Test Report

Hart InterCivic Voting System
Verity 2.2
North Carolina State Certification Testing

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v. TR-01-02-HRT-001-2018.01

1 Introduction

The purpose of this Test Report is to document the procedures that Pro V&V, Inc. followed to perform certification testing of the of the Hart InterCivic Voting System Verity 2.2 to the requirements set forth for voting systems in the North Carolina Election Systems Certification Program.

The state certification test campaign was not intended to result in exhaustive tests of system hardware and software attributes; these are evaluated during federal compliance testing. However, all system functions which are essential to the conduct of an election in the State of North Carolina were evaluated.

The scope of this testing event incorporated a sufficient spectrum of physical and functional tests to verify that the Verity 2.2 Voting System conforms to the North Carolina Election Systems Certification Program, Section 3.4.2.1, State Standards. Specifically, the testing event had the following goals:

- Ensure Verity 2.2 Voting System provides support for all North Carolina election management requirements (i.e. ballot design, results reporting, recounts, etc.).
- Simulate pre-election, Election Day, absentee, recounts, and post-election activities on the corresponding components of the Verity 2.2 Voting System for the required election scenarios.

1.1 References

The documents listed below were utilized in the development of this Test Report:

- North Carolina State Board of Elections Voting System Certification Checklist
- North Carolina State Board of Elections document "Elections Systems Certification Program" dated January 31, 2017
- Election Assistance Commission Testing and Certification Program Manual, Version 2.0
- Election Assistance Commission Voting System Test Laboratory Program Manual, Version 2.0
- Election Assistance Commission 2005 Voluntary Voting System Guidelines (VVSG) Version 1.0, Volume I, "Voting System Performance Guidelines", and Volume II, "National Certification Testing Guidelines"

- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2016 Edition, "NVLAP Procedures and General Requirements (NIST HB 150-2016)", dated July 2016
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, "Voting System Testing (NIST Handbook 150-22)", dated May 2008
- Pro V&V, Inc. Quality Assurance Manual, Revision 7.0
- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Hart Technical Data Package
- Pro V&V, Inc. Test Plan v. 01-02-HRT-001-2018.01, "Hart InterCivic. Verity 2.2 North Carolina State Certification Testing"

1.2 Terms and Abbreviations

The terms and abbreviations applicable to the development of this Test Report are listed below:

"ADA" – Americans with Disabilities Act 1990

"BMD" – Ballot Marking Device

"CM" – Configuration Management

"COTS" – Commercial Off-The-Shelf

"DRE" – Direct Recording Electronic

"EAC" – Election Assistance Commission

"EMS" – Election Management System

"Hart" – Hart InterCivic

"FCA" – Functional Configuration Audit

"HAVA" – Help America Vote Act

"NC" – North Carolina

"PCA" – Physical Configuration Audit

"TDP" – Technical Data Package

"QA" – Quality Assurance

"UPS" – Uninterruptible Power Supply

"VSTL" – Voting System Test Laboratory

"2005 VVSG" – EAC 2005 Voluntary Voting Systems Guidelines

1.3 Background

Hart InterCivic ("Hart") initiated the certification of the Verity 2.2 Voting System by submitting a Voting System Certification Checklist to the North Carolina State Board (last updated) on April 06, 2017. Along with the checklist, Hart provided the needed corresponding documentation and information. This submission was deemed complete and in abundant detail to warrant state certification testing. Pro V&V was then contracted to perform the required testing. As part of the test process, Pro V&V Test Plan v. 01-02-HRT-001-2018.01 was generated and presented to NC for approval. For the purposes of the testing/evaluation, this Test Plan served as the Evaluation Proposal.

On March 06, 2017, a Certification Test Report documenting successful completion of Federal compliance testing to the 2005 Voluntary Voting System Guidelines ("VVSG") of the Verity 2.2.1 Voting System was issued by SLI Compliance (a VSTL), to the Election Assistance Commission (EAC) for approval. The EAC issued a Certificate of Conformance granting certification of the system on March 13, 2017 and assigned it the certification number HRT-Verity-2.2.1.

