.
Variables: Voting Variations	* Non-Partisan contest: Vote for 1 of N (V1:2.1.7.2) (Judge) * Partisan contest: Multi-member board (N of M) (Congressional Representative) * Contest: Proposition/Question (Proposition 5) * Key pad, hand buttons, foot pedal/rockers, sip and puff, and Braille * Multi-language ballots (English, Korean, Cantonese, Mandarin and Spanish) * Audio ballots * 1 precinct
Variables: Election Variations	* **Judge**: 3 candidates/rotate by candidate * **Proposition 5:** Y/N * **Congressional Representative**: 6 candidates/write-in
A description of the voting system type and the operational environment	***EMS EED** - Election Management System Election Event Designer * **EMS RTR** - Election Management System Results, Tally & Reporting * **EMS Application Server** - Election Management System Application Server * **EMS DB Server** - Election Management System Database Server * **IC Precinct Tabulator -** ImageCast Precinct Tabulator * **IC Central Tabulator -** ImageCast Central Tabulator *** IC AudioVote Add-On -** ImageCast AudioVote Add-On * **ATI** - Audio-Tactile Interface * **Sip-n-Puff** and **foot paddles/rockers** Refer to the following tables for complete descriptions: Matrix of Required Software/Firmware Matrix of Required Hardware

Test Detail	Test
Standards Documents	2005 Voluntary Voting System Guidelines (VVSG), vol. 1 2005 Voluntary Voting System Guidelines (VVSG), vol. 2 HAVA 2002 Requirements Specific standards are noted in following steps
Pre-requisites and initialization of the test case	* Document the date and tester(s) * System is installed and set up as defined in the user documentation * Define election contests, candidates, issues etc. (V1:2.1.6) * Party affiliation is identified on the ballot where applicable (V1:2.1.1.1.d) * Create a supervisory level access 'user' and password' * Testers are informed that the test environment must remain static, if not, no changes shall occur without documentation in the test record and the authorization of the project manager * Have a Ballot Counter (V1:2.1.8) * Retrieve all supplies necessary for testing
Documentation of Test Data & Test Results	* Capture all voting steps in order to maintain repeatability of the test * Record election, ballot, and vote data fields on the corresponding worksheet tabs * Save all worksheet tabs for all iterations of the test case * Record results of test run by entering 'Accept/Reject' on the Test Results Matrix * Provide comments when observing deviations, issues/discrepancies or notable observations * Log issue/discrepancies on the Issues Log.
Pre-vote: Ballot Preparation procedures verifications	* Installation and Election databases can be accurately/securely defined and formatted * A ballot can be accurately/securely defined and formatted (V1:4.1.4.2) * A ballot can be accurately/securely programmed and installed into the appropriate media (V1:4.1.4.2.b, 4.1.4.2.c)
Pre-vote: Opening the Polls Verification	* Perform proper sequence of functions to open the polls * Identify any issues, failures, or unexpected results and their required corrective action(s)
Voting: Required functionality verifications	* Maintain accurate and complete audit records (V1:2.1.5.1.a, 4.1.7) * Maintain accurate and complete error and status messages (V1:2.1.5.1.b, 2.1.5.1.c,4.1.1) * All paper-based systems shall: Protect the secrecy of the vote throughout the process. (V1: 2.3.3.2) * Maintain integrity of Vote and Audit data (V1:4.1.3.1.f) * Accurate Definition * Write-in voting: Voting position identified for write-ins (V1:4.1.5.1.d) * Overvotes * Undervotes * Blank ballots (V1:4.1.5.1.d)

Test Detail	Test
Voting: Optional functionality verifications	* Non-Partisan contest: Vote for 1 of N (V1:2.1.7.2) (Judge) * Partisan contest: Multi-member board (N of M) (Congressional Representative) * Partisan contest, one party has no candidates (Congressional Representative) * Contest: Proposition/Question (Proposition 5) * Key pad, hand buttons, foot pedal/rockers, sip and puff, and Braille * Multi-language ballots (English, Korean, Cantonese, Mandarin and Spanish) * Audio ballots * 1 precinct
Usability and Accessibility verifications	* Functional Capabilities (V1:3.1.2) * Alternative Languages (V1:3.1.3) * Cognitive Issues (V1:3.1.4) * Perceptual Issues (V1:3.1.5) * Interaction Issues (V1:3.1.6) * Privacy (V1:3.1.7) * General Accessibility Requirements (V1:3.2.1) * Vision (V1:3.2.2) * Dexterity (V1:3.2.3) * Mobility (V1:3.2.4) * Hearing (V1:3.2.5) * Speech (V1:3.2.6) * English Proficiency (V1:3.2.7) * Cognition (V1:3.2.8)
Functional Capabilities	* Notification to a voter identifying the contest, issues, undervotes and overvotes.(3.1.2 a, b & e) * Notification to a voter prior casting, allowing changes to the ballot, and after the ballot has been marked (3.1.2 c &d)
Alternative Languages	* Allow ballot selection, review and instructions in any language required by the state. (3.1.3) * For voters who lack proficiency in reading English, or whose primary language is unwritten, provide spoken instructions and ballots in the preferred language of the voter, consistent with state and federal law (3.2.7)

Test Detail	Test
Cognitive Issues	* Minimize cognitive difficulties to the voter providing clear instructions/warnings and assistance. (3.1.4 a, b, c & d) * Clearly indicate maximum number of candidates for a single contest and ensure a consistent relationship between candidate name and mechanism used to vote for that candidate (3.1.4 cii, ciii) * Electronic image displays shall provide synchronized audio output to convey same information as is displayed on the screen (3.2.2.1 f)
Perceptual Issues	* Adjustable aspects of voting machines, shall have a mechanism to reset to the default value or shall automatically reset to standard default value upon completion voter's session (3.1.5 b & c) * Electronic voting machines shall provide minimum font size of 3.0 (measured as the height of a capital letter) and all text intended for the voter should be presented in a sans serif font.(3.1.5 d & h) * All voting machines using paper ballots should make provisions for voters with poor reading vision (3.1.5 e) * Color coding shall not be used as the sole means of conveying information (3.1.5 g)
Interaction Issues	* Voting machines with electronic image displays shall not require page scrolling (3.1.6 a) * Voting machines shall provide unambiguous feedback of voter's selections, be designed to minimize accidental activation, and no key shall have a repetitive effect as a result of being continually pressed (3.1.6 b, d & dii) * If a response from the voter is required within a specific time, the voting machine will issue an alert at least 20 seconds before this time has expired (3.1.6 c)
Privacy	* Preclude anyone else from determining the content of a voter's ballot without the voter's cooperation. Ballot and any input controls shall only be visible to the voter, the audio interface shall only be audible to the voter, and the voting system shall notify the voter of an attempted overvote in a way that preserves the privacy of the voter (3.1.7; 3.1.7.1 a, b & c)
Vision	* Accessible to voters with visual disabilities or voters with partial vision (3.2.2. 3.2.2.1) * Accessible to voters who are blind and provide an audio-tactile interface (ATI) that supports the full functionality of the visual ballot interface and allows the voter to control the rate of speech. (3.2.2.2, 3.2.2.2 b & cix) * Font size of 3.0-4.0 mm and 6.3 –9.0 mm, allow high contrast and allow adjustable color for partial vision (3.2.2.1 b, c & d) * Buttons and controls shall be distinguishable by both shape and color, all mechanically operated controls or keys shall be tactilely discernible without activating these controls and keys, and status of all locking or toggle controls or keys shall be visually discernable and also through touch and sound (3.2.2.1 e, 3.2.2.2 f &g)

Test Detail	Test
Dexterity	* Shall be accessible to voters who lack fine motor control or use of their hands and all controls should be operable with one hand without requiring tight grasping, pinching or twisting of the wrist. Force to activate keys or controls shall be no greater than 5 lbs. If normal procedure is for voters to submit their own ballots, the station shall provide features to these voters to enable them to perform this submission (3.2.3 a, b & e) * Controls shall not require direct bodily contact or for the body to be part of any electrical circuit (3.2.3 c) * Shall provide mechanism to enable non-manual input, equivalent to tactile input (3.2.3 d)
Mobility	* Accessible to voters who use mobility aids, including wheel chairs. All controls, keys, jacks, and any other part of the voting station shall be within reach as specified, and all labels, displays, controls, keys, jacks, etc. shall be legible to a voter in a wheelchair with normal eyesight, who is in an appropriate position and orientation with respect to the voting station. (3.2.4, b & c) * Voting station shall be within the clearance, obstruction and reach limits specified (3.2.4 a, bi, bii, biii, biv, bv, & bvi)
Hearing	* Voting station shall incorporate features under 3.2.2.2c to provide accessibility to voters with hearing disabilities, and if it provides sound cues to alert the voter, the tone shall be accompanied with a visual cue unless the station is in audio-only mode. (3.2.5 a & b) * Electronic image displays shall provide synchronized audio output to convey same information as is displayed on the screen (3.2.2.1 f)
Speech	* Voting process shall be accessible to voters with speech disabilities. No voting equipment shall require voter speech for operation (3.2.6 & 3.2.6a)
Independent verification	* Permit the voter to verify (in a private and independent manner) the votes selected by the voter on the ballot before the ballot is cast and counted. (3.1 a1Ai)
Post-Vote: Closing the Polls	* Polls are properly closed * Further casting of ballots is prohibited * Device status is normal * Identify any issues, failures, or unexpected results and their required corrective action(s) * Create a test record that verifies the sequence of test events

Appendix B – Index of Attachments

Attachment A – TDP Documents

Attachment B – Discrepancy Report

Accessing Attachments

To access attachments in Adobe Reader:

Select View > Navigation Tabs > Attachments. A tab will become available on the left side of the screen, and you can select and open attachments by clicking on the tab.

