

2007-CDOS-HAR-001-0404

HART INTERCIVIC

PROJECT OVERVIEW

“A.3”

COPY

**2007-CDOS-HAR-001-0404
PROJECT OVERVIEW BINDER “A.3”**

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PROJECT OVERVIEW BINDER “A.3”**

INTRODUCTION

STATE OF COLORADO
Department of State

1700 Broadway, Suite 270
Denver, CO 80290



Mike Coffman
Secretary of State

Holly Lowder
Director, Elections

Why an Amendment to the A.2 binder/report?

Acting in accordance with HB08-1155, the Secretary of State requested the Testing Board to evaluate conditions after listening to testimony from county officials and the voting system vendor. The conditions document was vetted through a public comment process after a public hearing. This document reflects the additional testing and results of public comment.

Introduction - Original

On April 4, 2007, Hart Intercivic approached the Colorado Secretary of State's Office with an application to certify a voting system. The application was accepted by the Voting Systems Certification Program Testing Board (Testing Board). The system was assigned certification number: 2007-CDOS-HAR-001-0404.

The voting system is known by its federal certification name as "System 6.0" Federal certification is to the 2002VSS standards, and was obtained on March 6th, 2006 (NASED#: N-1-04-22-22-004).

The Testing Board proceeded to evaluate the Hart voting system during the time period of April 4th – December 1st. All findings are documented within the binders A – 30, as well as addendum binders 2.1 – 8.1, 13.1, 16.1 – 25.1, 27.1, and 28.1.

The Project Overview Binders (Binders "A", "A.2", and "B" – "E") provides an overview of the findings of the project, and the following additional information:

- Introduction
- System Components
- Recommendation to the Secretary of State
- Restrictions on the use of the voting system suggested by the Testing Board
- Conditions to the Recommendation suggested by the Testing Board
- Additional Comments by the Testing Board
- Independent Audit Reports
- Miscellaneous Correspondence of importance

During the process of certifying the system, the Testing Board adhered to the procedures outlined by the Voting System Program procedures document. The certification process was led by Tim Bishop, with Michael Chadwell and Jerome Lovato providing the primary cross evaluation. Additional cross check and documentation verification was conducted by Danny Casias with additional coordination by the Program Manager – John Gardner with assistance from Michael Chadwell as necessary.

The Testing Board evaluated the voting system in accordance with the requirements set forth in Secretary of State Rule 45, as well as applicable elements contained within the laws of the Help America Vote Act, Colorado Revised Statute, multiple sections of Title 1, and Secretary of State Rules as appropriate. All testing results and output which includes extensive video documentation of the evaluation process have been archived and well preserved in accordance with the Voting Systems Program procedures document.

Through the evaluation, the Testing Board identified a variety of deficiencies within the system which include functionality, security, auditability and documentation requirements. The following sections will address these deficiencies as either a restriction for use (preventing recommendation by the Testing Board), or a condition for use (allowing the system to be recommended provided conditional elements are adhered to). Restrictions are identified in a one-to-one value. One identified restriction = one failure on the Detailed Test Summary. Conditional elements represent a one-to-many value. The execution of a single condition placed on the use of the system in many cases will address multiple failures as the Testing Board often experienced failures that exhibited a “daisy chain” effect. One high level failure would trigger many follow up test scenarios. Refer to the **Comments** section of this binder for additional comments on this topic.



Detailed Test Summary

The Testing Board executed the testing process for the Hart voting system in the manner prescribed by Rule 45, and the detailed procedures document provided on the Voting Systems Certification Program website (<http://www.elections.colorado.gov/DDefault.aspx?tid=501>).

The outcome of the process involved over 700 functional test evaluations, 5286 detailed line items for document review, and over 90 supplemental tests comprising the sections for application review, demonstration and work on completing the trusted build. The documentation comprised of this test work is evident in over 50 binders generated by the Testing Board, a multitude of boxes containing evidence generated from devices, ballots, reports, and other findings. In addition to this evidence, over 200 DVD records exist documenting the process of the Testing Board.

Below is the summary report of test status generated by the Testing Board regarding the Hart Voting System evaluation:

Hart						
	# Requirements	# Passed	# Failed	Binder Status		% Passed
Phase I - Application	22	20	2	signed		90.91%
Phase II - Doc. Review	5286	3964	1322	signed		74.99%
Phase III - Demo	54	54	0	signed		100.00%
Phase III - Trusted Build	20	16	4	signed		80.00%
Phase III - Functional Test (overall)	698	475	223		100.00%	68.05%
Security	139	119	20			85.61%
System Process	339	215	124			63.42%
Election (pre, ED and post)	220	141	79			64.09%
Independent Audit	1674	1674		Review of Test Board work.		100.00%
Phase IV - Certification Doc.	n/a	n/a	n/a	n/a	n/a	
Phase V - Qualification Report	n/a	n/a	n/a	n/a	n/a	

Requirements Status for Colorado Certification of Hart Voting System

Section Category	Binder #	Category	Seq	Total # of Tests to complete	Status:	DRE	PCOS	CCOS	EMS	Remaining to complete
Section "A" - Pre Testing	1	Application	aa	22	Pass	n/a	n/a	n/a	15	0
					Pass Conditional	n/a	n/a	n/a	5	
					Suspend	n/a	n/a	n/a		
					Fail	n/a	n/a	n/a	2	
					Not applicable	n/a	n/a	n/a		
	2-6	Documentation Review	ab	5286	Pass	384	326	32	82	0
					Pass Conditional					
					Suspend					
					Fail	90	100	327	805	
					Not applicable	407	455	522	1756	
	7	Demonstration	ac	54	Pass	13	13	12	14	0
					Pass Conditional	1		1		
					Suspend					
					Fail					
					Not applicable					
	8	Trusted Build	ad	20	Pass	2	2	4	4	0
					Pass Conditional					
					Suspend					
					Fail	2	2			
					Not applicable	1	1	1	1	
9-12	Source Code Review	ae	0	Not applicable	n/a	n/a	n/a	n/a	0	

Requirements Status for Colorado Certification of Hart Voting System

Section Category	Binder #	Category	Seq	Total # of Tests to complete	Status:	DRE	PCOS	CCOS	EMS	Remaining to complete
Section "B" - Security Testing	13	System Access	ba	36	Pass	6	6	5	12	0
					Pass Conditional					
					Suspend					
					Fail				3	
					Not applicable	1	1	1	1	
	14	Operating System Security	bb	20	Pass				1	0
					Pass Conditional					
					Suspend					
					Fail				1	
					Not applicable	9			9	
	15	Database Security	bc	24	Not applicable	6	6	6	6	0
	16	Removable Media	bd	13	Pass	1	1	1	1	0
					Pass Conditional					
					Suspend					
					Fail				1	
					Not applicable	2	2	2	2	
	17	Networking and Telecommunications	be	46	Pass	2	4	2	1	0
					Pass Conditional	1		2	3	
					Suspend					
					Fail	8	1		6	
Not applicable					1	7	7	1		

Requirements Status for Colorado Certification of Hart Voting System

Section Category	Binder #	Category	Seq	Total # of Tests to complete	Status:	DRE	PCOS	CCOS	EMS	Remaining to complete
Section "C" - System Testing	18	System	ca	47	Pass	8	6		16	0
					Pass Conditional					
					Suspend					
					Fail	1	2		12	
					Not applicable				2	
	18	System (central count)	cb	11	Pass	n/a	n/a	6	n/a	0
					Pass Conditional	n/a	n/a		n/a	
					Suspend	n/a	n/a		n/a	
					Fail	n/a	n/a	5	n/a	
					Not applicable	n/a	n/a		n/a	
	19-20	Ballot Process	cc	152	Pass	20	33	16	16	0
					Pass Conditional	1				
					Suspend					
					Fail	3	11	19	13	
					Not applicable	1	2	11	6	
	21	Performance	cd	24	Pass	1	1	1	4	0
					Pass Conditional	6				
					Suspend					
					Fail		4	4	2	
					Not applicable	1				
	21	DRE Processing	ce	24	Pass	19	n/a	n/a	n/a	0
					Pass Conditional		n/a	n/a	n/a	
					Suspend		n/a	n/a	n/a	
					Fail	2	n/a	n/a	n/a	
					Not applicable	3	n/a	n/a	n/a	
	22	Audits	cf	29	Pass	4	1	2		0
					Pass Conditional		1			
					Suspend					
Fail					3	5	5	8		
Not applicable										
22	Reports	cg	52	Pass	3	4		6	0	
				Pass Conditional				1		
				Suspend						
				Fail	6	7	9	3		
				Not applicable	4	3	3	3		

Requirements Status for Colorado Certification of Hart Voting System

Section Category	Binder #	Category	Seq	Total # of Tests to complete	Status:	DRE	PCOS	CCOS	EMS	Remaining to complete
Section "D" - Election Day Tests	23	Hardware Diagnostics Testing	da	8	Pass					0
					Pass Conditional	1				
					Suspend					
					Fail	1	1	1		
					Not applicable		1	1	2	
	23	Voting	db	65	Pass	8	5	7	2	0
					Pass Conditional					
					Suspend					
					Fail	3	15	14	5	
					Not applicable	6				
	24	Multi-Page Ballots	dc	6	Pass					0
					Pass Conditional					
					Suspend					
					Fail		2	1	1	
					Not applicable	2				
	24	Multiple Languages	dd	4	Pass	1	1	1	1	0
					Pass Conditional					
					Suspend					
					Fail					
					Not applicable					
	24	Provisional	de	25	Pass		1	1		0
					Pass Conditional					
					Suspend					
					Fail	7	4	2	5	
					Not applicable		1	3	1	
	25	V-VPAT	df	28	Pass	22	n/a	n/a	n/a	0
					Pass Conditional	2	n/a	n/a	n/a	
					Suspend		n/a	n/a	n/a	
Fail					3	n/a	n/a	n/a		
Not applicable					1	n/a	n/a	n/a		
25	Accessibility	dg	41	Pass	31	n/a	n/a	n/a	0	
				Pass Conditional		n/a	n/a	n/a		
				Suspend		n/a	n/a	n/a		
				Fail	5	n/a	n/a	n/a		
				Not applicable	5	n/a	n/a	n/a		
26	Closing Polls	dh	30	Pass	11	11	n/a	n/a	0	
				Pass Conditional			n/a	n/a		
				Suspend			n/a	n/a		
				Fail	4	4	n/a	n/a		
				Not applicable			n/a	n/a		

