

WYLE REPORT NO. T56285-01
APPENDIX A.6
USABILITY AND ACCESSIBILITY
TEST CASE PROCEDURE SPECIFICATION (T56285-70)

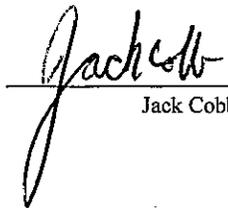
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7800 Highway 20 West
Huntsville, Alabama 35806
Phone (256) 837-4411
Fax (256) 721-0144
www.wyle.com

**USABILITY AND ACCESSIBILITY
TEST CASE PROCEDURE SPECIFICATION
FOR
UNISYN VOTING SOLUTIONS, INC.
OPENELECT VOTING SYSTEM, VERSION 1.0**

Prepared by:

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Jack Cobb, Senior Project Engineer



NVLAP LAB CODE 200771-0

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U.S. Election Assistance Commission

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1.0 INTRODUCTION

The purpose of the Usability and Accessibility requirements is to document and test the functionality of the Unisyn Open Elect Voting System (OVS), version 1.0. Wyle must verify that the OVS performs as documented in the Unisyn supplied Technical Data Package submitted to Wyle for the test campaign. Unisyn has submitted a summative usability test report to Wyle and the EAC. Wyle has reviewed this report to verify that it is in common industry format. Wyle must also validate that the OVS meets the requirements of the 2005 EAC Voluntary Voting Systems Guidelines (VVSG). Wyle qualified personnel will use this document as the procedure to execute the Usability and Accessibility test.

1.1 Scope

The scope of this procedure will focus on the usability and accessibility used for the Unisyn Open Elect Voting System (OVS). The OVS must meet the requirements set forth by the VVSG and Help America Vote Act (HAVA). The OVS usability and accessibility requirements ensure all eligible voters the ability to vote without discrimination regardless of any disabilities. Furthermore voters shall be provided a voting system that can be used comfortably and efficiently thus ensuring proper access, accurate ballot selection, and maintaining voter secrecy.

The requirements for physical, sensory, or cognitive disabilities shall be followed according to HAVA (a) (3) (B). Alternative languages shall be in accordance to HAVA (a) (4) and privacy mandated by HAVA (a) (1) (C). In addition Common Industry Format (CIF) shall be used for testing purposes according to ANSI/INCITS 354-2001 and in accordance with the VVSG. The usability and accessibility of the OVS will be tested as an end to end system test.

1.2 References

The documents listed below were used in the development of the Test Case Procedure and are utilized to perform certification testing.

- Election Assistance Commission 2005 Voluntary Voting System Guidelines, Volume I, Version 1.0, “Voting System Performance Guidelines”, and Volume II, Version 1.0, “National Certification Testing Guidelines”, dated December 2005
- Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date January 1, 2007
- Election Assistance Commission Voting System Test laboratory Program Manual, Version 1.0, effective date July 2008
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2006 Edition, “NVLAP Procedures and General Requirements (NIST Handbook 150)”, dated February 2006
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, “Voting System Testing (NIST Handbook 150-22)”, dated May 2008
- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Wyle Laboratories’ Quality Assurance Program Manual, Revision 4
- ANSI/NCSL Z540-1, “Calibration Laboratories and Measuring and Test Equipment, General Requirements”

1.0 INTRODUCTION (continued)

1.2 References (continued)

- ISO 10012-1, “Quality Assurance Requirements for Measuring Equipment”
- EAC Requests for Interpretation (listed on www.eac.gov)
- EAC Notices of Clarification (listed on www.eac.gov)

1.3 Terms and Abbreviations

The terms and abbreviations relevant to the test campaign are described in Table 1-1, below.