To access attachments in Adobe Acrobat:

Select Document > File Attachments. A dialog box appears allowing you to select and open attachments.

Appendix C – HAVA and VVSG Requirements Trace and Test Results

The table below displays the 2005 VVSG HAVA requirements, traced to each step of Functional Test Case BMD01. The final column displays the Pass/Fail results of each requirement.

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3	Usability and Accessibility Requirements	The importance of usability and accessibility in the design of voting systems has become increasingly apparent. It is not sufficient that the internal operation of these systems be correct; in addition, voters and poll workers must be able to use them effectively. Three broad principles motivate this section:		
VVSG 1 3a	Usability and Accessibility Requirements	a. All eligible voters shall have access to the voting process without discrimination. The voting process shall be accessible to individuals with disabilities. The voting process includes access to the polling place, instructions on how to vote, initiating the voting session, making ballot selections, review of the ballot, final submission of the ballot, and getting help when needed.	***Step # 10*** Testing Voter Privacy HAVA 301a.1.A.i Vol 1: 3.1.7, 3.1.7.1.a & b	Passed
VVSG 1 3b	Usability and Accessibility Requirements	b. Each cast ballot shall accurately capture the selections made by the voter. The ballot shall be presented to the voter in a manner that is clear and usable. Voters should encounter no difficulty or confusion regarding the process for recording their selections.	***Step #12*** Verifying ASSISTIVE TECHNOLOGY is available	Passed
VVSG 1 3c	Usability and Accessibility Requirements	c. The voting process shall preserve the secrecy of the ballot. The voting process shall preclude anyone else from determining the content of a voter's ballot, without the voter's cooperation. If such a determination is made against the wishes of the voter, then his or her privacy has been violated.	***Step #10*** Testing Voter Privacy ***Step #12*** Verifying ASSISTIVE TECHNOLOGY is available	Passed
VVSG 1 3.1	VVSG 1 3.1	The voting process shall provide a high level of usability for voters. Accordingly, voters shall be able to negotiate the process effectively, efficiently, and comfortably. The mandatory voting system standards mandated in HAVA Section 301 relate to the interaction between the voter and the voting system:	***Step #10*** Testing Voter Privacy ***Step #12*** Verifying ASSISTIVE TECHNOLOGY is available	Passed

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.1a	Usability Requirements	a. Requirements.--Each voting system used in an election for federal office shall meet the following requirements:		
VVSG 1 3.1a1	Usability Requirements	1. In general.--		
VVSG 1 3.1a1A	Usability Requirements	A. Except as provided in subparagraph (B), the voting system (including any lever voting system, optical scanning voting system, or direct recording electronic system) shall--		
VVSG 1 3.1a1Ai	UsabilityRequirements	i. Permit the voter to verify (in a private and independent manner) the votes selected by the voter on the ballot before the ballot is cast and counted;	***Step #9*** Using the Vote Data, initiate Election Day Voting on the DRE in multiple languages, as the vendor supports them. ***Step #10*** Testing Voter Privacy HAVA 301a.1.A.i Vol 1: 3.1.7, 3.1.7.1.a & b	Passed
VVSG 1 3.1a1Aii	Usability Requirements	ii. Provide the voter with the opportunity (in a private and independent manner) to change the ballot or correct any error before the ballot is cast and counted (including the opportunity to correct the error through the issuance of a replacement ballot if the voter was otherwise unable to change the ballot or correct any error); and	***Step #9*** Using the Vote Data, initiate Election Day Voting on the DRE in multiple languages, as the vendor supports them. ***Step #10*** Testing Voter Privacy HAVA 301a.1.A.i Vol 1: 3.1.7, 3.1.7.1.a & b	Passed
VVSG 1 3.1a1Aiii	Usability Requirements	iii. If the voter selects votes for more than one candidate for a single office—		
VVSG 1 3.1a1AI	Usability Requirements	I. Notify the voter that the voter has selected more than one candidate for a single office on the ballot;	***Step #20*** Verifying OVERVOTEs are handled correctly	Passed
VVSG 1 3.1a1AII	Usability Requirements	II. Notify the voter before the ballot is cast and counted of the effect of casting multiple votes for the office; and	***Step #20*** Verifying OVERVOTEs are handled correctly	Passed
VVSG 1 3.1a1AIII	Usability Requirements	III. Provide the voter with the opportunity to correct the ballot before the ballot is cast and counted.	***Step #20*** Verifying OVERVOTEs are handled correctly	Passed

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.1a1B	Usability Requirements	B. A state or jurisdiction that uses a paper ballot voting system, a punch card voting system, or a central count voting system (including mail-in absentee ballots and mail-in ballots), may meet the requirements of subparagraph (A)(iii) by—		
VVSG 1 3.1a1Bi	Usability Requirements	i. Establishing a voter education program specific to that voting system that notifies each voter of the effect of casting multiple votes for an office; and	***Step #20*** Verifying OVERVOTEs are handled correctly	Passed
VVSG 1 3.1a1Bii	Usability Requirements	ii. Providing the voter with instructions on how to correct the ballot before it is cast and counted (including instructions on how to correct the error through the issuance of a replacement ballot if the voter was otherwise unable to change the ballot or correct any error).	***Step #20*** Verifying OVERVOTEs are handled correctly ***Step #22*** Verifying HAVA compliant BALLOT NAVIGATION and INTERACTION	Passed
VVSG 1 3.1a1C	Usability Requirements	C. The voting system shall ensure that any notification required under this paragraph preserves the privacy of the voter and the confidentiality of the ballot.	***Step #19*** Verifying INSTRUCTIONS and ALERTS to VOTERS	Passed
VVSG 1 3.1.1a	Usability Testing	a. The vendor shall conduct summative usability tests on the voting system using individuals representative of the general population.	This is for the vendor to test.	Lot I Test
VVSG 1 3.1.1b	Usability Testing	b. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification.	This is for the vendor to provide documentation and test cases. SysTest will review during the PCA Documentation and FCA Documentation Review in Lot 1.	Lot I Test
VVSG 1 3.1.2	Functional Capabilities	The voting process shall provide certain functional capabilities to support voter usability.		
VVSG 1 3.1.2a	Functional Capabilities	a. The voting system shall provide feedback to the voter that identifies specific contests or ballot issues for which he or she has made no selection or fewer than the allowable number of selections (e.g., undervotes)	***Step #22*** Verifying HAVA compliant BALLOT NAVIGATION and INTERACTION	Passed
VVSG 1 3.1.2b	Functional Capabilities	b. The voting system shall notify the voter if he or she has made more than the allowable number of selections for any contest (e.g., overvotes)	***Step #20*** Verifying OVERVOTEs are handled correctly	Passed

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.1.2c	Functional Capabilities	c. The voting system shall notify the voter before the ballot is cast and counted of the effect of making more than the allowable number of selections for a contest	***Step #20*** Verifying OVERVOTEs are handled correctly	Passed
VVSG 1 3.1.2d	Functional Capabilities	d. The voting system shall provide the voter the opportunity to correct the ballot for either an undervote or overvote before the ballot is cast and counted	***Step #21*** Verifying UNDERVOTEs are handled correctly	Passed
VVSG 1 3.1.2e	Functional Capabilities	e. The voting system shall allow the voter, at his or her choice, to submit an undervoted ballot without correction	***Step #21*** Verifying UNDERVOTEs are handled correctly	Passed
VVSG 1 3.1.2f	Functional Capabilities	f. DRE voting machines shall allow the voter to change a vote within a contest before advancing to the next contest.	***Step #22*** Verifying HAVA compliant BALLOT NAVIGATION and INTERACTION	Passed
VVSG 1 3.1.2g	Functional Capabilities	g. DRE voting machines should provide navigation controls that allow the voter to advance to the next contest or go back to the previous contest before completing a vote on the contest currently being presented (whether visually or aurally).	***Step #22*** Verifying HAVA compliant BALLOT NAVIGATION and INTERACTION	Passed
VVSG 1 3.1.3	Alternative Languages	The voting equipment shall be capable of presenting the ballot, ballot selections, review screens and instructions in any language required by state or federal law.	***Step #18*** Verifying LANGUAGE requirements	Passed
VVSG 1 3.1.4	Cognitive Issues	The voting process shall be designed to minimize cognitive difficulties for the voter.		
VVSG 1 3.1.4a	Cognitive Issues	a. Consistent with election law, the voting system should support a process that does not introduce any bias for or against any of the selections to be made by the voter. In both visual and aural formats, contest choices shall be presented in an equivalent manner.	Aural is relating to the ear or to the sense of hearing. Visual and aural requirement will be tested during hardware testing for Lot 1.	Lot I Test
VVSG 1 3.1.4b	CognitiveIssues	b. The voting machine or related materials shall provide clear instructions and assistance to allow voters to successfully execute and cast their ballots independently.	***Step #9*** Using the Vote Data, initiate Election Day Voting on the BMD in multiple languages, as the vendor supports them. ***Step #10*** Testing Voter Privacy HAVA 301a.1.A.i Vol 1: 3.1.7, 3.1.7.1.a & b	Passed