The Verity 2.2 Voting System is a modification of the EAC certified Verity 2.0 Voting System.

The Verity 2.2 Voting System consists of the components listed below:

- Verity Data / Build / Count Workstation (Election Management System)
- Verity Central Workstation (Central Tabulator)
- Verity Touch Writers (Ballot Marking Devices)
- Verity Scan (Precinct Tabulator)
- Verity Print Devices (BOD)
- Peripherals and Accessories

2 Testing Overview

The evaluation of the Verity 2.2 Voting System incorporated a sufficient spectrum of physical and functional tests to verify that the modified system conformed to the requirements of the North Carolina Election Systems Certification Program, Section 3.4.2.1. The evaluation successfully addressed each of the following test goals in the manner described in the table below:

Table 2-1: Testing Overview

Test Goal	Testing Response
Ensure Verity 2.2 Voting System provides support for all North Carolina election management requirements (i.e. ballot design, results reporting, recounts, etc.).	This was tested by evaluating the Verity 2.2 System to specific election scenarios using a combination of different ballot programming approaches, ballot designs, ballot sizes, languages, and tabulators.
Simulate pre-election, Election Day, absentee, recounts, and post-election activities on the corresponding components of the Verity 2.2 Voting System for the required election scenarios	The components of the Verity 2.2 System were tested in pre-election, Election Day, post-election and recount situations and evaluated against documented behavior and expected results for all scenarios.

2.1 Test Candidate

The Verity 2.2 Voting System includes the Verity Scan digital scan tabulator, Verity Print Devices (BOD), Verity Touch Writers as ADA compliant ballot marking device, and the Verity Central Workstation, which is a digital scan central count ballot tabulator.

The Verity 2.2 Voting System consists of the major components listed below:

- Verity Data / Build / Count Workstation (Election Management System)
- Verity Central Workstation (Central Tabulator)
- Verity Touch Writers (Ballot Marking Devices)
- Verity Scans (Precinct Tabulator)
- Verity Print Devices (BOD)
- Peripherals and Accessories

The follow table provides the software and hardware components of the Verity 2.2 Voting System that were tested, identified with version numbers.

Table 2-2: Firmware/Software Versions

North Carolina Certification of Verity 2.2 Voting System	Firmware/Software Version	Hardware Version
Software Applications		
Verity Data / Build / Count Workstation	2.2.0	---
Voting Devices and Peripherals		
Verity Scan	2.2.0	---
Verity 2.2 Central Ballot Tabulators Components		
Verity Central Workstation	2.0.2	---
Verity 2.2 ADA Compliant Ballot Marking Device		
Verity Touch Writers Devices	2.0.3	---
Verity Print Devices	2.0.3	---

Table 2-3: Hardware Models/Serial Numbers

North Carolina Certification of Verity 2.2 Voting System	Hardware Model (Version)	Serial Number(s)
Precinct Ballot Tabulators		
Verity Scan	Revision C	S1500209110 S1600280301
Central Ballot Tabulators		
Verity Central Workstation	Cannon DR-G1130	GF303481
HP Z230 Desktop	HP Z230 Desktop	2UA5081678
Ballot Marking Devices		
Verity Touch Writers Devices	Revision C	W1500010102 W1500065606
Verity Print Device	Revision B	P1500204310

2.1.1 Test Candidate System Overview

The Verity 2.2 Voting System utilizes the data flows and configurations depicted in the following figures to exchange information, as taken from the Hart provided technical documentation:

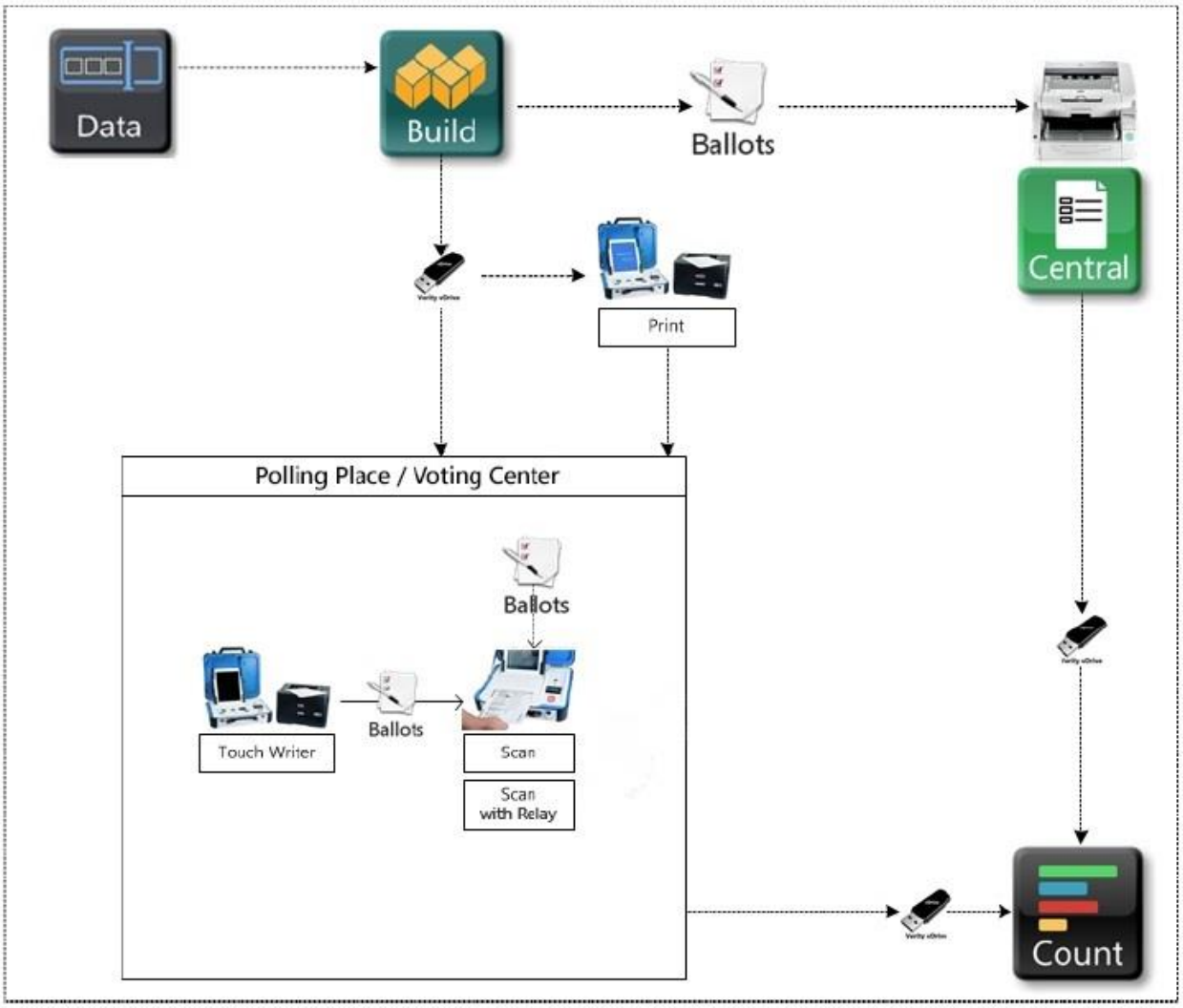

Figure 2.1 Verity Voting System Abstract Diagram

2.2 Testing Configuration

The testing event utilized a setup of the Verity 2.2 Voting System and its components. The following is a breakdown of the Verity 2.2 Voting System components and configurations for the test setup:

Standard Testing Platform:

The system was configured in the standalone configuration. This platform was used to test all scenarios as provided by the election definitions.

The central office setup was a standalone Verity Data / Build / Count Workstation configuration accompanied by a Verity Central Workstation.