Table 1-1 Terms and Abbreviations

Term	Abbreviation	Definition
American National Standards Institute	ANSI	
Audio-Tactile Interface	ATI	Voter interface designed to not require visual reading of a ballot. Audio is used to convey information to the voter and sensitive tactile controls allow the voter to communicate ballot selections to the voting system.
Commercial Off the Shelf	COTS	---
Common Industry Format	CIF	
United States Election Assistance Commission	EAC	Commission created per the Help America Vote Act of 2002, assigned the responsibility for setting voting system standards and providing for the voluntary testing and certification of voting systems.
Election Management System	EMS	Within the Open Elect system, the EMS equivalent is OCS.
Election Server	ES	A component of the OCS, the ES updates the system clock and downloads new Election data to the voting devices prior to each election, typically at the warehouse.
Equipment Under Test	EUT	---
Help America Vote Act of 2002	HAVA	
Open Elect Central Suite	OCS	Set of applications supplied by Unisyn to run at the Election Headquarters to support elections on the OVO, OVI, and OVCS systems. Includes: Ballot Layout Manager, Election Manager, Election Server, Tabulator Client, Tabulator Server and Tabulator Reports. In addition, the OCS includes the Software Server (SS) system for updating and validating OVO and OVI (voting device) software.
Open Elect Voting Device	OVD	OVD refers to the OVO, OVI, and OVCS hardware components of the Open Elect Voting System.
Open Elect Voting Interface	OVI	The OVI is an accessible voting device designed to accommodate voters with disabilities, and may also be used for Early Voting.
Open Elect Voting Optical Scan	OVO	The OVO is a ballot scanning and tabulation device which is located at a precinct and may also be used for Early Voting purposes.

1.0 INTRODUCTION (continued)

1.3 Terms and Abbreviations (continued)

Table 1-1 Terms and Abbreviations (continued)

Open Elect Voting System	OVS	The OVS is a voting system which is comprised of the OVS suite of software applications, and the OVO and OVI client machines used by voters to produce and cast ballots.
Software Server	SS	The SS application is used for the updating and validation of Certified Software Releases which are installed on OVS client machines.
Open Elect Voting Central Scan	OVCS	The OVCS is a COTS ballot scanning device that uses proprietary software to capture ballot images.
Tabulator Client	TC	The TC is a software application that retrieves vote files from the TM and transfers the files to the Tabulator.
Tabulator		Tabulator is a software application that receives uploaded voting data.
Voluntary Voting System Guidelines	VVSG	Provides a set of specifications and requirements against which voting systems can be tested to determine if they provide all the basic functionality, accessibility, and security capabilities required of voting systems.

1.4 RELATIONSHIP TO OTHER PROCEDURES

The Usability and Accessibility testing procedures are tested in conjunction with actual voting campaigns. Testing on the procedures is done on all aspects of usability and accessibility while the voting campaign is running concurrently. Applicable test procedures need to be run concurrent with this procedure.

2.0 DETAILS

The following sections describe the requirements that are applicable to the OVS and individual test cases that will be run in to facilitate usability testing.

2.1 Inputs, Outputs, and Special Requirements

During the PRE Usability testing, an election will be developed for use in the VOTE Usability testing run. Assumptions will be made that the election XML will be imported into the Election Manager application, options and sounds will be set, and the election will be exported to an election cd and loaded onto OVO and OVI units. The voting data produced during the VOTE Usability runs will not be used as no POST Usability functions are present in the OVS.

2.2 Usability Testing

Usability testing is performed to ensure proper ballot selection by any eligible voter. This is accomplished by maximizing the effectiveness, efficiency, and satisfaction of the voting process. Usability must be tested and measured ensuring the privacy and independence of all eligible voters. The primary focus of the usability testing shall be on the voter interface.

2.0 DETAILS (continued)

2.3 Accessibility Testing

Accessibility testing is utilized to ensure all areas of the voting process have been made accessible to eligible voters with disabilities requiring assistance. Although some disabilities shall require additional assistance all efforts must be tested and applied to provide the same privacy and independence during the entire voting process for as many voters as possible. Accessibility shall be performed in conjunction with usability testing to verify and ensure all requirements have been met according to the VVSG.

3.0 TEST COVERAGE REPORTING

This test suite functionally tests the following usability and accessibility handled by the OVS:

Table 3-1 Usability and Accessibility Testing

FUNCTIONS	SUBFUNCTIONS
Functional Capabilities	Check for undervotes
	Check for overvotes
	Correct overvote/undervote option
	Allow undervote
	Navigation of advancement and return for contest
Alternative Languages	Preparation and presentation of ballot
	Ballot selections made
	Review screens available
	Instructions provided by any language required by state or federal law
Cognitive Issues	Introduce no bias for or against selections made by voter
	Contest choices presented equally for both visual and aural formats
	Assistance granted at any time
	Instructions for all valid operations
	Single contest not spread over two pages or two columns
	Maximum number of candidates per contest
	Consistent relationship between name of candidate and mechanism used to vote for that candidate
	Warnings advise nature of problem and responses
	Warning advise voter or equipment error
	Color should agree with common conventions
	Green, blue, or white for general or normal status
	Amber or yellow for warnings or marginal status
	Red to indicate error conditions or problem