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.1.4bi	Cognitive Issues	i. Voting machines or related materials shall provide a means for the voter to get help at any time during the voting session.	***Step #22*** Verifying HAVA compliant	Passed
VVSG 1 3.1.4bii	Cognitive Issues	ii. The voting machine shall provide instructions for all its valid operations.	***Step #19*** Verifying instructions and alerts to voters	Passed
VVSG 1 3.1.4c	Cognitive Issues	c. The voting system shall provide the capability to design a ballot for maximum clarity and comprehension.	***Step #6*** Creating the media, printing ballots, and load election	Passed
VVSG 1 3.1.4ci	Cognitive Issues	i. The voting equipment should not visually present a single contest spread over two pages or two columns.	***Step #6*** Creating the media, printing ballots, and load election	Passed
VVSG 1 3.1.4cii	Cognitive Issues	ii. The ballot shall clearly indicate the maximum number of candidates for which one can vote within a single contest.	***Step #6*** Creating the media, printing ballots, and load election	Passed
VVSG 1 3.1.4ciii	Cognitive Issues	Iii.There shall be a consistent relationship between the name of a candidate and the mechanism used to vote for that candidate.	***Step #6*** Creating the media, printing ballots, and load election	Passed
VVSG 1 3.1.4d	Cognitive Issues	d. Warnings and alerts issued by the voting system should clearly state the nature of the problem and the set of responses available to the voter. The warning should clearly state whether the voter has performed or attempted an invalid operation or whether the voting equipment itself has malfunctioned in some way.	***Step #19*** Verifying instructions and alerts to voters	Passed
VVSG 1 3.1.4e	Cognitive Issues	e. The use of color by the voting system should agree with common conventions: (a) green, blue or white is used for general information or as a normal status indicator; (b) amber or yellow is used to indicate warnings or a marginal status; (c) red is used to indicate error conditions or a problem requiring immediate attention.	***Step #19*** Verifying instructions and alerts to voters	Passed
VVSG 1 3.1.5	Perceptual Issues	The voting process shall be designed to minimize perceptual difficulties for the voter.		
VVSG 1 3.1.5a	Perceptual Issues	a. No voting machine display screen shall flicker with a frequency between 2 Hz and 55 Hz.	***Step #7*** Testing color and vision accessibility requirements of the ballot	Passed

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.1.5b	Perceptual Issues	b. Any aspect of the voting machine that is adjustable by the voter or poll worker, including font size, color, contrast, and audio volume, shall automatically reset to a standard default value upon completion of that voter's session.	***Step #19*** Verifying instructions and alerts to voters	Passed
VVSG 1 3.1.5c	PerceptualIssues	c. If any aspect of a voting machine is adjustable by the voter or poll worker, there shall be a mechanism to reset all such aspects to their default values.	***Step #19*** Verifying instructions and alerts to voters	Passed
VVSG 1 3.1.5d	Perceptual Issues	d. All electronic voting machines shall provide a minimum font size of 3.0 mm (measured as the height of a capital letter) for all text.	***Step #7*** Testing color and vision accessibility requirements of the ballot	Passed
VVSG 1 3.1.5e	Perceptual Issues	e. All voting machines using paper ballots should make provisions for voters with poor reading vision.	***Step #7*** Testing color and vision accessibility requirements of the ballot	Passed
VVSG 1 3.1.5f	Perceptual Issues	f. The default color coding shall maximize correct perception by voters with color blindness.	***Step #7*** Testing color and vision accessibility requirements of the ballot	Passed
VVSG 1 3.1.5g	Perceptual Issues	g. Color coding shall not be used as the sole means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.	***Step #7*** Testing color and vision accessibility requirements of the ballot	Passed
VVSG 1 3.1.5h	Perceptual Issues	h. All text intended for the voter should be presented in a sans serif font.	***Step #7*** Testing color and vision accessibility requirements of the ballot	Passed
VVSG 1 3.1.5i	Perceptual Issues	i. The minimum figure-to-ground ambient contrast ratio for all text and informational graphics (including icons) intended for the voter shall be 3:1.	***Step #7*** Testing color and vision accessibility requirements of the ballot	Passed
VVSG 1 3.1.6	Interaction Issues	The voting process shall be designed to minimize interaction difficulties for the voter.		
VVSG 1 3.1.6a	Interaction Issues	a. Voting machines with electronic image displays shall not require page scrolling by the voter.	***Step #22*** Verifying HAVA compliant BALLOT NAVIGATION and INTERACTION	Passed

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.1.6b	Interaction Issues	b. The voting machine shall provide unambiguous feedback regarding the voter's selection, such as displaying a checkmark beside the selected option or conspicuously changing its appearance.	***Step #22*** Verifying HAVA compliant BALLOT NAVIGATION and INTERACTION	Passed
VVSG 1 3.1.6c	Interaction Issues	c. If the voting machine requires a response by a voter within a specific period of time, it shall issue an alert at least 20 seconds before this time period has expired and provide a means by which the voter may receive additional time.	***Step #22*** Verifying HAVA compliant BALLOT NAVIGATION and INTERACTION	Passed
VVSG 1 3.1.6d	Interaction Issues	d. Input mechanisms shall be designed to minimize accidental activation.	***Step #9*** Using the Vote Data, initiate Election Day Voting on the BMD in multiple languages, as the vendor supports them.	Passed
VVSG 1 3.1.6di	Interaction Issues	i. On touch screens, the sensitive touch areas shall have a minimum height of 0.5 inches and minimum width of 0.7 inches. The vertical distance between the centers of adjacent areas shall be at least 0.6 inches, and the horizontal distance at least 0.8 inches.	***Step #23*** Verify TOUCH SCREEN requirements	Passed
VVSG 1 3.1.6dii	Interaction Issues	ii. No key or control on a voting machine shall have a repetitive effect as a result of being held in its active position.	***Step #23*** Verify TOUCH SCREEN requirements	Passed
VVSG 1 3.1.7	Privacy	The voting process shall preclude anyone else from determining the content of a voter's ballot, without the voter's cooperation.	***Step #10*** Testing Voter Privacy HAVA 301a.1.A.i Vol 1: 3.1.7, 3.1.7.1.a & b	Passed
VVSG 1 3.1.7	Privacy	3.1.7.1 Privacy at the Polls		
VVSG 1 3.1.7.1	Privacy	When deployed according to the installation instructions provided by the vendor, the voting station shall prevent others from observing the contents of a voter's ballot.	***Test #10*** Testing Voter Privacy HAVA 301a.1.A.i Vol 1: 3.1.7, 3.1.7.1.a & b	Passed
VVSG 1 3.1.7.1a	Privacy	a. The ballot and any input controls shall be visible only to the voter during the voting session and ballot submission.	***Step #10*** Testing Voter Privacy HAVA 301a.1.A.i Vol 1: 3.1.7, 3.1.7.1.a & b	Passed
VVSG 1 3.1.7.1b	Privacy	b. The audio interface shall be audible only to the voter.	***Step #10*** Testing Voter Privacy HAVA 301a.1.A.i Vol 1: 3.1.7, 3.1.7.1.a & b	Passed

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.1.7.1c	Privacy	c. As mandated by HAVA 301 (a) (1) (C), the voting system shall notify the voter of an attempted overvote in a way that preserves the privacy of the voter and the confidentiality of the ballot.	***Step #10*** Testing Voter Privacy HAVA 301a.1.A.i Vol 1: 3.1.7, 3.1.7.1.a & b	Passed
VVSG 1 3.1.7.2	Privacy	Voter anonymity shall be maintained for alternative format ballot presentation.	***Step #10*** Testing Voter Privacy HAVA 301a.1.A.i Vol 1: 3.1.7, 3.1.7.1.a & b	Passed
VVSG 1 3.1.7.2a	Privacy	a. No information shall be kept within an electronic cast vote record that identifies any alternative language feature(s) used by a voter.	***Step #32*** Verifying that AUDIT log preserves voter PRIVACY	Passed
VVSG 1 3.1.7.2b	Privacy	b. No information shall be kept within an electronic cast vote record that identifies any accessibility feature(s) used by a voter.	***Step #32*** Verifying that AUDIT log preserves voter PRIVACY	Passed
VVSG 1 3.2	Accessibility Requirements	The voting process shall be accessible to voters with disabilities. As a minimum, every polling place shall have at least one voting station equipped for individuals with disabilities, as provided in HAVA 301 (a)(3)(B). A machine so equipped is referred to herein as an accessible voting station. Requirements HAVA Section 301 (a) (3) reads, in part: ACCESSIBILITY FOR INDIVIDUALS WITH DISABILITIES.--The voting system shall—		
VVSG 1 3.2a	Accessibility Requirements	(A) be accessible for individuals with disabilities, including nonvisual accessibility for the blind and visually impaired, in a manner that provides the same opportunity for access and participation (including privacy and independence) as for other voters;	***Step #14*** Verifying that the voting process is accessible for the blind and those with partial vision.	Passed
VVSG 1 3.2b	Accessibility Requirements	(B) satisfy the requirement of subparagraph (A) through the use of at least one direct recording electronic voting system or other voting system equipped for individuals with disabilities at each polling place	***Step #9*** Using the Vote Data, initiate Election Day Voting on the DRE in multiple languages, as the vendor supports them.	Passed
VVSG 1 3.2.1	General	The voting process shall incorporate the following features that are applicable to all types of disabilities:		