The precinct polling station setup consisted of a Verity Print, 2 Verity Touch Writers, and 2 Verity Scans with ballot boxes. The Verity Print and Verity Touch Writers were set up as accessible voting stations.

Hart provided all previously identified software and equipment necessary for the test campaign. North Carolina SBE provided the elections and ballots.

2.3 Test Support Equipment/Materials

All test support equipment and materials required to facilitate testing were supplied by Hart.

2.4 Technical Data Package

This subsection lists all manufacturer documentation that is relevant to the system being tested as per the system's TDP Document Control Guide.

The Verity 2.2 Voting System TDP is listed in the following table and follows the North Carolina State Board Of Elections Systems Certification Program (JAN. 31, 2017), Section 3.5.1.2.

Table 2-4: Verity 2.2 Technical Data Package

Document Description	Document Number/ Version
Hart Quality Processes	
Quality Manual	1000490 D.03
Software Test Design Development	1000508 D.02
Records Retention Matrix	1000510 E.02
Hardware Design Development Procedure	1000513 D.01
Hardware Verification and Validation Process	1000514 D.01

Document Control Procedure	1000538 E.05
SQA Requirements Management Process	1000540 A.02
Continual Improvement Process	1000550 E.02
Software Verification and Validation Process	1000560 D.02
Supplier Qualification and Management	1000563 C.02
VSTL Product Submission Procedure	1000565 D.02
Control of Nonconforming Product Procedure	1000657 B.02
Voting System Implementation and Maintenance	1000745 C.01
TDP Document Control Guide	1000757 B.01
Software Versioning Procedure	1001070 C.03
Configuration Management Process	1001074 D.00
Verity Devices Hardware	
Verity Supply Chain PRD – Supply Chain/Operations/Services Planning Document	3005302 A.01

Verity Scan	3005350 Rev. B
Verity Controller	3005351 Rev. B
Verity Touch Writer	3005352 Rev. B
Verity Touch	3005355 Rev. B
Verity Print	3005356 Rev. B
Verity Ballot Box	3005357 Rev. B
Verity Standard Booth	3005358 Rev. C
Verity Accessible Booth	3005359 Rev. C
AutoBallot Kit	3005174 Rev. A
Verity Device Safety, EMC, and Environmental testing Reports	n/a n/a
Verity 2.0.0 COTS List	n/a SVN
Verity Build Technical Requirements Document	4005452 A.10
Verity Central Technical Requirements Document	4005453 A.07
Verity Count Technical Requirements Document	4005454 A.10
Verity Data Technical Requirements Document	4005555 A.06

Verity Device Suite Technical Requirements Document	4005457 A.09
Verity Scan Technical Requirements Document	4005458 A.07
Verity Touch Writer Technical Requirements Document	4005459 A.09
Verity Touch Technical Requirements Document	4005529 A.06
Verity Controller Technical Requirements Document	4005528 A.07
Verity Print Technical Requirements Document	4005530 A.06
Verity System Design - Electronics Specification	4005461 A.09
Verity Base Station Microcontroller Specification	4005462 A.01
Verity Software Architecture & Design Technical Document	4005463 B.00
Verity Security Requirements	4005464 A.07
Verity System Description	4005466 B.01
Verity System Limits	4005470 B.02
Verity Election Management Technical Requirements Document	4005525 A.06
Verity Summative Usability Test Plan	4005495 A.01
Verity Summative Usability Report	4005496 A.00

Verity Voting Application Usability Impact Statement	N/A SVN
Verity Performance Characteristics	4005497 B.00
Verity Coding Standard	4005498 A.13
Verity Logging Technical Requirements Document	4005499 A.04
Verity 2.0.X Technical Data Package Overview	4005511 B.03
Verity Airgap Interface for Portable Electronic Media Technical Reference	4005512 A.02
Verity Risk Assessment	4005513 A.01
Verity Key Design Technical Document	4005514 A.01
Verity Operational Environment	4005515 B.02
Ballot Creation Technical Requirements Document	4005-551 A.01
Election Definition Data Technical Requirements Document	4005-552 A.01
Verity Vote Counting and Cast Vote Records Technical Requirements Document	4005-554 A.01
Verity Desktop Database Schema	N/A SVN
Verity Device Database Schema	N/A SVN