Requirements Status for Colorado Certification of Hart Voting System

Section Category	Binder #	Category	Seq	Total # of Tests to complete	Status:	DRE	PCOS	CCOS	EMS	Remaining to complete
Section "E" - Post Election	27	Post Election Audit	ea	4	Pass	1	1	1	1	0
					Pass Conditional					
					Suspend					
					Fail					
					Not applicable					
	27	Recount	eb	8	Pass	1	2	3	1	0
					Pass Conditional	1				
					Suspend					
					Fail					
					Not applicable					
	27	Recount (central count)	ec	1	Pass	n/a	n/a		n/a	0
					Pass Conditional	n/a	n/a		n/a	
					Suspend	n/a	n/a		n/a	
					Fail	n/a	n/a	1	n/a	
					Not applicable	n/a	n/a		n/a	

Archive Storage Boxes for the Hart Voting System Certification Process:



Backup Binders documenting the Hart System Certification Process (original binders moved to archive storage upon completion of process):



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COMPONENTS

STATE OF COLORADO
Department of State

1700 Broadway, Suite 270
Denver, CO 80290



Mike Coffman
Secretary of State

Holly Lowder
Director, Elections

Components

As submitted on April 4, 2007, the following components comprise the requested voting system package from Hart:

Component Name	System Function	Version Number
System 6.0 Software (EMS)	Software Application which includes: Boss Tally Rally Servo eCM Manager	6.0 4.2.13 4.2.8 2.2.4 4.1.6 1.1.7
Ballot Now	Software Application for Central Count Scanners. Which includes the following three scanners: Kodak i800 Series Kodak i600 Series Kodak i200 Series	3.2.4
eScan	Precinct Optical Scanner	1.1.6
eSlate (with and without audio – DAU)	Direct Record Electronic Device which also includes: JBC Units VBO Units	4.0.19 4.0.19 1.7.5

Photographs and additional details on each component can be found under test # AA6-P1-605.

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RECOMMENDATION



Recommendation Overview

The approach of the Testing Board regarding a recommendation is absolute. Any one item outstanding in the restrictions section of the binder (no “conditional use” option discoverable by the Testing Board) will trigger a “N” value on the **Recommendation** table.

Therefore, for quick understanding of the overall outstanding deficiencies with the system, and to provide a summary of reasons for the “Y” or “N” value in the **Recommendation** table.

The following table provides a high level summary statement of findings by the Testing Board. These items constitute a summary of the findings in the **Restrictions** section of the project overview binder.

Component (details in the components section)	Recommended to be Certified?	Reason
Software (See Components)	No	<ul style="list-style-type: none"> • Failure to provide required State Documentation. • Failure to prove Federal Testing was conducted. • Failure to process ballots with more than one page. • Failed to count ballots correctly. (When used with eScan and BallotNow only.) • Failed to meet Colorado Requirements for tabulating results. • Failure to prevent and detect normal operator changes within system (when used with eScan and Ballot Now only). • Failure to provide auditable data to detect security violations (when used with eScan and Ballot Now only). • Failure to operate in a secured, hardened, protected database environment (when used with eScan and Ballot Now only).
Precinct Scanner (eScan)	No	<ul style="list-style-type: none"> • Failed to count ballots correctly. • Failed to consistently scan ballots and generate consistent results. • Failure to provide required State Documentation. • Failure to process ballots with more than one page. • Failure to conduct State Requirements for Pre and Post Election Testing. • Failure to accurately process folded ballots. • Failure to provide auditable data to detect security violations.
Central Count Scanner (Ballot Now)	No	<ul style="list-style-type: none"> • Failed to count ballots correctly. • Failure to provide required State Documentation. • Failed to consistently scan ballots and generate consistent results. • Failure to process ballots with more than one page. • Failure to conduct State Requirements for Pre and Post Election Testing. • Failure to accurately process folded ballots. • Failure to provide auditable data to detect security violations.
DRE (eSlate)	No	<ul style="list-style-type: none"> • Failure to conduct State Requirements for Pre and Post Election Testing. • Failure to provide required State Documentation • Paper Record not accessible to blind voters. • Failure to meet state requirements for Accessibility



Hart Recommendation for Voting System Application:

2007-CDOS-HAR-001-0404

Binary Assessment plus N/A (with conditionals)

<u>Component</u>	<u>Version</u>	<u>Accuracy</u>	<u>Security</u>	<u>Accessibility</u>	<u>Compliance</u>	<u>Testing Board Recommendation</u>
System 6.0	See Components	Y ^{3,4}	Y ^{3,4}	N/A	N ^{1,2}	N
Ballot Now	3.2.4	N	N	N	N ^{1,2}	N
eSlate & Components	4.0.19 / 1.7.5	Y ³	Y ³	N	N ²	N
eScan	1.1.6	N	N	N	N ²	N

¹ Colorado Revised Statutes Title 1, Article 5, Section 6 (1-5-608.5) prohibits allowing certification of voting equipment by the Secretary of State if it has not been successfully qualified by a recognized ITA. Additionally, Rule 45.5.1.3 requires voting systems to be compliant with federal requirements.

² Missing/Insufficient state documentation pursuant to Colorado Secretary of State Rule 45.

³ Provided jurisdictions follow additional procedural steps outlined in the **Conditions** section to mitigate the deficiencies of the system as evaluated. Should conditions not be applied or adhered to as indicated in this binder, the testing board would reject the system and modify the value to a "N." This is specifically addressed in the test board comments section of this binder.

⁴ Provided eScan and BallotNow are not used with the system, otherwise "N".

Definitions:

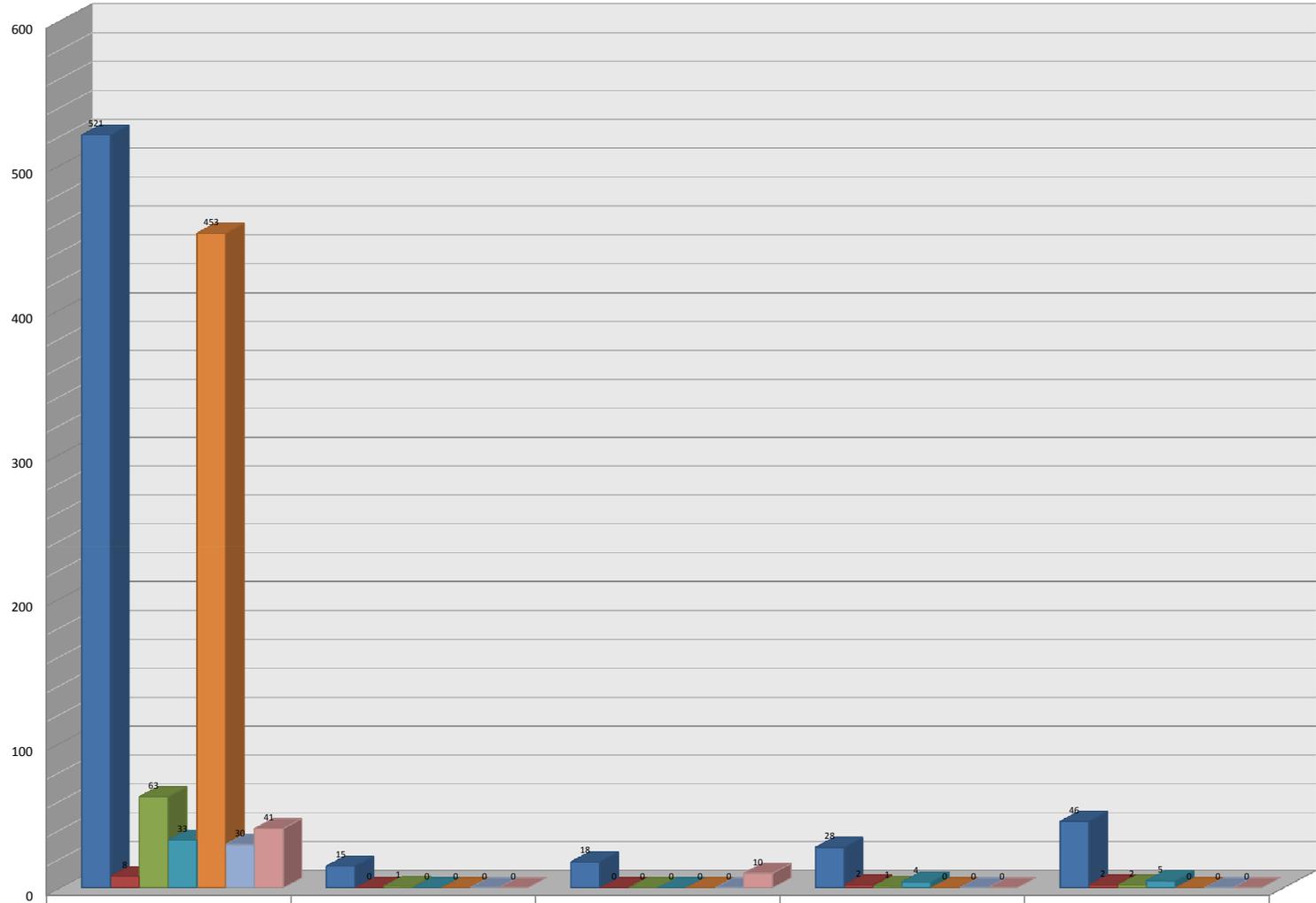
Accuracy – correctly reading, displaying, tabulating and reporting votes. (Functional, or Performance)

Security – vote data is protected and maintains integrity throughout system processing. (Audit, Security or Telecommunications)

Accessibility – voter system have requisite usability and reliability. (Functional, Accessibility, or Physical Design)

Compliance – system conforms to federal and state requirements for certification and/or documentation. (Documentation)