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.2.1a	General	a. When the provision of accessibility involves an alternative format for ballot presentation, then all information presented to voters including instructions, warnings, error and other messages, and ballot choices shall be presented in that alternative format.	***Step #11*** Alternative format for ballot presentation	Passed
VVSG 1 3.2.1b	General	b. The support provided to voters with disabilities shall be intrinsic to the accessible voting station. It shall not be necessary for the accessible voting station to be connected to any personal assistive device of the voter in order for the voter to operate it correctly.	***Step #12*** Verifying ASSISTIVE TECHNOLOGY is available	Passed
VVSG 1 3.2.1c	General	c. When the primary means of voter identification or authentication uses biometric measures that require a voter to possess particular biological characteristics, the voting process shall provide a secondary means that does not depend on those characteristics.	***Step #13*** Verifying identification other than biometrics	Passed
VVSG 1 3.2.2	Vision	The voting process shall be accessible to voters with visual disabilities.	***Step #14*** Verifying that the voting process is accessible for the blind and those with partial vision.	Passed
VVSG 1 3.2.2.1	Vision	The accessible voting station shall be accessible to voters with partial vision.		
VVSG 1 3.2.2.1a	Vision	a. The vendor shall conduct summative usability tests on the voting system using partially sighted individuals. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification.	PCA documentation review in Lot 1.	Lot I Test
VVSG 1 3.2.2.1b	Vision	b. The accessible voting station with an electronic image display shall be capable of showing all information in at least two font sizes, (a) 3.0-4.0 mm and (b) 6.3-9.0 mm, under control of the voter.	***Step #15*** Verifying visual accessibility of voting machine for the blind and those with partial vision.	Passed
VVSG 1 3.2.2.1c	Vision	c. An accessible voting station with a monochrome-only electronic image display shall be capable of showing all information in high contrast either by default or under the control of the voter or poll worker. High contrast is a figure-to-ground ambient contrast ratio for text and informational graphics of at least 6:1.	***Step #15*** Verifying visual accessibility of voting machine for the blind and those with partial vision.	Passed

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.2.2.1d	Vision	d. An accessible voting station with a color electronic image display shall allow the voter to adjust the color or the figure-to-ground ambient contrast ratio.	***Step #15*** Verifying visual accessibility of voting machine for the blind and those with partial vision.	Passed
VVSG 1 3.2.2.1e	Vision	e. Buttons and controls on accessible voting stations shall be distinguishable by both shape and color.	***Step #24*** Verify general accessibility of voting machine.	Passed
VVSG 1 3.2.2.1f	Vision	f. An accessible voting station using an electronic image display shall provide synchronized audio output to convey the same information as that which is displayed on the screen.	***Step #15*** Verifying visual accessibility of voting machine for the blind and those with partial vision.	Passed
VVSG 1 3.2.2.2	Vision	The accessible voting station shall be accessible to voters who are blind.	***Step #14*** Verifying that the voting process is accessible for the blind and those with partial vision.	Passed
VVSG 1 3.2.2.2a	Vision	a. The vendor shall conduct summative usability tests on the voting system using individuals who are blind. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification.	PCA documentation review in Lot 1.	Lot I Test
VVSG 1 3.2.2.2b	Vision	b. The accessible voting station shall provide an audio-tactile interface (ATI) that supports the full functionality of the visual ballot interface, as specified in Subsection 2.3.3	***Step #16*** Verifying ATI accessibility of voting machine for the blind and those with partial vision.	Passed
VVSG 1 3.2.2.2b i	Vision	i. The ATI of the accessible voting station shall provide the same capabilities to vote and cast a ballot as are provided by other voting machines or by the visual interface of the standard voting machine.	***Step #16*** Verifying ATI accessibility of voting machine for the blind and those with partial vision.	Passed
VVSG 1 3.2.2.2b ii	Vision	ii. The ATI shall allow the voter to have any information provided by the voting system repeated.	***Step #16*** Verifying ATI accessibility of voting machine for the blind and those with partial vision.	Passed
VVSG 1 3.2.2.2b iii	Vision	Iii.The ATI shall allow the voter to pause and resume the audio presentation.	***Step #16*** Verifying ATI accessibility of voting machine for the blind and those with partial vision.	Passed

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.2.2.2b iv	Vision	Iv.The ATI shall allow the voter to skip to the next contest or return to previous contests.	***Step #16*** Verifying ATI accessibility of voting machine for the blind and those with partial vision.	Passed
VVSG 1 3.2.2.2b v	Vision	v. The ATI shall allow the voter to skip over the reading of a referendum so as to be able to vote on it immediately.	***Step #16*** Verifying ATI accessibility of voting machine for the blind and those with partial vision.	Passed
VVSG 1 3.2.2.2c	Vision	c. All voting stations that provide audio presentation of the ballot shall conform to the following requirements:		
VVSG 1 3.2.2.2c i	Vision	i. The ATI shall provide its audio signal through an industry standard connector for private listening using a 3.5mm stereo headphone jack to allow voters to use their own audio assistive devices.	***Step #16*** Verifying ATI accessibility of voting machine for the blind and those with partial vision.	Passed
VVSG 1 3.2.2.2c ii	Vision	ii. When a voting machine utilizes a telephone style handset or headphone to provide audio information, it shall provide a wireless T-Coil coupling for assistive hearing devices so as to provide access to that information for voters with partial hearing. That coupling shall achieve at least a category T4 rating as defined by American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, ANSI C63.19.	N/A - The BMD did not support a voting machine utilizing a telephone style handset.	N/A
VVSG 1 3.2.2.2c iii	Vision	iii. No voting equipment shall cause electromagnetic interference with assistive hearing devices that would substantially degrade the performance of those devices. The voting equipment, considered as a wireless device, shall achieve at least a category T4 rating as defined by American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, ANSI C63.19.	This requirement will be tested during hardware testing for Lot 1.	Lot I Test
VVSG 1 3.2.2.2c iv	Vision	iv. A sanitized headphone or handset shall be made available to each voter.	***Step #12A*** Verifying ASSISTIVE TECHNOLOGY is available	Passed
VVSG 1 3.2.2.2c v	Vision	v. The voting machine shall set the initial volume for each voter between 40 and 50 dB SPL.	This requirement will be tested during hardware testing for Lot 1.	Lot I Test
VVSG 1 3.2.2.2c vi	Vision	vi. The voting machine shall provide a volume control with an adjustable volume from a minimum of 20dB SPL up to a maximum of 100 dB SPL, in increments no greater than 10 dB.	This requirement will be tested during hardware testing for Lot 1.	Lot I Test

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.2.2.2c vii	Vision	vii. The audio system shall be able to reproduce frequencies over the audible speech range of 315 Hz to 10 KHz.	This requirement will be tested during hardware testing for Lot 1.	Lot I Test
VVSG 1 3.2.2.2c viii	Vision	viii. The audio presentation of verbal information should be readily comprehensible by voters who have normal hearing and are proficient in the language. This includes such characteristics as proper enunciation, normal intonation, appropriate rate of speech, and low background noise. Candidate names should be pronounced as the candidate intends.	***Step #17*** Verifying ATI audio settings.	Passed
VVSG 1 3.2.2.2c ix	Vision	ix. The audio system shall allow voters to control the rate of speech. The range of speeds supported should be at least 75% to 200% of the nominal rate.	This requirement will be tested during hardware testing for Lot 1.	Lot I Test
VVSG 1 3.2.2.2d	Vision	d. If the normal procedure is to have voters initialize the activation of the ballot, the accessible voting station shall provide features that enable voters who are blind to perform this activation.	***Step #24*** Verify general accessibility of voting machine.	Passed
VVSG 1 3.2.2.2e	Vision	e. If the normal procedure is for voters to submit their own ballots, then the accessible voting station shall provide features that enable voters who are blind to perform this submission.	***Step #24*** Verify general accessibility of voting machine.	Passed
VVSG 1 3.2.2.2f	Vision	f. All mechanically operated controls or keys on an accessible voting station shall be tactilely discernible without activating those controls or keys.	***Step #24*** Verify general accessibility of voting machine.	Passed
VVSG 1 3.2.2.2g	Vision	g. On an accessible voting station, the status of all locking or toggle controls or keys (such as the "shift" key) shall be visually discernible, and discernible either through touch or sound.	***Step #24*** Verify general accessibility of voting machine.	Passed
VVSG 1 3.2.3	Dexterity	The voting process shall be accessible to voters who lack fine motor control or use of their hands.		
VVSG 1 3.2.3a	Dexterity	a. The vendor shall conduct summative usability tests on the voting system using individuals lacking fine motor control. The vendor shall document the testing performed and report the test results using the Common Industry Format. This documentation shall be included in the Technical Data Package submitted to the EAC for national certification.	This is for the vendor to provide documentation and test cases. SysTest will review during the PCA Documentation Review and the FCA Documentation Review in Lot 1.	Lot I Test