Verity Database Attributes	4005543 B.00
Verity Trusted Build Process	
The Creation and Configuration of the Access Build Environment	4005517 A.01
The Creation and Configuration of the Trusted Build Environment	4005518 A.02
The Creation and Configuration of the MCU Build Environment	4005519 A.02
Workstation Configuration Process Document for Verity 2.0	4005564 A.00
Device WES7 Creation Process Document for Verity 2.0	4005562 A.00
Device OS Configuration Process Document for Verity 2.0	4005563 A.00
Device Configuration Process Document	4005523 B.00
Workstation WES7 Creation Process Document for Verity 2.0	4005565 A.00
Workstation Manufacturing Process Document	4005525 A.02
Miscellaneous	
Hart Secure Ballot Stock Specification	4005526 A.00
Verity Voting National Certification Test Specification	4005527 B.00
Verity Central-Server file manifest	n/a SVN
Verity Central-Client file manifest	n/a SVN

Verity Controller-Device file manifest	n/a SVN
Verity Count-Client file manifest	n/a SVN
Verity Count-Client file manifest	n/a SVN
Verity Count-Server file manifest	n/a SVN
Verity Database-Database file manifest	n/a SVN
Verity DataBuild-Client file manifest	n/a SVN
Verity DataBuildCount-Client file manifest	n/a SVN
Verity DataBuildCount-Server file manifest	n/a SVN
Verity DataBuild-Server file manifest	n/a SVN
Verity Print-Device file manifest	n/a SVN
Verity Scan-Device file manifest	n/a SVN
Verity Touch-Device file manifest	n/a SVN
Verity Writer-Device file manifest	n/a SVN
Verity Design Notes and Design Documents	
Verity Logging Design	n/a 1.03

Verity Application Programming Interface Specification Technical Document	n/a Rev 2
Verity 2.0.3 Source Documentation	n/a n/a
End User Documents	
Verity Build Technical Reference Manual	6600009 A.01
Verity Central Technical Reference Manual	6600010 A.01
Verity Count Technical Reference Manual	6600011 A.01
Verity Data Technical Reference Manual	6600008 A.01
Verity Print Technical Reference Manual	6600007 A.01
Verity Service and Maintenance Operations Technical Reference Manual	6610001 B.01
Verity Polling Place Operations Technical Reference Manual	6610100 B.02
Verity Build Quick Reference Manual	6620009 A.01
Verity Central Quick Reference Manual	6620010 A.01
Verity Count Quick Reference Manual	6620011 A.01
Verity Data Quick Reference Manual	6620008 A.01

Verity Operational Guide	6640001 B.01
Training Materials	
6661-011 A Verity_2.X_Course Pack_Build	6661-011 A
6661-012 A Verity_2.0_Course Pack_Polling Place Operations - SW	6661-012 A
6661-014 A Verity_2.0_Course Pack_Polling Place Operations - CT	6661-014 A
6661-015 A Verity_2.0_Course Pack_APWD	6661-015 A
6661-017 A Verity_2.0_Course Pack_Support Procedures	6661-017 A
6661-018 A Verity_1.0_Course Pack_Central	6661-018 A
6661-019 A Verity_2.0_Course Pack_Count	6661-019 A
6661-020 A Verity_2.0_Course Pack_TTT	6661-020 A
6661-021 A Verity_2.0_Course Pack_MBP	6661-021 A
6661-010 A Verity_2.0_Course Pack_Data	6661-010 A
6661-016 A Verity_2.0_Course Pack_Print	6661-016 A
COTS Equipment Documentation	
Canon imageFORMULA DRG1100-G1130 User Manual	n/a n/a

EATON – Installation and user manual (for model 5P 1500)	n/a n/a
Kodak i5000 Series Scanners User's Guide	n/a n/a
OKI User's Manual Advanced (Model C431dn)	n/a n/a
OKI User's Manual Advanced (Model C831dn)	n/a n/a
OKI User's Manual Advanced (Model C911dn)	n/a n/a

3 Test Process and Results

The following sections outline the test process that was followed to evaluate the Verity 2.2 Voting System under the previously scope.