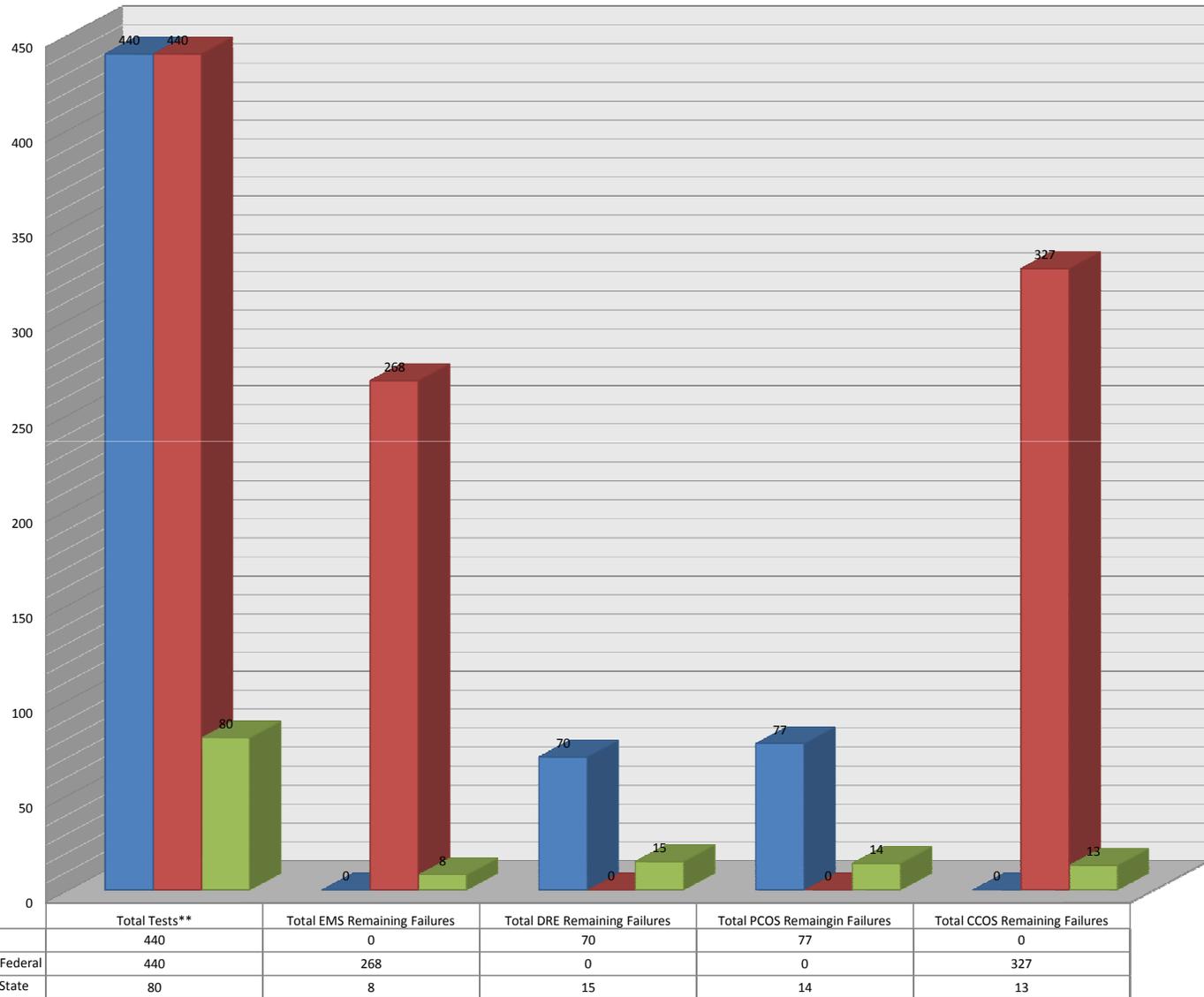
Hart Functional Failure Status by Category



	Total Tests	Total EMS Remaining Failures*	Total DRE Remaining Failures	Total PCOS Remaining Failures	Total CCOS Remaining Failures
Functional Requirements	521	15	18	28	46
Performance Levels	8	0	0	2	2
Physical design	63	1	0	1	2
Audit Capacity	33	0	0	4	5
Security	453	0	0	0	0
Telecommunications	30	0	0	0	0
Accessibility	41	0	10	0	0

* EMS failures tied directly to use of the system with eScan and Ballot Now. Without these two components, the items would be passable with conditions.

Hart Documentation Failure Status by Category



* Incorrectly tested means the ITA either reported that a required item was not tested, or a required item was tested incorrectly for the device type.

** Total tests has N/A items removed for chart scale.

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RESTRICTIONS



The Testing Board has identified the following items as deficient in the voting system, requiring restriction for use of the voting system components based on the review and testing of the voting system for compliance with state requirements:

Software Restrictions: (System 6.0)

See components

1) Functional requirements

The Test Board has determined that the scanners used by the Hart system 6.0 do not consistently detect, categorize, and count markings placed on the paper ballots by voter's to indicate the voter's choice.

Rule

1-5-611

No nonpunch card electronic voting system shall be purchased, leased, or used unless it fulfills the following requirements

(b) It permits each elector to write in the names of eligible candidates not appearing on the printed ballot, to vote for as many candidates for an office as there are vacancies for which the elector is entitled to vote, and to vote for or against any ballot issue upon which the elector is entitled to vote.

(c) It rejects any vote for an office or on a ballot issue if the number of votes exceeds the number the elector is entitled to cast.

1-5-615

No electronic or electromechanical voting system shall be certified by the secretary of state unless such system:

(b) Permits each elector to vote for all offices for which the elector is lawfully entitled to vote and no others, to vote for as many candidates for an office as the elector is entitled to vote for, and to vote for or against any ballot question or ballot issue on which the elector is entitled to vote.

1-5-615

No electronic or electromechanical voting system shall be certified by the secretary of state unless such system:

1 (f) Does not record a vote for any office, ballot question, or ballot issue that is overvoted on a ballot cast by an elector.

(g) For electronic and electromechanical voting systems using ballot cards, accepts an overvoted or undervoted ballot if the elector chooses to cast the ballot, but it does not record a vote for any office, ballot question, or ballot issue that has been overvoted.

(l) Counts votes correctly.

(m) Can tabulate the total number of votes for each candidate for each office and the total number of votes for and against each ballot question and ballot issue for the polling place.

1-7-508

Votes cast for an office to be filled or a ballot question or ballot issue to be decided shall not be counted if a voter marks more names than there are persons to be elected to an office or if for any reason it is impossible to determine the elector's choice of candidate or vote concerning the ballot question or ballot issue. A defective or an incomplete mark on any ballot in a proper place shall be counted if no other mark is on the ballot indicating an intention to vote for some other candidate or ballot question or ballot issue.

See components

(Functional requirements continued.)

	Rule	Text
	27.2	Multiple Page Ballots. In any election where a multiple page printed ballot is used, a voter must vote and return all pages of the ballot at the same time. Any voter who has returned at least one page of a multiple page printed ballot will be considered to have voted. Any additional page returned at a later time shall not be counted but shall be appropriately marked, set aside, and preserved as other election materials in accordance with section 1-7-802, C.R.S.
	45.6.2.2.1 45.6.2.3.15	Demonstrate the ability for a user to generate and maintain a maximum of 10 different counting methods – the minimum is three and they are Absentee, Polling Place (or vote center) and Provisional – most counties shall have early voting as well as this.
	45.6.2.3.14	Ballots shall include the following minimum race situations to simulate and test “real world” situations in the State of Colorado: In a general election, allow a voter to vote for any candidate for any office, in the number of positions allowed for the office, and to select any measure on the ballot that the candidate is allowed to vote in, regardless of party.
	45.6.2.3.3	Each voting system shall be tested and examined by conducting at least three mock elections which shall include voting scenarios that exist within a primary election, a coordinated election, and a recall election.
	45.6.2.3.6	The voting system provider is required to produce ballots in quantities identified below for each of the two elections. Enough ballots need to be created to conduct the testing of the voting system as defined in this rule. One complete set of ballots will be tested in each of the applicable counter types (or groups): <ul style="list-style-type: none">(a) Poll Place or Vote Center - ballots are flat – no score marks.(b) Early Voting – ballots are flat – no score marks.(c) Mail-in – ballots are scored and folded to fit in standard Colorado Absentee Mailing Envelopes.
2) Documentation requirements	1-5-601.5	Compliance with federal requirements. All voting systems and voting equipment offered for sale on or after May 28, 2004, shall meet the voting systems standards that were promulgated in 2002 by the federal election commission and that may thereafter be promulgated by the federal election assistance commission. Subject to section 1-5-608.2, nothing in this section shall be construed to require any political subdivision to replace a voting system that is in use prior to May 28, 2004.
	45.5.1.1	All voting systems shall meet the voting systems standards pursuant to section 1-5-601.5, C.R.S., and Secretary of State Rule 37.3.

See components

(Documentation requirements continued.)

Documentation was not provided by the voting system vendor to allow testing board to evaluate this requirement.

2) Performance Levels

Rule	Text
45.4.2	<p>A voting system provider that submits a voting system for certification shall complete the Secretary of State's "Application for Certification of Voting System". Which contains all of the following documentation:</p> <ul style="list-style-type: none">• Level, location and programming of audit trail information.• COTS Hardware, Software and services used for Telecommunications.• Process for Battery Charging.• Basis for useful life estimate.
45.5.2.2.3	<p>The voting system provider shall publish and specify processing standards for each component of the voting system as part of the documentation required for certification.</p>
45.5.2.4.2	<p>All VSTL qualification reports, test logs, and technical data packages shall be evaluated to determine if the voting system meets the requirements of this rule and have completed the applicable federal certification requirements at the time of State testing. Failure to provide such documentation of independent testing will result in the voting system application being rejected.</p> <p>(a) The voting system provider shall execute and submit any necessary releases for the applicable VSTL and/or EAC to discuss any and all procedures and findings relevant to the voting system submitted for certification with the Secretary of State's office. The voting system provider shall provide a copy of the same to the Secretary of State's office.</p>
45.5.2.5.2	<p>The voting systems shall include detailed documentation as to the level, location, and programming of audit trail information throughout the system. The audit information shall apply to:</p> <p>(a) Operating Systems (workstation, server, and/or DRE);</p>
45.5.2.7.10	<p>Voting systems providers shall document how they plan to monitor and respond to known threats to which their voting systems are vulnerable. This documentation shall provide a detailed description, including scheduling information, of the procedures the voting system provider will use to:</p> <p>(a) Monitor threats, such as through the review of assessments, advisories, and alerts for COTS components;</p> <p>(b) Evaluate the threats and, if any, proposed responses.</p> <p>(c) Develop responsive updates to the system and/or corrective procedures; and</p> <p>(d) As part of certification requirements of the proposed system, provide assistance to customers, either directly or through detailed written procedures, how to update their systems and/or to implement the corrective procedures within the timeframe established by the Secretary of State.</p>
45.5.2.3.20	<p>The voting system provider's software application shall be able to recover operations after a power outage or other abnormal shutdown of the system on which that application and database are operating without loss of more than the current transaction data record on which the administrative account or authorized operator account is currently working.</p>

Precinct Count Scanner Restrictions:

eScan 1.1.6

1) Functional requirements

The Test Board has determined that the scanners used by the Hart system 6.0 do not consistently detect, categorize, and count markings placed on the ballots by voter's to indicate the voter's choice.