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.2.3b	Dexterity	b. All keys and controls on the accessible voting station shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls and keys shall be no greater 5 lbs. (22.2 N).	***Step #25*** Verify that issues concerning DEXTERITY are addressed in a HAVA compliant manner.	Passed
VVSG 1 3.2.3c	Dexterity	c. The accessible voting station controls shall not require direct bodily contact or for the body to be part of any electrical circuit.	***Step #25*** Verify that issues concerning DEXTERITY are addressed in a HAVA compliant manner.	Passed
VVSG 1 3.2.3d	Dexterity	d. The accessible voting station shall provide a mechanism to enable non-manual input that is functionally equivalent to tactile input.	***Step #25*** Verify that issues concerning DEXTERITY are addressed in a HAVA compliant manner.	Passed
VVSG 1 3.2.3e	Dexterity	e. If the normal procedure is for voters to submit their own ballots, then the accessible voting station shall provide features that enable voters who lack fine motor control or the use of their hands to perform this submission.	***Step #25*** Verify that issues concerning DEXTERITY are addressed in a HAVA compliant manner.	Passed
VVSG 1 3.2.4	Mobility	The voting process shall be accessible to voters who use mobility aids, including wheelchairs.		
VVSG 1 3.2.4a	Mobility	a. The accessible voting station shall provide a clear floor space of 30 inches (760 mm) minimum by 48 inches (1220 mm) minimum for a stationary mobility aid. The clear floor space shall be level with no slope exceeding 1:48 and positioned for a forward approach or a parallel approach.	***Step #26*** Verify that issues concerning **MOBILITY** are addressed in a HAVA compliant manner for approach and reach.	Passed
VVSG 1 3.2.4b	Mobility	b. All controls, keys, audio jacks and any other part of the accessible voting station necessary for the voter to operate the voting machine shall be within reach as specified under the following sub-requirements:	***Step #26*** Verify that issues concerning **MOBILITY** are addressed in a HAVA compliant manner for approach and reach.	Passed
VVSG 1 3.2.4bi	Mobility	i. **If** the accessible voting station has a forward approach with no forward reach obstruction then the high reach shall be 48 inches maximum and the low reach shall be 15 inches minimum. See Figure 1.	***Step # 26A*** Verify that issues concerning MOBILITY are addressed in a HAVA compliant manner for approach and reach.	Passed

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.2.4bii	Mobility	ii. **If** the accessible voting station has a forward approach with a forward reach obstruction, the following requirements apply (See Figure 2): - The forward obstruction shall be no greater than 25 inches in depth, its top no higher than 34 inches and its bottom surface no lower than 27 inches. - If the obstruction is no more than 20 inches in depth, then the maximum high reach shall be 48 inches; otherwise it shall be 44 inches.	***Step # 26A*** Verify that issues concerning MOBILITY are addressed in a HAVA compliant manner for approach and reach.	N/A to vendor system
VVSG 1 3.2.4biii	Mobility	iii. Space under the obstruction between the finish floor or ground and 9 inches (230 mm) above the finish floor or ground shall be considered toe clearance and shall comply with the following provisions: - Toe clearance shall extend 25 inches (635 mm) maximum under the obstruction - The minimum toe clearance under the obstruction shall be either 17 inches (430 mm) or the depth required to reach over the obstruction to operate the accessible voting station, whichever is greater - Toe clearance shall be 30 inches (760 mm) wide minimum	***Step #27*** Verify that issues concerning MOBILITY are addressed in a HAVA compliant manner for approach and reach.	N/A to vendor system
VVSG 1 3.2.4biv	Mobility	iv. Space under the obstruction between 9 inches (230 mm) and 27 inches (685 mm) above the finish floor or ground shall be considered knee clearance and shall comply with the following provisions: - Knee clearance shall extend 25 inches (635 mm) maximum under the obstruction at 9 inches (230 mm) above the finish floor or ground. - The minimum knee clearance at 9 inches (230 mm) above the finish floor or ground shall be either 11 inches (280 mm) or 6 inches less than the toe clearance, whichever is greater. -Between 9 inches (230 mm) and 27 inches (685 mm) above the finish floor or ground, the knee clearance shall be permitted to reduce at a rate of 1 inch (25 mm) in depth for each 6 inches (150 mm) in height. - Knee clearance shall be 30 inches (760 mm) wide minimum.	***Step #27*** Verify that issues concerning MOBILITY are addressed in a HAVA compliant manner for approach and reach.	Passed
VVSG 1 3.2.4bv	Mobility	v. **If** the accessible voting station has a parallel approach with no side reach obstruction then the maximum high reach shall be 48 inches and the minimum low reach shall be 15 inches. See Figure 3.	***Step #28*** Verify that CONDITIONAL issues concerning MOBILITY are addressed in a HAVA compliant manner for approach.	Passed

Req. #	Req. Type	Requirement Text	Test Case Step	Pass / Fail
VVSG 1 3.2.4bvi	Mobility	vi. **If** the accessible voting station has a parallel approach with a side reach obstruction, the following sub-requirements apply. See Figure 4. - The side obstruction shall be no greater than 24 inches in depth and its top no higher than 34 inches. - If the obstruction is no more than 10 inches in depth, then the maximum high reach shall be 48 inches, otherwise it shall be 46 inches.	***Step #28*** Verify that CONDITIONAL issues concerning MOBILITY are addressed in a HAVA compliant manner for approach.	N/A to vendor system
VVSG 1 3.2.4c	Mobility	c. All labels, displays, controls, keys, audio jacks, and any other part of the accessible voting station necessary for the voter to operate the voting machine shall be easily legible and visible to a voter in a wheelchair with normal eyesight (no worse than 20/40, corrected) who is in an appropriate position and orientation with respect to the accessible voting station	***Step #28A*** Verify that CONDITIONAL issues concerning MOBILITY are addressed in a HAVA compliant manner for approach.	Passed
VVSG 1 3.2.5	Hearing	The voting process shall be accessible to voters with hearing disabilities.		
VVSG 1 3.2.5a	Hearing	a. The accessible voting station shall incorporate the features listed under requirement 3.2.2.2 (c) for voting equipment that provides audio presentation of the ballot to provide accessibility to voters with hearing disabilities.	***Step #30*** Verify that issues concerning HEARING are addressed in a HAVA compliant manner.	Passed
VVSG 1 3.2.5b	Hearing	b. If voting equipment provides sound cues as a method to alert the voter, the tone shall be accompanied by a visual cue, unless the station is in audio-only mode.	***Step #30*** Verify that issues concerning HEARING are addressed in a HAVA compliant manner.	Passed
VVSG 1 3.2.6	Speech	The voting process shall be accessible to voters with speech disabilities.	***Step #30***Verify that issues concerning SPEECH are addressed in a HAVA compliant manner.	Passed
VVSG 1 3.2.6a	Speech	a. No voting equipment shall require voter speech for its operation.	***Step #30***Verify that issues concerning SPEECH are addressed in a HAVA compliant manner.	Passed
VVSG 1 3.2.7	English Proficiency	For voters who lack proficiency in reading English, or whose primary language is unwritten, the voting equipment shall provide spoken instructions and ballots in the preferred language of the voter, consistent with state and federal law. The requirements of 3.2.2.2 (c) shall apply to this mode of interaction.	***Step #18*** Verifying LANGUAGE requirements	Passed
VVSG 1 3.2.8	Cognition	The voting process should be accessible to voters with cognitive disabilities.		

Appendix D – NYSBOE BMD Requirements Trace and Test Results

SysTest Labs has conducted a requirements gap analysis and trace of the NYSBOE BMD requirements to document the NYSBOE requirements that were verified by the execution of test case BMD01. The table below displays the NYSBOE requirement, traced to each step of Functional Test Case BMD01. The final column displays the Pass/Fail results of each requirement.

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
Title	1	The New York State Board Of Elections intends to approve for use at elections in New York State conducted after September 1, 2008, ballot marking devices (BMD) that meet the accessibility provisions of the Help America Vote Act of 2002 (Public Law 107-252) and the provisions contained herein.		
Title	2	In order for a BMD to be considered for approval by the State Board for use, it shall comply with the minimum requirements stated herein:		
Lot 2 test	2.1	All capabilities to electronically record or tabulate a vote must be disabled or absent.	9, 32	Passed
Title	2.2	**Accessibility provisions for usability by voters who are disabled:**		
Lot 2 test	2.2.1	Be constructed to allow a voter with disabilities to mark his or her vote choices on a paper ballot.	9, 10, 11, 12, 12a, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 26a, 27, 27a, 28, 28a, 29, 30	Passed
Lot 1 test	2.2.2	Permit inspectors of elections to easily and safely place the BMD in an accessible position.		Lot I Test
Lot 2 test	2.2.3	Be equipped with a voting device with tactile discernible controls, designed pursuant to Election Law Section 7-202 to meet the needs of voters with limited reach and/or hand dexterity, allow them the ability to mark their ballot, and shall include, for example: raised buttons of different shapes and colors, large or raised numbers or letters, and light pressure switches.	23, 24, 25	Passed
Lot 2 test	2.2.4	Be equipped with an audio voting feature, pursuant to Election Law Section 7-202. The audio feature shall be able to be used either independently or simultaneously with the on-screen display. The audio voting feature shall allow for the complete content of the ballot in all required languages, to be communicated to the voter in a voice which permits a voter who is blind or visually impaired to mark a secret ballot using voice-only or tactile discernible controls. The audio voting feature shall include a feature that, if selected, will allow a voter to control the volume of the voice within the ranges contained in the 2005 Voluntary Voting System Guidelines.	9, 11, 12, 12a, 15, 16, 17, 18, 29	Passed