3.0 TEST COVERAGE REPORTING (CONTINUED)

Table 3-1 Usability and Accessibility Testing (continued)

Perceptual Issues	No flicker between 2Hz and 55Hz
	Adjustable settings reset to standard default
	Minimum font size 3.0 mm
	Provisions made for voters with poor vision
	Color coding to correct color blindness
	Color coding shall not be sole means to convey information
	All text in sans serif font
	Minimum contrast 3:1
Interaction Issues	No page scrolling for electronic image displays
	Unambiguous feedback regarding selection
	20 seconds minimum alert and option for additional time
	Touch screen sensitive touch area minimum height 0.5 in. and 0.7 in. width
	Vertical distance between centers minimum 0.6 in. and horizontal at least 0.8 in.
	No repetitive effect of key being held
Privacy	Privacy granted without voter cooperation
	Ballot and controls visible by voter only
	Interface audible to voter only
	Notify voter of overvote maintaining privacy and confidentiality
No Recording of Alternate Format Usage	No information held with electronic cast to identify alternative language
	No information held with electronic cast to identify accessibility
General	Alternative format selected all information presented in that format
	Support for voters with disabilities shall be intrinsic
	No connection required for accessible voting station and assistive device
	Biometrics used secondary means shall be provided
Vision	Accessible to voters with visual disabilities
	Audio ballot provided
Partial Vision	Electronic image display capable of showing two fonts 3.0-4.0mm and 6.3-9.0mm
	Monochrome only image display capable of showing contrast at least 6:1
	Color electronic image display allow control of color or contrast ratio
	Buttons and controls distinguished by shape and color
	Synchronized audio output

3.0 TEST COVERAGE REPORTING (continued)

Table 3-1 Usability and Accessibility Testing (continued)

Blindness	Audio-tactile interface (ATI) full function
	ATI provides same capabilities to vote
	ATI shall allow info to be repeated
	ATI allows pause and resume
	ATI allows skip or return contest function
	ATI allows skipping of referendum to vote instantly
	Private audio signal using 3.5mm stereo headphone jack
	Wireless t-coil provided
	No EMI and T4 rating
	Volume set between 40 50 dB SPL
	Adjustable volume from 20dB SPL to 100 dB SPL increments of 10 dB
	Audio frequency between 315 Hz to 10 KHz
	Audio presentation readily comprehensible
	Rate of speech control 75% to 200%
	Allow blind voters to initialize activation of ballot
	Allow blind voters to submit own ballot
Dexterity	All keys and controls operated one handed
	Force no greater than 5 lbs.
	No direct body contact or body part of an electrical circuit
	Allow voters to submit own ballot if normal procedure
Mobility	Clear floor space 30in. by 48in. minimum
	Level floor not to exceed 1:48 slope
	All controls, keys, jacks within reach
	Forward approach high reach of 48 in. and low reach of 15in.
	Obstructed forward approach less than 25in. depth under 34in. and above 27in.
	Depth under 20in. high reach under 48in. otherwise 44in.
	Toe clearance 9in. above finish floor
	Toe clearance shall extend 25in. max under obstruction

3.0 TEST COVERAGE REPORTING (continued)

Table 3-1 Usability and Accessibility Testing (continued)

Mobility	Toe clearance minimum shall be 17in. or depth required to reach over obstruction
	Toe clearance shall be 30in. wide minimum
	Knee clearance between 9in. and 27in. above floor
	Knee clearance shall extend 25in. max under obstruction 9in. above floor
	Knee clearance minimum 9in. above floor shall be 11 in. or 6in. less than toe clearance which ever is greater
	9in. to 27in. above floor knee clearance shall reduce at rate of 1 in. depth to 6in. height
	Knee clearance shall be 30in. wide
	Parallel approach no side reach max reach 48in. and minimum reach shall be 15in.
	Parallel approach w/side reach obstruction under 24in. depth and top below 34in.
	If obstruction no more than 10in. depth then max reach shall be 48in otherwise 44in.
	All labels, displays, controls, keys, audio jacks easily legible
	Readable information visible by voter in wheelchair with normal vision 20/40 corrected
	Voter in appropriate position and orientation
Hearing	Audio presentation of ballot provided per 3.2.2.2 (c)
	Sound cues to voter accompanied by visual cue, unless audio only mode
Speech	No system shall require voter speech to operate