Rule

Text

1-5-615

No electronic or electromechanical voting system shall be certified by the secretary of state unless such system:

(l) Counts votes correctly.

(g) For electronic and electromechanical voting systems using ballot cards, accepts an overvoted or undervoted ballot if the elector chooses to cast the ballot, but it does not record a vote for any office, ballot question, or ballot issue that has been overvoted.

(m) Can tabulate the total number of votes for each candidate for each office and the total number of votes for and against each ballot question and ballot issue for the polling place.

1-7-508

(2) Votes cast for an office to be filled or a ballot question or ballot issue to be decided shall not be counted if a voter marks more names than there are persons to be elected to an office or if for any reason it is impossible to determine the elector's choice of candidate or vote concerning the ballot question or ballot issue. A defective or an incomplete mark on any ballot in a proper place shall be counted if no other mark is on the ballot indicating an intention to vote for some other candidate or ballot question or ballot issue.

27.2

Multiple Page Ballots. In any election where a multiple page printed ballot is used, a voter must vote and return all pages of the ballot at the same time. Any voter who has returned at least one page of a multiple page printed ballot will be considered to have voted. Any additional page returned at a later time shall not be counted but shall be appropriately marked, set aside, and preserved as other election materials in accordance with section 1-7-802, C.R.S.

37.1.2

Voting systems (including optical scanning voting systems or direct recording electronic systems) certified by the secretary of state and acquired, purchased or leased by counties pursuant to state law shall:

(d) Ensure that any notification required under this paragraph preserves the privacy of the vote and the confidentiality of the ballot.

eScan 1.1.6

	Rule	Text
	45.5.2.1.2	The Voting system shall provide for appropriately authorized operators to conduct hardware and diagnostics testing as required herein;
	11.5.2.1	The county clerk and recorder shall commence the Hardware Diagnostic Test prior to the election and allow time for each electronic voting device within the county to be tested. Each device being used in the election, including units identified as spare or backup units, shall be tested to verify that mechanical components are working correctly. This test shall include, but not be limited to, the following tests: (a) All input and output devices; (b) Communications ports; (c) System printers; (d) System modems when applicable; (e) System Screen displays; (f) Boot performance and initializations; (g) Firmware loads; (h) Software loads; (i) Confirmation that screen displays are functioning; and (j) Date, time and calibration of systems.
(Functional requirements continued.)	45.5.2.1.8	The voting system shall include hardware and software to enable the closing of the voting location and disabling acceptance of ballots on all vote tabulation devices to allow for the following: (g) Ability to accommodate a two page ballot (races on four faces) is required.
	45.6.2.3.10	Ballots shall be cast and counted in all applicable counter types (or counter groups) as necessary based on the parts included in the voting system. These are at a minimum: Poll Place (or Vote Center), Absentee, Provisional, and Early Voting. Ballots may be run through components 10 or more times depending on components and counter group being tested to achieve a minimum number of ballots cast as follows for each group: (a) Polling Place / OS 1500. (b) Vote Center/ OS 5000 (e) Early Voting / OS 5000. (h) Provisional 5,000
	45.6.2.3.14	Ballots shall include the following minimum race situations to simulate and test “real world” situations in the State of Colorado: (e) Allow for programming to accommodate Colorado recall questions as prescribed in Article 12 of Title 1, C.R.S.;
	45.6.2.3.3	Each voting system shall be tested and examined by conducting at least three mock elections which shall include voting scenarios that exist within a primary election, a coordinated election, and a recall election.

eScan 1.1.6

Because of failure with counting ballots, the testing board is unable to determine if error was due to folds on ballots or due to the nature of the machine.

(Functional requirements continued.)

2) Performance levels

3) Physical and design characteristics

Ballot handling errors: misfeeds (≤ 1 per 5000) and corrective action reporting. Device tested outside of acceptable criteria.

Rule

45.6.2.3.6

45.6.2.3.7

45.6.2.2.1
45.6.2.3.15

45.6.2.3.9

1-5-611

45.6.2.2.1
45.6.2.3.15

Text

The voting system provider is required to produce ballots in quantities identified below for each of the two elections. Enough ballots need to be created to conduct the testing of the voting system as defined in this rule. One complete set of ballots will be tested in each of the applicable counter types (or groups):
(c) Mail-in – ballots are scored and folded to fit in standard Colorado Absentee Mailing Envelopes.

All ballots provided shall be blank with no marks on them. The following combinations of ballots are required:
(a) Four separate decks of ballots shall be provided consisting of 25 ballots for each precinct/precinct split generated for each election that are flat (1500 minimum combined). At least one deck shall have the General Election data, and at least one shall have the Primary election data as indicated in the instructions for voting system providers;
(b) Four separate decks of ballots shall be provided consisting of 25 ballots for each precinct/precinct split generated for each election that are folded (1500 minimum combined). At least one deck shall have the General Election data, and at least one shall have the Primary election data as indicated in the instructions for voting system providers;
(e) All ballots provided shall be blank with no marks on them. The following combinations of ballots are required: One separate deck of ballots consisting of 10 ballots for each precinct generated for the Recall election that are flat as indicated in the instructions for vendors.

Test all ballot reading functions – are they accurate and reliable as described in the requirement - how do scanner(s) responds to smudges, folds, etc; response to valid and invalid or absence of marks.

The testing board shall mark a minimum of 300 ballots with marking devices of various color, weight, and consistency to determine accurate counting with a variety of marking devices.

No nonpunch card electronic voting system shall be purchased, leased, or used unless it fulfills the following requirements:
(1)(f)(I) If the system uses a voting device: It is suitably designed, of durable construction, and capable of being used safely, efficiently, and accurately in the conduct of elections and the tabulation of votes.

The system shall stop and inform operator of ballot handling errors such as misfeeds, damaged ballot, and multiple feeds. Also, give corrective measures to remove the ballot, sort is as unreadable (out stack) and gives a way to restart or recount the uncounted ballots. (Misfeeds ≤ 1 per 5,000).

eScan 1.1.6

4) Documentation requirements

(Documentation requirements continued.)

Rule	Text
45.4.2	<p>A voting system provider that submits a voting system for certification shall complete the Secretary of State's "Application for Certification of Voting System". Which contains all of the following documentation:</p> <ul style="list-style-type: none">• Level, location and programming of audit trail information.• Process for Battery Charging.• Basis for useful life estimate.
45.5.1.2	<p>All voting system software, hardware, and firmware shall meet all requirements of federal law that address accessibility for the voter interface of the voting system. These laws include, but are not necessarily limited to, (a) the Help America Vote Act,</p>
45.5.2.2.3	<p>The voting system provider shall publish and specify processing standards for each component of the voting system as part of the documentation required for certification.</p>
45.5.2.3.2	<p>The voting system shall meet the following environmental controls allowing for storage and operation in the following physical ranges:</p> <p>(a) Operating – Max. 95 Degrees Fahrenheit; Min 50 Degrees Fahrenheit, with max. humidity of 90%, normal or minimum operating humidity of 15%.</p>
45.5.2.3.18	<p>The approach to design shall be unrestricted, and it may incorporate any form or variant of technology that is capable of meeting the requirements of this rule, and other attributes specified herein. The frequency of voting system malfunctions and maintenance requirements shall be reduced to the lowest level consistent with cost constraints. Applicants are required to meet or exceed MIL-HDBK-454; "Standard General As Amended 10/2/07 Page 119 Requirements for Electronic Equipment" that is hereby adopted and incorporated by reference, as a guide in the selection and application of materials and parts only as is relevant to this section.</p>
45.5.2.3.19	<p>All electronic voting devices provided by the voting system provider shall have the capability to continue operations and provide continuous device availability during a period of electrical outage without any loss of election data.</p> <p>(d) The voting system provider shall deliver to the Secretary of State documentation detailing estimated time of operation on battery for each type of optical scanner, ballot imager, DRE, and V-VPAT they provide, assuming continuous use of the devices by voters during an interruption of normal electrical power.</p> <p>(e) The voting system provider shall deliver to the Secretary of State documentation specifying the steps and times required for charging batteries for each type of optical scanner, ballot imager, DRE and V-VPAT they provide.</p>
45.5.2.3.22	<p>The voting system and all associated components shall have an estimated useful life of at least eight (8) years. Voting system provider shall provide documentation of the basis for the estimate.</p>

eScan 1.1.6

(Documentation requirements continued.)

Rule
45.5.2.7.10

Text
Voting systems providers shall document how they plan to monitor and respond to known threats to which their voting systems are vulnerable. This documentation shall provide a detailed description, including scheduling information, of the procedures the voting system provider will use to:
(a) Monitor threats, such as through the review of assessments, advisories, and alerts for COTS components;
(b) Evaluate the threats and, if any, proposed responses.
(c) Develop responsive updates to the system and/or corrective procedures; and
(d) As part of certification requirements of the proposed system, provide assistance to customers, either directly or through detailed written procedures, how to update their systems and/or to implement the corrective procedures within the timeframe established by the Secretary of State.

5) Audit Capacity

1-5-615

No electronic or electromechanical voting system shall be certified by the secretary of state unless such system:
(1)(p) Saves and produces the records necessary to audit the operation of the electronic or electromechanical voting system, including a permanent paper record with a manual audit capacity.