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
Lot 2 test	2.2.5	Be equipped with a switch voting attachment which can be operated orally by gentle pressure or the creation of a vacuum through the inhalation or exhalation of air by the voter including, but not limited to, a sip-and-puff switch voting attachment.	12, 25	Passed
	2.2.6	Vendors shall provide documentation, cost information and sources for any additional accessibility devices which may work in conjunction with their proposed system, including but not limited to rocker paddles, if available.		
Title	2.3	**Ballot provisions:**		
Lot 1 test	2.3.1	As to the printing and arrangement of ballots, all ballots shall meet the requirements as to form and content provided in the Election Law.		Lot I Test
Lot 1 test	2.3.1.1	Print a paper ballot that conforms to **Election Law Sections 7-104 and 7-121**, and any other applicable provisions of statute, and that such ballot is easily visible under typical lighting found in a poll site.		Lot I Test
Lot 1 test	2.3.2	Ballots shall be printed in black print on a white background and, in the case of a primary, allow for only the identification portion of the ballot to appear in different colors to identify, each political party according to the color assigned to such party pursuant to law.		Lot I Test
Lot 1 test	2.3.3	Ballots shall include machine-readable code and also human-readable code, to identify different ballot styles.		Lot I Test
Lot 1 test	2.3.4	The types of ballots used and their form, type size and arrangement must be approved by the State Board Of Elections.		Lot I Test
Title	2.4	**Provisions for noise level:**		
Lot 1 test	2.4.1.1	BMDs shall be constructed in a manner so that noise levels of the system or equipment during operation will not interfere with the duties of the election inspectors or the voting public.		Lot I Test
Lot 1 test	2.4.1.2	The noise level of write-in components of the BMD shall be so minimal that it will be virtually impossible under normal conditions for someone at the table used by the inspectors of elections to determine that a write-in vote is being marked or has been marked.		Lot I Test
Title	2.5	**Provisions for voter privacy:**		
Lot 2 test	2.5.1	The BMD shall be constructed so that no one within the polling site will be able to see how a voter is marking their ballot.	9, 10, 20, 21	Passed

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
Lot 2 test	2.5.1.1	The BMD shall be provided with a curtain, screen, shield or other privacy device, which shall allow voters with a range of disabilities to, either electronically or manually, open, close or otherwise use the device with ease when entering and exiting the BMD.	9, 10, 11, 12, 25	Passed
Lot 2 test	2.5.1.2	The privacy and anonymity of all voters shall be preserved during the process of marking and verifying ballot choices.	9, 10, 11, 12, 25	Passed
Lot 2 test	2.5.1.3	The privacy and anonymity of all voters whose paper records contain any of the alternative languages chosen for making ballot selections shall be maintained.	9, 10, 11, 12, 25	Passed
Lot 1 test	2.5.2	Information for the purposes of auditing paper records that may permit a voter to reveal his or her ballot choices shall be displayed so as not to be memorable to the voter.		Lot I Test
Title	2.6	**Ballot Marking Device integrity and security:**		
Lot 1 test	2.6.1	Not include any device or functionality potentially capable of externally transmitting or receiving data via the internet or via radio waves or via other wireless means.		Lot I Test
Lot 1 test	2.6.2	The BMD must be secure against attempts to interfere with correct system operation. The vendor shall identify each potential point of attack. For each potential point of attack, the vendor shall identify the technical safeguards embodied in the BMD to defend against attack, and the procedural safeguards that the vendor has recommended be followed by the election administrators to further defend against that attack. Each defense shall be classified as preventative, if it prevents the attack in the first place; detective if it allows detection of an attack; or corrective if it allows correction of the damage done by an attack. Security requirements and provisions shall include the ability of the system to detect, prevent, log and recover from the broad range of security risks identified. These procedures shall also examine system capabilities and safeguards claimed by the vendor to prevent interference with correct system operations. The NYSBOE, with the assistance of a contractor(s), shall conduct tests to confirm that the security requirements defined herein have been completely addressed. Notwithstanding any other provisions of these requirements, the NYSBOE shall determine whether all or a portion of such security requirements and security provisions shall be available for public inspection, but shall exclude any information which compromises the security of the BMD.		Lot I Test
Lot 1 test	2.6.3	The BMD shall contain software and hardware required to perform a diagnostic test of system status, to demonstrate that the system is fully operational and that all voting positions are operable.		Lot I Test
Lot 1 test	2.6.4	The BMD printers shall be physically secure from tampering.		Lot I Test
Lot 1 test	2.6.5	The BMD shall communicate with its printers over a standard, publicly documented printer port using a standard communication protocol.		Lot I Test

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
Lot 1 test	2.6.6	The printer shall not be permitted to communicate with any other system or machine other than the single BMD to which it is connected.		Lot I Test
Lot 1 test	2.6.7	The printer shall only be able to function as a printer: it cannot store information or contain or provide any services that are not essential to system function, (e.g., provide copier or fax functions) or have network capability.		Lot I Test
Lot 1 test	2.6.8	Printer access to replace consumables such as ink or paper shall only be granted if it does not compromise the sealed printer paper path.		Lot I Test
Lot 1 test	2.6.9	The BMD shall provide for the ability for poll workers, prior to the opening of polls on election day, to demonstrate that the ballot storage devices are empty.		Lot I Test
Lot 1 test	2.6.10	Tamper-evident seals or physical security measures shall protect the connection between the printer and the BMD, so that the connection cannot be broken or interfered with without leaving extensive and obvious evidence.		Lot I Test
Lot 1 test	2.6.11	The BMD's printers shall be highly reliable and easily maintained.		Lot I Test
Lot 1 test	2.6.12	The BMD shall include a printer port to which a commercial off-the-shelf printer could be attached for the purposes of printing paper records and any additional records.		Lot I Test
Lot 1 test	2.6.13	The BMD shall detect errors and malfunctions such as paper jams or low supplies of consumables such as paper and ink that may prevent paper records from being correctly displayed and printed.		Lot I Test
Lot 1 test	2.6.14	If an error or malfunction occurs, the BMD attached to the malfunctioning printer shall suspend ballot marking operations and shall present a clear indication to the voter and election workers of the error or malfunction.		Lot I Test
Lot 1 test	2.6.15	The vendor shall provide estimated quantities of supplies of consumable items such as paper and printer ink necessary to operate from opening to closing of polls for each fifty (50) ballots voted.		Lot I Test
Lot 1 test	2.6.15.1	The vendor shall also provide cost and contact information for procurement of supplies of consumable items necessary to operate the device.		Lot I Test
Lot 1 test	2.6.16	Printing devices should contain paper and ink of sufficient capacity so as not to require reloading or opening equipment covers or enclosures and circumventing security features, or reloading shall be able to be accomplished with minimal disruption to voting and without circumvention of security features such as seals.		Lot I Test

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
Lot 1 test	2.6.17	Vendor documentation shall include specifications regarding the temperature and humidity ranges specified by the manufacturer for the storage of printer consumables.		Lot I Test
Lot 1 test	2.6.18	Vendor documentation shall include procedures for investigating and resolving malfunctions including but not limited to unreadable 3 paper records, paper jams, low ink, misfeeds and power failures.		Lot I Test
Lot 1 test	2.6.19	Vendor documentation shall include procedures for ensuring, in the case of malfunctions, that paper records are correctly marked.		Lot I Test
Lot 1 test	2.6.20	Protective coverings intended to be transparent on BMDs shall be maintainable via a predefined cleaning process.		Lot I Test
Lot 1 test	2.6.21	The paper record shall be sturdy, clean, and of sufficient durability to be used for manual tabulation. The paper record shall be able to be stored and remain fully readable without degradation for 22 months within the temperature and humidity ranges specified by the manufacturer, but at a minimum temperature range of at least from -20 degrees to 140 degrees Fahrenheit, and at a humidity as high as 98%.		Lot I Test
Title	2.7	**In addition to the requirements above, a BMD shall meet the following provisions:**		
Lot 2 test	2.7.1	Be constructed so as to allow for a voter to mark a paper ballot for all candidates who may be nominated and on all ballot proposals which may be submitted.	9, 16, 18, 20, 21, 22	Passed
Lot 2 test	2.7.2	The BMD shall provide a method for a voter to mark a paper ballot indicating their selection for any person for any office, whether or not nominated as a candidate (write-in) by any party or independent body.	9	Passed
Lot 1 test	2.7.3	Be constructed so that a voter cannot mark a ballot for a candidate or for a ballot proposal for whom or on which he or she is not lawfully entitled to vote.		Lot I Test
Lot 2 test	2.7.4	The BMD must prevent voters from over-voting and indicate to the voter specific contests or ballot issues for which no selection or an insufficient number of selections has been made, and provide the voter with the opportunity to correct the ballot before the ballot is marked.	9, 20, 21	Passed
Lot 2 test	2.7.5	Provide an opportunity such that any voter, including voters who are blind or visually impaired, may privately and independently verify their selections and the ability to privately and independently change such selections or correct any error before the ballot is marked.	9, 10, 11, 12, 14, 15, 16, 17, 19, 20, 21, 22	Passed