ATTACHMENT A
USABILITY AND ACCESSABILITY TEST RUNS

PRE-USABILITY - RUN 1			
BLM – ALTERNATIVE LANGUAGE SUPPORT AND BALLOT LAYOUT OPTIONS			
ASSUMED DISTRICTS, PRECINCTS, AND CONTESTS HAVE ALREADY BEEN DEFINED			
	Functional Description	Test Case No.	Test Case Name
1	OS login	PRE_TC-01	OS Access
2	App login	PRE_TC-02	EMS Access
3	Add language – Spanish and Japanese	PRE_TC-18-US	Election Definition Creation Alt Language & Language Display
4	Edit translation – edit translation for messages intended for the voter	PRE_TC-ILTS-08	Edit Translation Election and Ballot
5	Create general election	PRE_TC-19	Election Definition Creation General Election
6	Open previous election	PRE_TC-44	DB Management Election DB Edit
7	Allow straight ticket voting	PRE_TC-15	Election Definition Creation Straight Party Voting
8	Ballot Layout	PRE_TC-40-US	Ballot Layout Create
9	Create ballot measures	PRE_TC-33	Create Election Creating Ballot Measures
10	Add created contests to election	PRE_TC-ILTS-22	Add Created Contest to Election
11	Add candidates to contests	PRE_TC-31	Create Election Creating Candidates
12	Translate contests and ballot measures	PRE_TC-75	Election Definition Creation Translate Contest
13	Ballot generation	PRE_TC-52	Load Election Definition Ballot Generation
14	Review & proof ballot – verify alternative language is presented on ballot	PRE_TC-99	Review & Proof Ballot
15	Logout of EMS	PRE_TC-102	Logout of the EMS
16	Logout of OS	PRE_TC-103	Logout of the OS

VOTING USABILITY RUN 1 – AUDIO BALLOT, ALT. LANGUAGE, STRAIGHT PARTY ASSUMED ELECTION CREATED IN PRE USABILITY RUN 1 HAS BEEN COMPLETED IN ELECTION MANAGER AND HAS BEEN LOADED ONTO BOTH AN OVO & OVI UNIT			
	Functional Description	Test Case No.	Test Case Name
1	Privacy inspection	VOTE_TC-111-US	Privacy Inspection
2	Spanish	VOTE_TC-53	Voting Language Select
3	Alternate Language Support – Verify all text presented in spanish	VOTE_TC-112-US	Alternative Language
4	Select a straight party (audio)	VOTE_TC-43-US	Voting Straight Party Vote(Audio)
5	Review Instructions	VOTE_TC-ILTS-02	Review Voting Instructions
6	Make a vote selection (audio)	VOTE_TC-44-US	Voting Make Vote Selection(Audio)
7	Goto next contest (audio)	VOTE_TC-46-US	Voting Proceed to Next Contest(Audio)
8	Verify audio comprehension	VOTE_TC-114-US	Audio Comprehension
9	Audio Visual sync	VOTE_TC-104-US	Voting Audio Visual Sync
10	Magnify text	VOTE_TC-54-US	Voting Text Size and Magnifying Tool
11	Attempt to overvote (audio) – should fail	VOTE_TC-62-US	Voting Make Vote Selection Overvote(Audio)
12	Cancel a vote selection (audio)	VOTE_TC-47-US	Voting Cancel Vote Selection(Audio)
13	Make a vote selection (Audio)	VOTE_TC-44-US	Voting Make Vote Selection(Audio)
14	Goto next contest (audio)	VOTE_TC-46-US	Voting Proceed to Next Contest(Audio)
15	Repeat audio information	VOTE_TC-95-US	Voting Repeat Information (Audio)
16	Return to previous contest (audio)	VOTE_TC-45-US	Voting Return to Previous Contest(Audio)
17	Goto next contest (audio)	VOTE_TC-46-US	Voting Proceed to Next Contest(Audio)
18	Pause audio	VOTE_TC-96-US	Voting Pause Audio Playback
19	Resume audio	VOTE_TC-97-US	Voting Resume Audio Playback
20	Volume test	VOTE_TC-116-US	Adjust Audio Volume
21	Tempo test	VOTE_TC-115-US	Adjust Audio Speed
22	Manually reset settings to defaults	VOTE_TC-90-US	Voting Manually Reset to Defaults
23	Skip referendum text (audio)	VOTE_TC-94-US	Voting Skip Referendum Text (Audio)
24	Review selection (audio)	VOTE_TC-48-US	Voting Review Selections(Audio)
25	Navigate forward	VOTE_TC-78	Navigate Forward
26	Print ballot	VOTE_TC-ILTS-03	Print OVI Ballot
27	Cast audio ballot	VOTE_TC-49-US	Voting Ballot Casting(Audio)