45.5.2.5.3

The voting system shall track and maintain audit information of the following voting system application events:
(a) Log on and log off activity.
(b) Application start and stop.
(d) Election events – setup, set for election, unset for election, open polls, close polls, end election, upload devices, download devices, create ballots, create precincts, create districts, create poll places (or Vote Centers), initialize devices, backup devices, and voting activity;

Central Count Scanner Restrictions:**Ballot Now 3.2.4**

1) **Functional requirements**

Rule
10.3

Text
If there is no candidate on the ballot for any particular office, the ballot shall read, “No candidate for this office.”

1-5-611

No nonpunch card electronic voting system shall be purchased, leased, or used unless it fulfills the following requirements:
(1)(c) It rejects any vote for an office or on a ballot issue if the number of votes exceeds the number the elector is entitled to cast.

Ballot Now 3.2.4

(Functional requirements continued.)

Rule

Text

1-5-615

Electronic and electromechanical voting systems - requirements.

- (1) No electronic or electromechanical voting system shall be certified by the secretary of state unless such system:
- (b) Permits each elector to vote for all offices for which the elector is lawfully entitled to vote and no others, to vote for as many candidates for an office as the elector is entitled to vote for, and to vote for or against any ballot question or ballot issue on which the elector is entitled to vote;
- (c) Permits each elector to verify his or her votes privately and independently before the ballot is cast;
- (f) Does not record a vote for any office, ballot question, or ballot issue that is overvoted on a ballot cast by an elector.
- (g) For electronic and electromechanical voting systems using ballot cards, accepts an overvoted or undervoted ballot if the elector chooses to cast the ballot, but it does not record a vote for any office, ballot question, or ballot issue that has been overvoted;
- (l) Counts votes correctly.
- (m) Can tabulate the total number of votes for each candidate for each office and the total number of votes for and against each ballot question and ballot issue for the polling place;

1-7-508

Votes cast for an office to be filled or a ballot question or ballot issue to be decided shall not be counted if a voter marks more names than there are persons to be elected to an office or if for any reason it is impossible to determine the elector's choice of candidate or vote concerning the ballot question or ballot issue. A defective or an incomplete mark on any ballot in a proper place shall be counted if no other mark is on the ballot indicating an intention to vote for some other candidate or ballot question or ballot issue.

27.2

Multiple Page Ballots. In any election where a multiple page printed ballot is used, a voter must vote and return all pages of the ballot at the same time. Any voter who has returned at least one page of a multiple page printed ballot will be considered to have voted. Any additional page returned at a later time shall not be counted but shall be appropriately marked, set aside, and preserved as other election materials in accordance with section 1-7-802, C.R.S.

Ballot Now 3.2.4

(Functional requirements continued.)

Rule	Text
27.4.2	<p>Sequence of Resolution Procedures for Central Count Optical</p> <p>(b) Scan Procedures are</p> <p>(2) Official ballots shall be processed through the optical scanner, with sorted overvotes, blank ballots, and write-in ballots viewed and resolved by the resolution board. Only ballots sorted by the machine shall be subject to review by the resolution board. If there are no legally qualified write-in candidates, the write-in sort option shall not be utilized. The number of each duplicated ballot shall be entered on the resolution board log sheet.</p> <p>(d) (1) Optical scan equipment must be set to consistent sensitivity standards for each system type, must be tested prior to the recount, and shall be programmed to sort undervotes for the individual race(s), issue(s) or question(s) being recounted.</p>
37.1.2	<p>Voting systems (including optical scanning voting systems or direct recording electronic systems) certified by the secretary of state and acquired, purchased or leased by counties pursuant to state law shall:</p> <p>(b) 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).</p> <p>(c) if the voter selects votes for more than one candidate for a single office:</p> <p>(i) notify the voter that the voter has selected more than 1 candidate for a single office on the ballot;</p> <p>(ii) notify the voter before the ballot is cast and counted of the effect of casting multiple votes for the office; and</p> <p>(iii) provide the voter with the opportunity to correct the ballot before the ballot is cast and counted.</p> <p>(d) Ensure that any notification required under this paragraph preserves the privacy of the vote and the confidentiality of the ballot.</p>
45.5.2.1.2	<p>The Voting system shall provide for appropriately authorized operators to conduct hardware and diagnostics testing as required herein;</p>
11.5.2.1	<p>The county clerk and recorder shall commence the Hardware Diagnostic Test prior to the election and allow time for each electronic voting device within the county to be tested. Each device being used in the election, including units identified as spare or backup units, shall be tested to verify that mechanical components are working correctly. This test shall include, but not be limited to, the following tests:</p> <p>(a) All input and output devices;</p> <p>(b) Communications ports;</p> <p>(c) System printers;</p> <p>(d) System modems when applicable;</p> <p>(e) System Screen displays;</p> <p>(f) Boot performance and initializations;</p> <p>(g) Firmware loads;</p> <p>(h) Software loads;</p> <p>(i) Confirmation that screen displays are functioning; and</p> <p>(j) Date, time and calibration of systems.</p>

Ballot Now 3.2.4

(Functional requirements continued.)

Because of failure with counting ballots, the testing board is unable to determine if error was due to folds on ballots or due to the nature of the machine.

Rule	Text
45.5.2.1.5	The voting system shall provide for the tabulation of votes cast in split precincts where all voters residing in one precinct are not voting the same ballot style.
45.6.2.3.3	Each voting system shall be tested and examined by conducting at least three mock elections which shall include voting scenarios that exist within a primary election, a coordinated election, and a recall election.
45.6.2.3.6	The voting system provider is required to produce ballots in quantities identified below for each of the two elections. Enough ballots need to be created to conduct the testing of the voting system as defined in this rule. One complete set of ballots will be tested in each of the applicable counter types (or groups): Absentee – ballots are scored and folded to fit in standard Colorado Absentee Mailing Envelopes.
45.6.2.3.7	All ballots provided shall be blank with no marks on them. The following combinations of ballots are required: (a) Four separate decks of ballots shall be provided consisting of 25 ballots for each precinct/precinct split generated for each election that are flat (1500 minimum combined). At least one deck shall have the General Election data, and at least one shall have the Primary election data as indicated in the instructions for voting system providers; (b) Four separate decks of ballots shall be provided consisting of 25 ballots for each precinct/precinct split generated for each election that are folded (1500 minimum combined). At least one deck shall have the General Election data, and at least one shall have the Primary election data as indicated in the instructions for voting system providers; (d) One separate deck of ballots consisting of 200 ballots of any single precinct from the Coordinated election shall be provided that contains a two page ballot (races on four faces). (e) One separate deck of ballots consisting of 10 ballots for each precinct generated for the Recall election that are flat as indicated in the instructions for vendors. (f) Any vendor that uses serial numbers printed on ballots for processing shall produce ballots of each requirement printed both with and without serial numbers.
45.6.2.3.10	Ballots shall be cast and counted in all applicable counter types (or counter groups) as necessary based on the parts included in the voting system. These are at a minimum: Poll Place (or Vote Center), Absentee, Provisional, and Early Voting. Ballots may be run through components 10 or more times depending on components and counter group being tested to achieve a minimum number of ballots cast as follows for each group: (c) Vote Center/ OS 5000. (e) Early Voting / OS 5000. (g) Mail-in 10,000. (h) Provisional 5,000.

Ballot Now 3.2.4

(Functional requirements continued.)

	Rule	Text
	45.6.2.3.14	Ballots shall include the following minimum race situations to simulate and test “real world” situations in the State of Colorado: (d) In a general election, allow a voter to vote for any candidate for any office, in the number of positions allowed for the office, and to select any measure on the ballot that the candidate is allowed to vote in, regardless of party. (e) Allow for programming to accommodate Colorado recall questions as prescribed in Article 12 of Title 1, C.R.S.;
	45.6.2.3.3	Each voting system shall be tested and examined by conducting at least three mock elections which shall include voting scenarios that exist within a primary election, a coordinated election, and a recall election.
2) Performance levels	45.6.2.2.1 45.6.2.3.15	Test all ballot reading functions – are they accurate and reliable as described in the requirement - how do scanner(s) responds to smudges, folds, etc; response to valid and invalid or absence of marks.
	45.6.2.3.9	The testing board shall mark a minimum of 300 ballots with marking devices of various color, weight, and consistency to determine accurate counting with a variety of marking devices.
3) Physical and design characteristics	1-5-611	No nonpunch card electronic voting system shall be purchased, leased, or used unless it fulfills the following requirements: (1)(f)(I)If the system uses a voting device: It is suitably designed, of durable construction, and capable of being used safely, efficiently, and accurately in the conduct of elections and the tabulation of votes.
4) Documentation requirements	1-5-601.5	Compliance with federal requirements. All voting systems and voting equipment offered for sale on or after May 28, 2004, shall meet the voting systems standards that were promulgated in 2002 by the federal election commission and that may thereafter be promulgated by the federal election assistance commission. Subject to section 1-5-608.2, nothing in this section shall be construed to require any political subdivision to replace a voting system that is in use prior to May 28, 2004.
	45.4.2	A voting system provider that submits a voting system for certification shall complete the Secretary of State’s “Application for Certification of Voting System”. Which contains all of the following documentation: <ul style="list-style-type: none">• Level, location and programming of audit trail information.• Process for Battery Charging.• Basis for useful life estimate.
	45.5.1.2	All voting system software, hardware, and firmware shall meet all requirements of federal law that address accessibility for the voter interface of the voting system. These laws include, but are not necessarily limited to, (a) the Help America Vote Act,

Ballot Now 3.2.4

(Documentation requirements continued.)