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
Lot 2 test	2.7.6	Provide a feature to permit a voter to independently verify their paper ballot after it has been marked, including voters who are blind or visually impaired.	9, 10, 11, 12, 14, 15, 16, 17, 19, 20, 21, 22	Passed
Lot 1 test	2.7.7	Be provided with a lock or locks, or other device or devices, the use of which, immediately after the polls are closed or the operation of the BMD for such election is completed, will absolutely secure the BMD and prevent the marking of additional ballots.		Lot I Test
Lot 1 test	2.7.8	Be provided with sufficient space to display the ballot definition information required herein, provided, however, in the alternative, such information may be displayed within the official ballot;		Lot I Test
Lot 1 test	2.7.9	Retain all paper ballots marked or produced in a manner intended and designed to protect the privacy of the voter. Such ballots shall allow for manual tabulation and shall be preserved in accordance with the provisions of Section 3-222 of the Election Law.		Lot I Test
Lot 1 test	2.7.10	Provide sufficient illumination to enable the voter to see the ballot.		Lot I Test
Lot 1 test	2.7.11	Contain a device which enables all the election inspectors and poll watchers at such polling place to determine when the BMD has been activated for voting and when the voter has completed marking his or her ballot.		Lot I Test
Lot 1 test	2.7.12	Permit the primaries of at least five parties to be conducted at a single election utilizing the BMD, and accommodate such number of different ballot styles at a single election as may be required by the New York State Board Of Elections and/or the county board of elections.		Lot I Test
Lot 1 test	2.7.13	Be capable of conducting both pre-election and post-election testing of the BMD that demonstrates accurate ballot layout presentation and the ability to accurately mark ballots reflecting the choices made by voters.		Lot I Test
Lot 2 test	2.7.14	Permit alternative language accessibility pursuant to the requirements of section 203 of the Voting Rights Act of 1965 (42 U.S.C. 1973aa-1a) such that it must have the capacity to display the full ballot in the alternative languages required by the federal Voting Rights Act if such BMD is to be used where such alternative languages are required or where the local board deems such feature necessary.	1, 2, 3, 6, 9, 17, 18, 20, 21	Passed
	2.7.14.1	The vendor shall provide, documentation and cost figures, if any, related to the addition of new language capabilities which may be required by reason of demographic changes identified by the decennial federal census.		

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
Lot 1 test	2.7.15	Provide a battery power source in the event that the electric supply used to make the BMD function is disrupted. The battery power source shall operate the device and allow for the marking of ballots for a period not less than 2 hours to ensure that the device can shut down prior to the battery power failure, and can resume functionality when power is provided or restored without significant or intrusive power-up procedures. Such batteries must be rechargeable and have a minimum five-year life when used under normal conditions. In the event of a power failure, the device shall perform a normal shut-down not less than one hour before battery power is depleted, and shall notify the election inspector that the system will do so.		Lot I Test
Lot 1 test	2.7.16	The paper record shall allow for a manual tabulation and allow for preservation in accordance with the provisions of Election Law, Section 3-222.		Lot I Test
Lot 2 test	2.7.17	The BMD shall be capable of showing the information on the display screen in a font size of 3.0 mm, and should be capable of showing the information in at least two font ranges, a) 3.0-4.0 mm and b) 6.3-9.0 mm, under control of the voter. The voter shall also be able to control the contrast of the display screen.	7, 15	Passed
Lot 1 test	2.7.18	There shall be instructions for performing the verification process made available to the voter, in accessible formats, in a location on or near the BMD.		Lot I Test
Lot 2 test	2.7.19	The BMD shall display and print a paper record in any of the alternative languages chosen for making ballot selections. Candidate names and other markings not related to the ballot selection on the paper record shall appear in English.	1, 2, 3, 6, 9, 17, 18, 20, 21	Passed
Lot 2 test	2.7.20	The BMD shall allow the voter to approve or reject the paper record.	9, 12, 14, 16, 19, 20, 21, 22, 25	Passed
Lot 1 test	2.7.21	Vendor documentation shall include procedures for returning a BMD to correct operation after a voter has used it incompletely or incorrectly.		Lot I Test
	2.7.22	The vendor shall, without additional cost, provide to the purchaser a five-year guarantee of parts and service that such BMD equipment shall be kept in good working order. Shipping costs for any factory repairs or part replacement will be incurred by the vendor.		
Lot 1 test	2.7.23	The BMD shall provide a means by which the ballot definition code may be positively verified to ensure that it corresponds to the format of the ballot face and the election configuration.		Lot I Test

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
Lot 1 test	2.7.27	The vendor shall provide cost terms and documentation to include alternative options for BMD printers that are capable of printing ballots in a size where the measurement of the smallest width of such ballot is grater than 8-1/2 inches.		Lot I Test
Title	3	**Education, Training and Required Documents:**		
Title	3.1	INSTRUCTION OF PERSONNEL:		
Lot 1 test	3.1.1	The vendor shall provide detailed information regarding in-person training as follows:		Lot I Test
Lot 1 test	3.1.1.1	The maximum number of participants per training session.		Lot I Test
Lot 1 test	3.1.1.2	The duration of training based on vendor-recommended roles and responsibilities.		Lot I Test
Lot 1 test	3.1.1.3	The cost and terms for training to include both regionalized and on-site county training		Lot I Test
	3.1.2	Within ten business days of acceptance by the Contractor of a Purchase Order, the Contractor and the Authorized User shall agree upon mutually-acceptable training dates for the contractor to provide live instruction by qualified personnel sufficient to ensure that the product is operating correctly and operator-maintained so as to perform to the full extent of its design capabilities. The Authorized Users shall designate personnel to receive instruction.		
Lot 1 test	3.1.3	In addition, Contractors of BMDs shall, prior to delivery, provide training for Authorized User personnel in the following areas:		Lot I Test
Lot 1 test	3.1.3.1	Training on unpacking, assembling and acceptance testing of the equipment.		Lot I Test
Lot 1 test	3.1.3.2	Training for proper use of the equipment, including maintenance, storage and transportation procedures.		Lot I Test
Lot 1 test	3.1.3.3	Training in the procedures to be used to accomplish ballot face layout and ballot programming.		Lot I Test
Lot 1 test	3.1.3.4	Instruction on procedures to be followed by inspectors at polling places.		Lot I Test
Title	3.2	INSTRUCTION MATERIALS:		
Lot 1 test	3.2.1	Prior to the commencement of any training, the Contractor(s) shall furnish to the Authorized User complete instruction materials, (video, graphics, audio or text) for the BMD and all accessibility features. These instruction materials shall include the following:		Lot I Test
Lot 1 test	3.2.1.1	Training on unpacking, assembling and acceptance testing of the equipment.		Lot I Test
Lot 1 test	3.2.1.2	Training on adjusting and aligning the equipment.		Lot I Test

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
Lot 1 test	3.2.1.3	Training for proper use of the equipment, including maintenance, storage and transportation procedures.		Lot I Test
Lot 1 test	3.2.1.4	Training in the procedures to be used to accomplish ballot face layout and ballot programming.		Lot I Test
Lot 1 test	3.2.1.5	Training on operating the product (including layout and interconnection diagrams and schematic and wiring diagrams).		Lot I Test
Lot 1 test	3.2.1.6	Training on preventive and corrective maintenance procedures (including complete part lists, manufacturer's catalog numbers, and ordering information, if applicable).		Lot I Test
Lot 1 test	3.2.1.7	Training on voter education on the use of the BMD and any accessibility devices (including methods to be used by eligible voters to mark a ballot).		Lot I Test
Lot 1 test	3.2.1.8	Training on procedures to be followed by inspectors at polling places.		Lot I Test
Lot 1 test	3.2.1.9	All training materials shall also be provided to the Authorized Users at no additional cost in electronic version to enable the Authorized User to incorporate the training material in the Authorized User's training procedures and training manuals and outreach materials.		Lot I Test
Lot 1 test	3.2.2	This requirement is separate from, and in addition to, any materials otherwise provided.		Lot I Test
	3.3	In addition, within ten (10) business days of the State Board approving for use such BMD, and prior to the commencement of any training of Authorized Users, the Contractor(s) shall furnish to the NYSBOE five (5) complete sets of instruction materials, (video, graphics, audio or text) for each product and component supplied to the Authorized Users. These instruction materials shall include:		
Lot 1 test	3.3.1	Training on unpacking, assembling and acceptance testing of the equipment.		Lot I Test
Lot 1 test	3.3.2	Training on adjusting and aligning the equipment.		Lot I Test
Lot 1 test	3.3.3	Training for proper use of the equipment, including maintenance, storage and transportation procedures.		Lot I Test

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
Lot 1 test	3.3.4	Training in the procedures to be used to accomplish ballot face layout and ballot programming.		Lot I Test
Lot 1 test	3.3.5	Training on operating the product (including layout and interconnection diagrams and schematic and wiring diagrams).		Lot I Test
Lot 1 test	3.3.6	Training on preventive and corrective maintenance procedures (including complete part lists, manufacturer's catalog numbers, and ordering information, if applicable).		Lot I Test
Lot 1 test	3.3.7	Training on voter education on the use of the new voting machines and any accessibility devices (including methods to be used by eligible voters to mark a ballot).		Lot I Test
Lot 1 test	3.3.8	Training on procedures to be followed by inspectors at polling places.		Lot I Test
Lot 1 test	3.3.9	This requirement is separate from, and in addition to, any materials otherwise provided.		Lot I Test
	3.3.10	The vendor shall permit the NYSBOE and Authorized Users to duplicate these materials for use in public education and training programs.		
Lot 1 test	3.3.10.1	All training materials shall also be provided to the NYSBOE at no additional cost in electronic version to enable the NYSBOE and/or Authorized Users to incorporate the training material in the Authorized User's training procedures and training manuals and outreach materials.		Lot I Test
Lot 1 test	3.4	**Submission, Testing and Examination:** The NYSBOE shall cause the BMD to be examined and a report of the examination to be made. Such examination shall include a determination as to whether the BMD meets the provision of these requirements, and shall include a thorough review and testing of any electronic or computerized features of the device. Such report shall state an opinion as to whether the kind of BMD so examined can safely and properly be used by voters and local boards of elections at elections, under the conditions prescribed herein and the requirements of the federal Help America Vote Act. If the report states that the BMD can be so used, and the board after its own review so determines, in accordance with subdivision four of Section 3-100 of the Election Law, the BMD shall be deemed approved, and may then be purchased for use at elections as herein provided.		Lot I Test
Title	3.5	Submission.		