VOTING USABILITY RUN 2 – NORMAL VOTE			
STRAIGHT PARTY, ATTEMPT OVERVOTE, AUTO RESET TO DEFAULTS			
	Functional Description	Test Case No.	Test Case Name
1	Auto reset to defaults	VOTE_TC-103-US	Voting Auto Reset to Defaults
2	English	VOTE_TC-53	Voting Language Select
3	Select a straight party	VOTE_TC-32-US	Voting Straight Party Vote
4	Review Instructions	VOTE_TC-ILTS-02	Review Voting Instructions
5	Make a vote selection	VOTE_TC-33-US	Voting Make Vote Selection
6	Next page	VOTE_TC-78	Move Forward on Ballot
7	Attempt to overvote – should fail	VOTE_TC-61-US	Voting Make Vote Selection Overvote
8	Make a vote selection	VOTE_TC-33-US	Voting Make Vote Selection
9	Next page	VOTE_TC-78	Move Forward on Ballot
10	Magnifying tool	VOTE_TC-54-US	Voting Text Size and Magnifying Tool
11	Coltrol activation dexterity test	VOTE_TC-91-US	Voting Dexterity Required for Activation of Controls
12	Page scrolling inspection	VOTE_TC-105-US	Voting Page Scrolling
13	Test accidental activation	VOTE_TC-93-US	Voting Accidental Activation
14	Make a vote selection – repeat in conjunction with step below until ballot is completed	VOTE_TC-33-US	Voting Make Vote Selection
15	Next page – repeat in conjunction with step above until ballot is completed	VOTE_TC-78	Move Forward on Ballot
16	Review selections	VOTE_TC-37	Voting Review Selections
17	Next page – repeat until prompted to print ballot	VOTE_TC-78	Move Forward on Ballot
18	Print ballot	VOTE_TC-ILTS-03	Print OVI Ballot
19	Cast ballot	VOTE_TC-39-US	Voting Ballot Casting

VOTING USABILITY RUN 3 – UNDERVOTED BALLOT			
ASSUMED A BALLOT HAS BEEN ACTIVATED			
	Functional Description	Test Case No.	Test Case Name
1	Select English	VOTE_TC-53	Voting Language Select
2	Next page (multiple times if needed)	VOTE_TC-78	Move Forward on Ballot
3	Review Instructions	VOTE_TC-ILTS-02	Review Voting Instructions
4	Next page (multiple times if needed)	VOTE_TC-78	Navigate Forward
5	Select a candidate	VOTE_TC-33-US	Voting Make Vote Selection
6	Next page review instructions	VOTE_TC-37	Voting Review Selections
7	Next page (multiple times if needed)	VOTE_TC-78	Navigate Forward
8	Print Ballot	VOTE_TC-ILTS-03	Print OVI Ballot
9	Cast an undervoted ballot	VOTE_TC-41-US	Voting Undervoted Ballot Casting

VOTING USABILITY RUN 4 – BLANK AUDIO BALLOT			
ASSUMED A BALLOT HAS BEEN ACTIVATED			
	Functional Description	Test Case No.	Test Case Name
1	English	VOTE_TC-53	Voting Language Select
2	Next page (multiple times if needed)	VOTE_TC-78	Move Forward on Ballot
3	Review instructions	VOTE_TC-ILTS-02	Review Voting Instructions
4	Next contest (multiple times if needed)	VOTE_TC-46-US	Voting Proceed to Next Contest (Audio)
5	Continue	VOTE_TC-37	Voting Review Selections
6	Next contest (multiple times if needed)	VOTE_TC-46-US	Voting Proceed to Next Contest (Audio)
7	Print Ballot	VOTE_TC-ILTS-03	Print OVI Ballot
8	Cast blank audio ballot	VOTE_TC-58-US	Voting Blank Ballot Casting(Audio)