Rule	Text
45.5.2.2.3	The voting system provider shall publish and specify processing standards for each component of the voting system as part of the documentation required for certification.
45.5.2.3.19	All electronic voting devices provided by the voting system provider shall have the capability to continue operations and provide continuous device availability during a period of electrical outage without any loss of election data. (d) The voting system provider shall deliver to the Secretary of State documentation detailing estimated time of operation on battery for each type of optical scanner, ballot imager, DRE, and V-VPAT they provide, assuming continuous use of the devices by voters during an interruption of normal electrical power. (e) The voting system provider shall deliver to the Secretary of State documentation specifying the steps and times required for charging batteries for each type of optical scanner, ballot imager, DRE and V-VPAT they provide.
45.5.2.4.2	All VSTL qualification reports, test logs, and technical data packages shall be evaluated to determine if the voting system meets the requirements of this rule and have completed the applicable federal certification requirements at the time of State testing. Failure to provide such documentation of independent testing will result in the voting system application being rejected. (a) The voting system provider shall execute and submit any necessary releases for the applicable VSTL and/or EAC to discuss any and all procedures and findings relevant to the voting system submitted for certification with the Secretary of State's office. The voting system provider shall provide a copy of the same to the Secretary of State's office.
45.5.2.5.2	The voting systems shall include detailed documentation as to the level, location, and programming of audit trail information throughout the system. The audit information shall apply to: (a) Operating Systems (workstation, server, and/or DRE);
45.5.2.7.10	Voting systems providers shall document how they plan to monitor and respond to known threats to which their voting systems are vulnerable. This documentation shall provide a detailed description, including scheduling information, of the procedures the voting system provider will use to: (a) Monitor threats, such as through the review of assessments, advisories, and alerts for COTS components; (b) Evaluate the threats and, if any, proposed responses. (c) Develop responsive updates to the system and/or corrective procedures; and (d) As part of certification requirements of the proposed system, provide assistance to customers, either directly or through detailed written procedures, how to update their systems and/or to implement the corrective procedures within the timeframe established by the Secretary of State.

Ballot Now 3.2.4

5) Audit capacity

Rule	Text
1-5-611	No nonpunch card electronic voting system shall be purchased, leased, or used unless it fulfills the following requirements: (1)(f)(III) If the system uses a voting device: It contains a protective counter with a register which cannot be reset, which shall register the cumulative total number of movements of the operating mechanism.
1-5-615 37.1.4	No electronic or electromechanical voting system shall be certified by the secretary of state unless such system: Saves and produces the records necessary to audit the operation of the electronic or electromechanical voting system, including a permanent paper record with a manual audit capacity.
45.5.2.5.3	The voting system shall track and maintain audit information of the following voting system application events: (b) Application start and stop. (c) Printing activity (where applicable). (d) Election events – setup, set for election, unset for election, open polls, close polls, end election, upload devices, download devices, create ballots, create precincts, create districts, create poll places (or Vote Centers), initialize devices, backup devices, and voting activity;

DRE Restrictions:

eSlate 4.0.19, JBC 4.0.19

1) Functional requirements

Rule	Text
11.5.2.1	The county clerk and recorder shall commence the Hardware Diagnostic Test prior to the election and allow time for each electronic voting device within the county to be tested. Each device being used in the election, including units identified as spare or backup units, shall be tested to verify that mechanical components are working correctly. This test shall include, but not be limited to, the following tests: (a) All input and output devices; (b) Communications ports; (c) System printers; (d) System modems when applicable; (e) System Screen displays; (f) Boot performance and initializations; (g) Firmware loads; (h) Software loads; (i) Confirmation that screen displays are functioning; and (j) Date, time and calibration of systems.

eSlate 4.0.19, JBC 4.0.19

(Functional requirements continued.)

	Rule	Text
	45.5.2.1.2	<p>The Voting system shall provide for appropriately authorized operators to conduct hardware and diagnostics testing as required herein;</p> <p>(a) Prepare the system for an election;</p> <p>(b) Setup and prepare ballots for an election;</p> <p>(c) Lock and unlock system to prevent or allow changes to ballot design;</p> <p>(d) Conduct hardware and diagnostics testing as required herein;</p> <p>(e) Conduct logic and accuracy testing as required herein;</p> <p>(f) Conduct an election and meet additional requirements as identified in this section for procedures for voting, auditing information, inventory control, counting ballots, opening and closing polls, recounts, reporting, and accumulating results as required herein;</p> <p>(g) Conduct the post election audit as required herein; and</p> <p>(h) Preserve the system for future election use.</p>
2) Documentation requirements	45.4.2	<p>A voting system provider that submits a voting system for certification shall complete the Secretary of State’s “Application for Certification of Voting System”. Which contains all of the following documentation:</p> <ul style="list-style-type: none">• Level, location and programming of audit trail information.• Accessibility documentation.• Process for Battery Charging.• Basis for useful life estimate.
	45.5.2.2.3	<p>The voting system provider shall publish and specify processing standards for each component of the voting system as part of the documentation required for certification.</p>
	45.5.2.3.2	<p>The voting system shall meet the following environmental controls allowing for storage and operation in the following physical ranges:</p> <p>(b) Non-Operating – Max. 140 Degrees Fahrenheit; Min. 4 Degrees Fahrenheit. Non-operating humidity ranges from 5% to 90% for various intervals throughout the day.</p>
	45.5.2.3.13	<p>All DRE voting devices shall use touch screen technology or other technology providing visual ballot display and selection. The voting system provider shall include documentation concerning the use of touch screen or other display and selection technology, including but not limited to:</p> <p>(b) Technical documentation describing the nature and sensitivity of any other technology used to display and select offices, candidates, or issues;</p>

eSlate 4.0.19, JBC 4.0.19

(Documentation requirements continued.)

Rule	Text
45.5.2.3.18	The approach to design shall be unrestricted, and it may incorporate any form or variant of technology that is capable of meeting the requirements of this rule, and other attributes specified herein. The frequency of voting system malfunctions and maintenance requirements shall be reduced to the lowest level consistent with cost constraints. Applicants are required to meet or exceed MIL-HDBK-454; "Standard General As Amended 10/2/07 Page 119 Requirements for Electronic Equipment" that is hereby adopted and incorporated by reference, as a guide in the selection and application of materials and parts only as is relevant to this section.
45.5.2.3.22	The voting system and all associated components shall have an estimated useful life of at least eight (8) years. Voting system provider shall provide documentation of the basis for the estimate.
45.5.2.7.10	Voting systems providers shall document how they plan to monitor and respond to known threats to which their voting systems are vulnerable. This documentation shall provide a detailed description, including scheduling information, of the procedures the voting system provider will use to: (a) Monitor threats, such as through the review of assessments, advisories, and alerts for COTS components; (b) Evaluate the threats and, if any, proposed responses. (c) Develop responsive updates to the system and/or corrective procedures; and (d) As part of certification requirements of the proposed system, provide assistance to customers, either directly or through detailed written procedures, how to update their systems and/or to implement the corrective procedures within the timeframe established by the Secretary of State.
45.5.2.8.2	Documentation of the accessibility of the voting system shall include the following items at a minimum: (c) Technology used by the voting system that prevents headset/headphone interference with hearing aids; (i) Method for adjusting color settings, screen contrasts, and screen angles/tilt if the system uses a display screen.

eSlate 4.0.19, JBC 4.0.19

3) Accessibility requirements

Rule	Text
1-5-704 35.1.5	Standards for accessible voting systems. (1) Notwithstanding any other provision of this article, each voting system certified by the secretary of state for use in local, state, and federal elections shall have the capability to accept accessible voter interface devices in the voting system configuration to allow the voting system to meet the following minimum standards: (d) Devices providing audio and visual access shall be able to work both separately and simultaneously. (f) Any voting system that requires any visual perception shall allow the font size as it appears to the voter to be set from a minimum of fourteen points to a maximum of twenty-four points before the voting system is delivered to the polling place. (n) Audio ballots shall meet the following standards: (X) The elector shall have the opportunity to review the elector's write-in input to the voter interface device, edit that input, and confirm that the edits meet the elector's intent.
37.1.4	The voting systems described in the foregoing paragraphs shall produce a record with an audit capacity for such system. (d) The paper record shall 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.
35.1.7	Any voting system that requires any visual perception shall offer the election official who programs the system, prior to its being sent to the polling place, the capability to set the font size to a level that can be read by voters with low vision. While there is no standard font size for this situation, a sans-serif font of 18 points as printed on a standard 8.5" x 11" piece of paper will allow the most universal access;
45.5.2.8.1	Specific minimum accessibility requirements include those specified in section §1-5-704 C.R.S., Secretary of State Rule 34, Rule 35 and the following: (b) Audio ballots shall meet the following standards: (ii)The audio system shall allow voters to control within reasonable limits, the rate of speech. (f) Adjustability of color settings, screen contrasts and/or screen angles/tilt may be made by either the poll worker or voter if the system uses a display screen. A minimum of two color settings, two contrast settings and two angles shall be available for all display screens.
45.5.2.9.10	The V-VPAT device shall be designed to allow every voter to review, and accept or reject his/her paper record in as private and independent manner as possible for both disabled and non-disabled voters.

eSlate 4.0.19, JBC 4.0.19

(Accessibility requirements continued.)

Rule

45.5.2.9.12

Text

The V-VPAT printer shall print at a font size no less than ten (10) points for ease of readability. Any protective covering intended to be transparent shall be in such condition that it can be made transparent by ordinary cleaning of its exposed surface.

**2007-CDOS-HAR-001-0404
PROJECT OVERVIEW BINDER “A.3”**

CONDITIONS



FINAL – 4/4/2008

Conditions for Use – HART - AMENDED 4/4/08

The Testing Board would also recommend the following conditions for use of the voting system. These conditions are required to be in place should the Secretary approve for certification any or all of the items indicated in the **COMPONENTS** section. The Testing Board has modified the conditions based on information provided through public hearing under legislative updates to consider additional procedures. Any deviation from the conditions provides significant weakness in the security, auditability, integrity and availability of the voting system.

Global Conditions (applies to all components):

- 1) Modem and other telecommunication devices may not be used on any subsystem component - system provider was unable to meet or provide prerequisite FIPS 140/180 certifications.
- 2) Provisional ballots must be processed separately from non-conditional ballots - system subcomponents are unable to functionally differentiate and correctly process to Colorado specific requirements.
- 3) Coordination of Escrow Setup - Upon Certification, voting system manufacturer must coordinate the Escrow of the TRUSTED BUILD software with SOS escrow, or third party escrow service as required by Rule 11 prior to use in Colorado.
- 4) Abstract Report generation - abstracts used for State reporting must come from Tally Software, or other external solution, rather than from the specific device.
- 5) Trusted Build Verification
 - a) The system components do not allow for proper verification of trusted build software. Any breach of custody and/or other security incidents will require the rebuild of the component with the state trusted build software. This requirement applies to all voting devices, firmware and software components of the system. Additionally, due to concerns and previous history of software version control with this vendor, counties will be required to audit equipment and submit reports as necessary by the Secretary of State's office to ensure that only the approved components are present on any system in use in this state. Submission of this information shall happen at least once prior to each election and following each election.
 - b) Counties shall ensure that hardware, software and firmware purchased for use of the system matches the specifications of VSTL/EAC and/or State Certified and trusted versions, not to the version presented in the vendor documentation.