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
Lot 1 test	3.5.1	The vendor shall submit, completed ballot layouts and ballot coding based upon the pre-qualification test format as defined in Exhibit A.		Lot I Test
Lot 1 test	3.5.2	The vendor shall acknowledge that the fees for the examination of a BMD shall be assessed against the vendor by the NYSBOE based upon the cost to the NYSBOE for examination of such BMD by an outside contractor, laboratory or other authorized examiner.		
Title	3.5.3	A vendor shall affirm that:		
	3.5.3.1	The submitted BMD complies with all applicable requirements found herein, and is suitable for use by voters to mark a paper ballot at elections in New York State, and;		
	3.5.3.2	The vendor shall quote and provide a statewide, uniform price for each unit of the BMD, and;		
	3.5.3.3	The submitted BMD's software shall not contain any code, procedures or other material which may disable, disarm or otherwise affect in any manner, the proper operation of the BMD, or which may damage the BMD, any hardware, or any computer system or other property of the NYSBOE or county board, including but not limited to 'viruses', 'worms', 'time bombs', and 'drop dead' devices that may cause the BMD to cease functioning properly at a future time, and;		
	3.5.3.4	Any submitted BMD shall provide methods through security seals or device locks to physically secure against attempts to interfere with correct device operations. Such physical security shall guard access to device panels, doors, switches, slots, ports, peripheral devices, firmware, and software.		
	3.5.4	The vendor shall disclose, any pecuniary interest in or any direct or indirect control over any testing laboratory as defined herein or which has been approved by the federal Election Assistance Commission (EAC) which may be used in connection with testing of BMD or voting systems.		
Title	3.6	Submission to the NYSBOE.		
	3.6.1	BMD and other devices accessible to individuals with disabilities, must be approved for use by the NYSBOE prior to use. Each complete BMD, all documentation prescribed herein, must be submitted to the NSYBOE for testing purposes no later than 11 am Eastern Standard Time ten (10) business days after a bid opening. Deliveries must be completed as inside delivery and include the following:		

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
	3.6.1.1	Each complete BMD including all accessibility components.		
	3.6.1.2	A certified or bank check in the amount of $5,000 shall accompany such submission, and be applied towards the actual cost of the examination.		
	3.6.1.3	The election management software.		
	3.6.1.4	Media containing the test general election and test primary election ballot definition code in all required text and audio translations of alternative languages, including English.		
	3.6.1.5	The BMD shall be pre-programmed with the test general election ballot definition code in all required text and audio translations of alternative languages, including English.		
	3.6.1.5.1	Audio translation shall include instruction for voters to utilize the BMD for all test ballot styles in alternative languages, including English (Spanish, Korean, Mandarin, and Cantonese).		
	3.6.1.6	An adequate supply of proprietary and non-proprietary consumables as follows:		
	3.6.1.6.1	Vendor-recommended paper ballot stock sufficient to test the marking of 1,100 ballots.		
	3.6.1.6.2	If ballots are to be pre-printed, the vendor shall provide 500 pre-printed test general election ballots and for each of the three test primary election ballots, 200 each.		
	3.6.1.7	All vendors shall submit to the NYSBOE with their BMD, sworn affidavits from the president, chief executive officer or chief operating officer of the vendor, disclosing any contributions made within the United States by any of those officers, by the vendor itself, or by any controlling shareholder to any political party or candidate for any office, within two years prior to the date the BMD is submitted. After the submission of any BMD, or after the submission of any such affidavit, a vendor must submit to the Election Operations Unit, an affidavit at the end of each calendar quarter (March 31, June 30, September 30 and December 31), disclosing whether or not any new contribution has been made. The submission of such affidavits shall be required throughout the period during which the BMD is approved for use in New York.		

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
	3.6.1.8	All vendors shall submit with their BMD, information regarding past or pending court cases involving their BMD or its major components, any evidence of fraud, faulty systems, or failure to correct past problems.		
	3.6.1.9	Vendors submitting a BMD for approval must also provide additional systems to be used by the NYSBOE for the purposes of conducting tests.		
	3.6.1.10	If the BMD is approved for use by the NYSBOE, the specific BMD and components examined by the NYSBOE shall become the property of the NYSBOE for as long as the BMD or equipment is in use in the State or for such shorter period as the NYSBOE shall so determine. BMD's not approved shall be disposed of pursuant to the vendor's direction.		
	3.6.1.11	The vendor shall provide service and normal maintenance of said BMD or equipment after approval and shall supply to the NYSBOE, at no cost, any modification to the BMD for upgrading of any feature during the period that said BMD is offered for sale and use in the State.		
	3.6.1.12	Vendors shall submit recommendations for acceptance and maintenance testing to ensure that the software and/or firmware in BMDs purchased and used by county boards of elections is identical to that which was approved.		
Title	4	Examination: The BMD shall be examined by examiners or testing laboratories to be selected for such purpose by the NYSBOE. Each examiner or laboratory shall receive compensation and expenses for making an examination and report as to each BMD examined by him or it. Neither any member of the NYSBOE nor any examiner or owner or employee of any testing laboratory shall have any pecuniary interest in any BMD. Any form of BMD not so approved, cannot be used at any election.		
	4.1	When any change is made in the operation or material of any feature or component of any BMD which has been approved pursuant to the provisions of this section, such BMD must be submitted for such re-examination and re-approval pursuant to the provisions defined herein as the state board of elections deems necessary.		

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
	4.2	If at any time after any BMD has been approved pursuant to the provisions of the Election Law, the state board of elections has any reason to believe that such BMD does not meet all the requirements for BMDs, it shall forthwith cause such BMD to be examined again in the manner prescribed herein. If the opinions in the report of such examinations do not state that such BMD can safely and properly be used by voters at elections, the NYSBOE shall forthwith rescind its approval of such BMD. After the date on which the approval of any BMD is rescinded, no BMD of such type may be used or purchased for use in this state. The NYSBOE may examine all BMDs of such type which were previously purchased, to determine if they may continue to be used in elections in this state.		
	4.3	Compliance during warranty period. If the NYSBOE determines, during the applicable warranty period, that existing BMD requirements requires that the BMD be modified, the vendor shall make such modifications without additional charge or cost to the State or county boards of elections. Such modifications may be necessary to conform the BMD to full system certification compliance criteria. Such full system compliance shall be performed by the NYSBOE and any contractor(s) authorized to examine such device or system.		
	4.3.1	If the NYSBOE determines, after the applicable warranty period and during any period of maintenance and support, that existing state law requires, that existing BMD requirements require that the BMD be modified, the vendor shall make such modifications without additional charge or cost to the State or county boards of elections.		
Title	4.4	Examination will have the following principal objectives:		
Lot 2 test	4.4.1	To demonstrate the ability of a voter to mark a ballot using the BMD.	9, 12, 14, 15, 16, 18, 19, 20, 21, 22, 25	Passed
Lot 1 test	4.4.2	To demonstrate the ability of the BMD to mark a ballot accurately.		Lot I Test
Lot 2 test	4.4.3	To demonstrate the ability of the voter to verify their ballot, to include notification of any undervote(s), and/or overvote(s) and that the BMD allows the voter to correct same; if they choose.	9, 11, 12, 14, 16, 18, 19, 20, 21, 22	Passed
Lot 2 test	4.4.4	To demonstrate the ability of the voter to independently verify their ballot after the BMD has marked the ballot.	9, 11, 12, 14, 16, 18, 19, 20, 21, 22	Passed

Lot Test	Req #	Requirement	Test Step #	Pass / Fail
Lot 2 test	4.4.5	To demonstrate that the BMD's hardware and software operate in a manner consistent with a voter's ability to mark a ballot.	9, 11, 12, 14, 16, 18, 19, 20, 21, 22	Passed
Lot 1 test	4.4.6	To demonstrate that the BMD's vendor-provided security requirements and security provisions are identified for each system function and operating mode, and that all features function as described.		Lot I Test
Lot 1 test	4.4.7	Independently identify any additional security procedures, tasks or features which the BMD shall accommodate, and verify that such additional requirements are in place and function as required.		Lot I Test
	4.5	Whenever the state board is satisfied that a BMD has been proven to meet or exceed these requirements and the vendor is able to provide documentation for the state board to establish that those requirements have been met, then the state board, may, in its discretion, accept such documentation as satisfaction of the required tests.		

End of Test Report