VOTING USABILITY RUN 5 – VOTER RESPONSE			
ASSUMED A BALLOT HAS BEEN ACTIVATED			
	Functional Description	Test Case No.	Test Case Name
1	Voter response	VOTE_TC-92-US	Voting Voter Response

VOTING USABILITY RUN 6 – INSPECTIONS			
ASSUMED USER HAS ACCESS TO CALIBRATED MEASUREMENT DEVICES			
	Functional Description	Test Case No.	Test Case Name
1	Inspect ATI handset	VOTE_TC-101-US	VM Capabilities ATI Handset Audio Support Inspection
2	Inspect buttons and controls	VOTE_TC-107-US	Voting Button, Control, and Key Inspection
3	Accessibility inspection	VOTE_TC-113-US	Accessibility Inspection
4	Mobility inspection	VOTE_TC-102-US	VM Capabilities Mobility

VOTING USABILITY RUN 7 – DISPLAY INSPECTIONS			
ASSUMED USER HAS ACCESS TO DIAGNOSTICS AND CAN ACTIVATE A BALLOT			
	Functional Description	Test Case No.	Test Case Name
1	Verify display refresh rate (flicker)	VOTE_TC-108-US	Display Refresh Rate (Flicker) Test
2	Verify ambient contrast ratio	VOTE_TC-110-US	Ambient Contrast Ratio
3	Verify touch sensitive areas of screen	VOTE_TC-100-US	Voting Inspect Touch Sensitive Areas of Touchscreen
4	Adjust color settings of screen	VOTE_TC-98-US	Voting Adjust Color Settings for Color Screens
5	Adjust contrast ratio of screen	VOTE_TC-99-US	Voting Adjust Ambient Contrast Ratio Settings for Color Screens
6	Inspect display to verify accessibility to color blind voters	VOTE_TC-109-US	Color Blindness

ATTACHMENT B
2005 EAC VVSG REQUIREMENT CHECKLIST

VVSG Req. No.	2005 VVSG Volume I Functional Requirement Matrix	REQUIREMENTS MET
Volume I	Voting System Performance Guidelines	
Section 3	Usability and Accessibility Requirement	
3.1	Usability Requirments	
a.1.A.i	The voting system (including any lever voting system, optical scanning voting system, or direct recording electronic system) shall 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.	X
a.1.A.ii	The voting system (including any lever voting system, optical scanning voting system, or direct recording electronic system) shall 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).	X
a.1.A.iii	I. Notify the voter that the voter has selected more than one candidate for a single office on the ballot;	X
	II. Notify the voter before the ballot is cast and counted of the effect of casting multiple votes for the office; and	X
	III. Provide the voter with the opportunity to correct the ballot before the ballot is cast and counted.	X
a.1.B	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	X
	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).	X
a.1.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.	X
3.1.2	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).	X
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).	X
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.	X
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.	X

VVSG Req. No.	2005 VVSG Volume I Functional Requirement Matrix	REQUIREMENTS MET
Volume I	Voting System Performance Guidelines	
Section 3	Usability and Accessibility Requirement	
3.1	Usability Requirements	
3.1.2	Functional Capabilities	
e.	The voting system shall allow the voter, at his or her choice, to submit an undervoted ballot without correction.	X
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.	X
3.1.4	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.	X
b.	The voting machine or related materials shall provide clear instructions and assistance to allow voters to successfully execute and cast their ballots independently.	X
b.i	Voting machines or related materials shall provide a means for the voter to get help at any time during the voting session.	X
b.ii	The voting machine shall provide instructions for all its valid operations.	X
c.	The voting system shall provide the capability to design a ballot for maximum clarity and comprehension.	X
c.i	The voting equipment should not visually present a single contest spread over two pages or two columns.	X
c.ii	The ballot shall clearly indicate the maximum number of candidates for which one can vote within a single contest.	X
c.iii	There shall be a consistent relationship between the name of a candidate and the mechanism used to vote for that candidate.	X
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.	X
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.	X