- 6) Counties using the voting system shall testify through their security plan submission that the voting system is used only on a closed network and/or as stand alone devices as required.
- 7) Use of wireless components is forbidden on the system. Any workstation or laptop that is designed with wireless communications shall have the device disabled and unable to be enabled by anyone other than the system administrator.
- 8) Election Programming and database distribution shall take place by one of the following three methods:
 - a) In the event the county has the software and technical expertise to confidently program their own election, the county shall submit any non-default template to the Secretary of State's office for verification prior to the download of memory cards used in the election. This effort will match the details prescribed under the ballot processing requirements for each device.
 - b) In the event the county has the software but not the expertise to program their own election, counties may choose to coordinate through the manufacturer or other third party company for this service. These companies must be bonded and insured as required under Secretary of State Rule 11. Copies of the database and separated template files must be submitted to the Secretary of State's office as indicated under the ballot processing requirements for each device. In addition, the counties must use the appropriate software to change administrator and device level passwords preventing the manufacturer from knowing such passwords.
 - c) In the event that the county does not have the software to program the election, the county may choose to coordinate through the manufacturer or other third party company for this service. These companies must be bonded and insured as required under Secretary of State Rule 11.

The county shall follow the following procedures to ensure the integrity of the trusted build and the verification of vote totals:

1. Counties shall log any deployment of a vendor to any voting location within the county (this includes pre-election testing, early voting and polling places).
 - a. Logs must contain the name of location, vendor name, county person name, date/time, and system serial number at a minimum.
2. Counties shall comply with accompaniment rule (43.8.6.1) for vendors having access to equipment to ensure that a vendor is accompanied at all times by a county employee.
3. Vendor is allowed any access to voting devices deemed necessary by county official.
 - a. Counties have the option to quarantine (Secure) the device and request backup equipment from SOS in lieu of vendor accessing voting device.
4. County shall conduct a 100% manual audit of the paper record of all races and ballots cast recorded by the device.
 - a. The MBB (Memory card) may be uploaded after audit is verified to match paper records.
 - b. If audit does not match, the device shall be quarantined (secured) and the county shall contact the SOS.
5. For any voting device handled by the voting system vendor, the trusted build shall be reinstalled after the election.
6. Counties shall submit logs and records of hand audits for devices that fall into this category prior to the canvass of official results to the Secretary of State.

All copies of the database and separated template files must be submitted to the Secretary of State's office as indicated under the ballot processing requirements for each device for the original database and any subsequent changes to the database.

Counties shall identify in the filing of their security plans which method will be executed for a given election.

Software Conditions (BOSS and Components):

- 1) System/Database/Network Security Hardening.
 - a) Because the voting system operates in a non-restricted system configuration containing open file system access to locate, copy, open and overwrite without detection, election vote content database files outside of election management system application by third-party tools, counties will be required to modify their physical environmental conditions, or request a variance from the Secretary of State to create Hart system hardening documentation in lieu of environmental changes. Counties shall submit their plan for approval to the Secretary of State's office to be included in the County Security Plan on overcoming these conditions through county environmental and/or procedural changes where possible.
 - b) In addition to physical environmental changes, counties shall maintain the integrity of the master Tally databases with one of the following two methods:
 - Option #1 - Create a second (or backup) copy of the BOSS, and in some cases, the Tally database that is created immediately after the point of memory card downloads. The backup copy shall be stored on closed CD Media and documented as matching the master database. This process shall be observed by two election staff members. Chain of custody documents shall be generated for the media, and the media shall be sealed with at least two tamper evident seals and stored in a sealed or lockable transfer case that is stored in a limited access area. On election day, the designated election official shall load the sealed copy of the database onto the server/workstation, create a Tally database, if necessary, from the secured copy of the finalized database and proceed with uploading memory cards into Tally after documenting the loading of the backup master database onto the system. After loading the sealed database copy, the county shall re-secure the database with seals (updating necessary logs) in the limited access location; or
 - Option #2 - Create a second (or backup) copy of the BOSS database that is created immediately after the point of downloading all memory cards. The copy of the database will be escrowed with the Colorado Secretary of State's office along with the template files used. After each of the events described below, the county shall provide both an updated copy of the database to the Secretary of State's office, an updated database audit log, and the forensic analysis of the database performed by a commercially available forensics tool, identifying changes to database properties since the last report. Events triggering a report update to the Secretary of State include: any download of memory cards, any upload of memory cards, completion of L&A Testing, and completion of Post-Election Audit. Reports are to be submitted to the Secretary of State's office within 24 hours of the event.

Counties shall indicate in their Security Plan which option they will be executing to meet the security requirements.

c) Additionally, to overcome deficiencies in security and auditing of the system, the county will be required to perform increased Election Night and Post Election Audits for this system. All post-election audit data shall process a hand count of paper ballots (or paper records) which shall match the totals report from the specific device, as well as the totals for the Tally database. Counties shall prepare for this event with one of two methods:

Option #1 – Prepare for the upload of memory cartridges as normal. Print necessary zero report. Upon uploading each individual memory card, print a summary report showing the change in totals from the upload of the memory card. Label the report to match the name/number of the memory card uploaded. Continue to upload memory cards and print totals reports to match. When auditing a specific device, use the difference between the report totals for the memory card selected for the audit and the totals from the immediately preceding memory card report to calculate vote totals generated by the Tally software.

When memory cards are delivered to the county for upload, the machine generated report shall be delivered for inspection as well. During the post-election audit the summary report indicated above is created, the difference totals (delta report) are immediately compared to the totals from the report generated by the device (or JBC) at the polling place. If the reports match, the public and the canvass board is ensured that the totals from the polling place match the totals from the county server. If the totals are different, the county is to report the situation (on election night) to the Secretary of State's office for audit, security and remedy procedures.

During the post election audit process, the totals of the paper record for the specific device are to be hand counted and verified against the electronic record for the device. The canvass board shall report the verification of three totals to match – the paper record of the device, the totals of the electronic vote on the device, and the totals in the central count server; OR

Option #2 – Prepare for the upload of memory cartridges by creating one master default database (containing all memory cards/cartridges). Create individual databases to contain values (upload data) for each separate memory card (or in some instances by batch of ballots – see condition #4b under Central Count devices. Upload memory card/cartridges into master database, and into the specific database created for that memory card (two separate uploads). This process can take place any time after the close of polls including through the canvass period, with observation by at least two people. Election summary reports shall be printed from each individual database and manually added together. The totals from the individual databases must match the master database before proceeding. Upon verification that the master and individual databases match, the county can then use the individual reports to conduct a hand count of the paper ballot (or paper record) generated by the device to show that the software totals match. The verification of the separate upload databases verify that the database totals match the field totals on each memory card device, as was designed after the point of Logic and Accuracy testing took place.

2) Virus Protection.

The county shall submit for review to the Secretary of State a solution to virus protection that allows for manual updates as required.

3) Audit Trail Information:

a) Counties will be required to produce certain reports identified in C.R.S. 1-7-509 using an external process which will include at a minimum exporting result from the Tally or other software component for processing by other methods.

- b) Operators of the system shall also be required to maintain logs indicating use of the report printing functions of the software, and detailed information to changes of the system including hardware changes which shall include: insert removable media, remove removable media, modify system hardware drivers, modify system physical hardware, and any other system property changes made by either judges or other trusted staff. Logs shall be maintained physically in a file outside or separate from the database, which is NOT accessible for review and/or modification by user/operator accounts on the system, but that is readily accessible to election officials or other interested party.

Such logs may be achievable by a manner best suitable to each county. Solutions may include the use of key stroke recording software, windows event log recordings, detailed video camera recordings, manually written records or any combination to achieve the necessary audit data. Counties shall report to the Secretary of State's office through their security plans the method of achieving this condition.

4) Performance Deficiencies.

- a) Due to failures in performance, counties shall allow extra time for downloads and uploads of memory card devices. This may impact programming, testing and use of the system on election night. Counties shall ensure trusted staff is properly trained on this issue and accommodating the allowable time required for programming memory devices.
- b) Counties shall ensure that hardware purchased for use of the system matches the specifications of VSTL versions, not the Hart documentation.

5) Provisional Ballots.

The software is not capable of processing provisional ballots internally to accept federal and state only questions. A procedure outside of the voting system will be required. Additionally, the abstracts and reports created by the software do not meet the requirements of rule 41.6.3(g) and users of the system will be required to generate an abstract outside of the voting system.

6) Election Database Creation and Testing.

- a) The system was unable to be fully tested with all Testing Board requirements for ballot layouts as required. Therefore, additional testing will be required by counties for both electronic and paper ballots to ensure all voting positions are working as designed prior to each election. This shall include ordering a complete set of at least 4 ballots of each style that contain the prescribed design for that election. County officials shall mark each possible position for each race on the ballots. All ballots shall be tested internally prior to the public logic and accuracy test. The goal of the pretest is to ensure that all available positions are counting when marked correctly.
- b) Counties to ensure ballots are designed and created according to state requirements. The vendor may offer a solution that includes non-certified and non-tested proprietary components. Counties may not use any modified template other than what is available as part of the default, and trusted configuration.

Precinct Count Scanner Conditions (eScan):

1) Intrusion Seals for Protection of Trusted Build Firmware.

Device has no provision of Trusted Build verification once installed. Counties will be required to maintain constant seals on voting device memory slot, back panel, and other entry points as indicated by the Secretary of State. Refer to Global Condition #5a for ensuring integrity of trusted build.

2) Ballot Processing.

Counties shall ensure that all election programming and layout features have been designed with template files that have been submitted to the Secretary of State's office, have been issued hash values by the Testing Board and have been included with the Trusted Build components of the voting system. Changes to template files must be on file as part of the trusted build in the same manner.

3) External Power Supply Required.

Insufficient internal power reserves to sustain minimum 3 hour continuous operation. Counties shall purchase and use an external power supply that meets or exceeds the vendors' recommendation for the component.

4) Device Security Accessibility.

a) County use of voting system will be required to modify the "administrator" password on the voting devices preventing the manufacturer access to the device by means of a password. Refer to Global Condition #8 for additional details on this condition and optional procedures to mitigate security concerns by this deficiency.

b) Counties shall coordinate with the vendor and submit to the state the plan for an approved transfer container for securing ballots after the close of polls on the device.

c) Counties will be required to perform additional post election audit functions for the device to accommodate for security deficiencies. In an effort to increase confidence in the recording of votes by the device, the post-election audit shall include the verification of the hand count of paper ballots to match the totals generated from the Tally software as indicated in Software condition #1c.

5) Ballot/Race Conditions Simulation.

Additional County testing shall be required to accommodate ballots with conditions from each election. This shall include ordering a complete set of at least 4 ballots of each style that contain the prescribed design for that election. County officials shall mark each possible position for each race on the ballots. All ballots shall be tested internally prior to the public logic and accuracy test. The goal of the pretest is to ensure that all available positions are counting when marked correctly.

6) Audit Trail Information:

a) Counties will be required to produce certain reports identified in C.R.S. 1-7-509 using an external process which will include at a minimum exporting result from the Tally software for processing by other methods.

b) Judges shall be required to include device serial number on all reports regarding use of the device. Additionally, the county shall include the device serial number on applicable reports from the device.

- c) Due to errors in processing and auditing information processed by the device, the device will be limited in functionality to only using serial numbered ballots.
- d) Election official shall not reset the device without first creating an event and backing up the device in order to maintain a complete history of the audit logs.

7) Voting Secrecy.

Insufficient privacy of ballot was detected using secrecy sleeve. Election administrators must ensure system secrecy sleeve (from Hart) is used for ballots that are 14” in length or shorter. For ballots outside of this description, the counties shall create a secrecy sleeve to accommodate the deficiency and submit design form to Secretary of State for approval.

Central Count Scanner Conditions (Ballot Now/Scanners):

1) Intrusion Seals for Protection of Trusted Build Firmware.

Device has no provision of Trusted Build verification once installed. Counties will be required to maintain constant seals on voting device memory slot, back panel, and other entry points as indicated. Refer to Global Condition #5a for ensuring integrity of trusted build.

2) Ballot Processing.

Counties shall ensure that all election programming and layout features have been designed with template files that have been submitted to the Secretary of State’s office, have been issued hash values by the Testing Board and have been included with the Trusted Build components of the voting system. Changes to template files must be on file as part of the trusted build in the same manner.

3) External Power Supply Required.

Insufficient internal power reserves to sustain minimum 3 hour continuous operation. Counties shall purchase and use an external power supply that meets or exceeds the vendors’ recommendation for the component. Acceptable power supply sources include generators and other facility based solutions.

4) Audit Trail Information:

- a) Judges shall be required to include device serial number on all reports regarding use of the device. Additionally, the county shall include the device serial number on applicable reports from the device.
- b) Counties will be required to produce certain reports identified in C.R.S. 1-7-509 using an external process which will include at minimum exporting results from the appropriate software module for processing by other methods.
- c) Counties will be required to perform additional post election audit functions for the device to accommodate for security deficiencies. In an effort to increase confidence in the recording of votes by the device, the post-election audit shall include a hand count of at least the following amount of ballots counted on the device for the specific races selected in the post election audit:

Total # of Ballots Counted on Device:	Total # of Ballots to audit:	# of errors requiring escalation:
150,000 to 500,000	1,250	6
35,001 to 150,000	800	4
10,001 to 35,000	500	3
3,201 to 10,000	315	2
1,201 to 3,200	200	2
501 to 1,200	125	2
281 to 500	80	1
151 to 280	50	1
91 to 150	32	1
51 to 90	20	1
26 to 50	13	1
16 to 25	8	1
9 to 15	5	1
1 to 8	3 or 100% if less than 3	1

Errors detected during the manual audit process shall be resolved according to C.R.S. 1-7-514, and Secretary of State Rule 11. Errors discovered exceeding the error rate identified in the table above shall require escalation measures including increased audits as prescribed by the Secretary of State's office. County officials shall contact the Secretary of State's office as soon as possible if an audit detects errors above the escalation threshold.

The verification of the hand count of paper ballots shall match the totals generated from the Tally software as indicated in Software condition #1c. Counties shall load only the master database from the secured storage location for processing the post election audit ballots as indicated in Software Condition #1b. Counties shall prepare database and batches of ballots prior to scanning into system (for election results) to accurately generate reports in batch sizes as necessary for the audit.

5) Ballot/Race Conditions Simulation.

Additional County testing shall be required to accommodate ballots with conditions listed. This shall include ordering a complete set of at least 4 ballots of each style that contain the prescribed design for that election. County officials shall mark each possible position for each race on the ballots. All ballots shall be tested internally prior to the public logic and accuracy test. The goal of the pretest is to ensure that all available positions are counting when marked correctly.

6) Network Access/Availability.

The voting system must be used with no network connectivity between devices/units and software. Only a direct connection (SCSI, IEEE 1394(i.e. Firewire), etc.) between scanner and workstation will be allowed.

DRE Conditions (eSlate):

1) External Power Supply Required.

Insufficient internal power reserves to sustain minimum 3 hour continuous operation. Counties shall purchase and use an external power supply that meets or exceeds the vendors' recommendation for the component to accommodate a 120 minute short coming experienced by the Testing Board during testing of the device

2) Intrusion Seals for Protection of Trusted Build Firmware.

a) Device has no provision of Trusted Build verification once installed. Counties will be required to maintain constant seals on voting device memory slot, back panel, and other entry points as indicated by the Secretary of State. Refer to Global Condition #5a for ensuring integrity of trusted build.

b) Election official shall be required to change passwords for the JBC preventing the manufacturer to have access by means of password to the device. Refer to Global Condition #8 for additional details on this condition and optional procedures to mitigate security concerns by this deficiency.

3) Ballot Processing.

Counties shall ensure that all election programming and layout features have been designed with template files that have been submitted to the Secretary of State's office, have been issued hash values by the Testing Board and have been included with the Trusted Build components of the voting system. Changes to template files must be on file as part of the trusted build in the same manner.

4) Ballot/Race Conditions Simulation.

Additional County testing shall be required to accommodate ballots with conditions listed. This shall include ordering a complete set of at least 4 ballots of each style that contain the prescribed design for that election. County officials shall mark each possible position for each race on the ballots. All ballots shall be tested internally prior to the public logic and accuracy test. The goal of the pretest is to ensure that all available positions are counting when marked correctly. All ballots in this detail shall be "marked" using the DRE device as applicable for similar testing.

5) V-VPAT Paper Record Shall Be Handled Per Rule 11.6.

a) Prescribed paper record is of the thermal type and requires special storage conditions to avoid legibility degradation. Counties shall follow the requirements for handling according to Secretary of State Rule 11 and 43.

b) Election judges are required to perform the "Printer Test" in between paper changes and verify with one additional judge that the paper has been loaded correctly and is printing according to design which ensures that all machines will have paper records for each vote cast.

6) Audit Trail Information:

a) Counties will be required to produce certain reports identified in C.R.S. 1-7-509 using an external process which will include at a minimum exporting result from the Tally software for processing by other methods.

b) Operators of the system shall also be required to maintain logs indicating use of the administrator functions of the device by either judges or other trusted staff.

c) Election official shall not reset the device without first creating an event and backing up the device in order to maintain a complete history of the audit logs.

- 7) V-VPAT Security.
 - a) The V-VPAT device provides no assurance that it cannot accommodate other devices, and/or the device is a standard communication port. This connection between the V-VPAT printer and the DRE unit shall be secured with tamper evident seals with proper chain of custody documentation to prevent and detect tampering.
 - b) The lock on the V-VPAT unit must be sealed with a tamper-evident seal.

- 8) Accessible Operation.
 - a) Due to the inability for the voter to pause and resume the audio text, election judges shall provide instructions specific to this fact to the voters and operations for repeating the text if text was missed, which shall include details on navigating forward and backwards through the system prompts.
 - b) A headset with an adjustable volume, which meets the State of Colorado specifications, must be provided.

**2007-CDOS-HAR-001-0404
PROJECT OVERVIEW BINDER “A.3”**

COMMENTS



Testing Board Comments (updated – A.3)

Changes to the project overview binder reflect predominantly changes allowed to conditions pursuant to SB08-1105. The Testing Board has reflected conditional changes throughout this version of the document.

Testing Board Comments – Original

The test board has unveiled a known reality that no computer system is perfect. Additionally, we have discovered and documented that no system can currently meet the requirements of Rule 45 as applied in its strictest sense. Where possible, the Testing Board attempted to overcome these deficiencies in the form of “conditions for use” of the system – procedural workarounds.

The Testing Board recognizes that the conditions created are in essence a “last resort” workaround to accommodate requirements that do not meet specific sections of Colorado Revised Statutes 1-5-615. The preference of the Testing Board would be to have the specific deficiencies addressed with a system solution as required. Given the ability to mitigate deficiencies with procedural workarounds (C.R.S. 1-5-621), the Testing Board presents conditional use scenarios in the “**Conditions**” section that are directly tied to the recommendation status. Being that many workarounds address the security, auditability and availability of the system component, the Testing Board would firmly reject any option which removes, replaces or diminishes the conditional requirement and still allow the system to be used and recommended for certification. Any “Y” value in the **Recommendation** table would change to a “N” value with any change to the conditions.

These conditional procedures rely heavily on proper execution by county administrators and/or election judges. While we have faith that these dedicated workers will attempt to perform their duties to the best of their abilities, a majority of the conditions involve a human element which may or may not produce the acceptable outcome. This single factor alone causes concern that a security issue may not be resolvable in a post-election scenario.

Finally, it is of value to point out that the conditions that address security specific events are only addressing the attack scenario of a change in vote totals (refer to Cyber Security Report). The essence of the workaround in this case is to ensure that the vote totals calculated electronically are a match to the paper records. This requires absolute assurance that all paper records exist and are auditable for a successful outcome and high confidence in the report of votes by any given county.