VVSG Req. No.	2005 VVSG Volume I Functional Requirement Matrix	REQUIREMENTS MET
Volume I	Voting System Performance Guidelines	
Section 3	Usability and Accessibility Requirement	
3.1	Usability Requirments	
3.1.5	Perceptual Issues	
a.	No voting machine display screen shall flicker with a frequency between 2 Hz and 55 Hz.	X
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.	X
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.	X
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.	X
e.	All voting machines using paper ballots should make provisions for voters with poor reading vision.	X
f.	The default color coding shall maximize correct perception by voters with color blindness.	X
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.	X
h.	All text intended for the voter should be presented in a sans serif font.	X
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.	X
3.1.6	Interaction Issues	
a.	Voting machines with electronic image displays shall not require page scrolling by the voter.	X
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.	X
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.	X
d.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.	X
d.ii	No key or control on a voting machine shall have a repetitive effect as a result of being held in its active position.	X
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.	X
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3.1	Usability Requirments	
3.1.7	Privacy	
3.1.7.1	Privacy at the Polls	
a.	The ballot and any input controls shall be visible only to the voter during the voting session and ballot submission.	X
b.	The audio interface shall be audible only to the voter.	X
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.	X
3.1.7.2	No Recording of Alternate	
a.	No information shall be kept within an electronic cast vote record that identifies any alternative language feature(s) used by a voter.	X
b.	No information shall be kept within an electronic cast vote record that identifies any accessibility feature(s) used by a voter.	X
3.2	Accessibility	
3.2.1	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.	X
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.	X
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.	X
3.2.2	Vision	
3.2.2	The voting process shall be accessible to voters with visual disabilities.	X
3.2.2.1	Partial 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.	X
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.	X

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3.2.2	Vision	
3.2.2.1	Partial Vision	
e.	Buttons and controls on accessible voting stations shall be distinguishable by both shape and color.	X
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.	X
3.2.2.2	Blindness	
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. [Casting a Ballot] Full functionality includes at least: Instructions and feedback on initial activation of the ballot (such as insertion of a smart card), if this is normally performed by the voter on comparable voting stations Instructions and feedback to the voter on how to operate the accessible voting station, including settings and options (e.g., volume control, repetition) Instructions and feedback for navigation of the ballot Instructions and feedback for contest choices, including write-in candidates Instructions and feedback on confirming and changing selections Instructions and feedback on final submission of ballot	X
b.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.	X
b.ii.	The ATI shall allow the voter to have any information provided by the voting system repeated.	X
b.iii.	The ATI shall allow the voter to pause and resume the audio presentation.	X
b.iv.	The ATI shall allow the voter to skip to the next contest or return to previous contests.	X
b.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.	X
c.	All voting stations that provide audio presentation of the ballot shall conform to the following requirements:	X
c.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.	X

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c.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.	X
c.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.	X
c.v.	The voting machine shall set the initial volume for each voter between 40 and 50 dB SPL.	X
c.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.	X
c.vii.	The audio system shall be able to reproduce frequencies over the audible speech range of 315 Hz to 10 KHz.	X
c.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.	X
c.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.	X
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.	X
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.	X
f.	All mechanically operated controls or keys on an accessible voting station shall be tactilely discernible without activating those controls or keys.	X
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.	X

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3.2.3	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).	X
c.	The accessible voting station controls shall not require direct bodily contact or for the body to be part of any electrical circuit.	X
d.	The accessible voting station shall provide a mechanism to enable non-manual input that is functionally equivalent to tactile input.	X
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.	X
3.2.4	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.	X
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:	X
b.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.	X
b.ii.	If the accessible voting station has a forward approach with a forward reach obstruction, the following requirements apply: 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.	X
b.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	X

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3.2.4	Mobility	
b.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.	X
b.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.	X
b.vi.	If the accessible voting station has a parallel approach with a side reach obstruction, the following sub-requirements apply: 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.	X
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	X
3.2.5	Hearing	
a.	The accessible voting station shall incorporate the features listed under requirement 3.2.2.2 (c) [Blindness] for voting equipment that provides audio presentation of the ballot to provide accessibility to voters with hearing disabilities.	X
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.	X
3.2.6	Speech	
a.	No voting equipment shall require voter speech for its operation.	X
3.2.7	English	
a.	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) [Blindness] shall apply to this mode of interaction.	X
3.2.8	Cognition	
	The voting process should be accessible to voters with cognitive disabilities.	X