3.1 General Information

All testing was conducted under the guidance of Pro V&V by personnel verified by Pro V&V to be qualified to perform the testing. The examination was performed at the North Carolina Board of Elections & Ethics Enforcement offices in Raleigh, NC. Representatives from Hart and NC SBE were on-site during test performance.

3.2 Testing Initialization

Prior to execution of the required test scenarios, the system under test underwent testing initialization. The testing initialization sought to establish the baseline for testing and ensure that the testing candidate matched the expecting testing candidate and that all equipment and supplies are present.

The following were completed during the testing initialization:

- Ensure proper system of equipment. Check network connections, power cords, keys, etc.
- Check version numbers of (system) software and firmware on all components.
- Verify the presence of only the documented COTS.

- Ensure removable media is clean
- Ensure batteries are fully charged.
- Inspect supplies and test decks.
- Record protective counter on all tabulators.
- Review physical security measures of tabulators and ballot boxes.
- Record basic observations of the testing setup and review.
- Record serial numbers of equipment.
- Retain proof of version numbers.

3.3 Test Scenarios/Procedures

Scenario-based Procedures

The following procedures provide the general overview of the testing. Each scenario will be handled in a similar manner with variations based upon scenario type and observations during the testing.

Scenario Setup

1. Pre-election system setup:
    a. Full voting system, ballots, and all peripherals submitted for certification shall be delivered to the North Carolina State Board of Elections appointed VSTL
    b. Physical Configuration Audit (PCA) shall be performed to baseline the system and ensure all items necessary for testing are present
    c. Voting system setup as designated by the manufacturer supplied Technical Documentation Package (TDP)
2. Pre-certification elections loaded:
    a. Open all six elections in the Election Management System (EMS)
    b. Review offices, districts, and precincts
    c. Review ballot setups
    d. Save election
3. Prepare media for election (label each one with date, election name, precinct, etc.)

4. Load election on each component and perform an Operational Status Check, whereby at least five (5) ballots per component are processed and results are verified against known expected results from pre-determined marking patterns.

General Election Creation Testing

1. Election parameters:

   a. At least one split

   b. Three precincts

   c. English only

   d. At least one ballot style to accommodate seventeen (17) year-old voters

   e. At least one N of M contest

   f. Write-ins

   g. At least one referendum

2. Print ballots or burn media for EBM

3. Create test deck:

   a. Test deck shall consist of 100 ballots including all four precincts

   b. Hand mark ballots according to manufacturer documentation in a pre-determined voting pattern as described in the associated Election Definition to ensure expected known results

4. Vote ballots on each component of the system:

   a. The tabulators shall have 100 ballots cast two times (this can be all on one unit or split among 2-3 units for a total of 200 ballots cast)

   b. The Central Count shall have 100 ballots cast five time (this shall be split equally among all different models included for testing with a total of 500 ballots scanned)

   c. The EBM shall have 100 ballots created and voted once on both the tabulator and Central Count to ensure they can each tabulate the ballots

5. Verify all results in the manufacturer EMS and also against any machine printed tapes or reports.

Stress, Accuracy, and Reliability

1. Test parameters

   a. Election: Primary Election

   b. Marking Pattern: as stated in Election Definition

   c. Number of pre-marked ballots: 2520 (PCOS = 5 each ballot style, Central = 25 each ballot style)

   d. Number of ballot styles: 84

   e. Under Test: PCOS, Central Count

2. Test execution for large General Election (PCOS)

   a. Assemble manufacturer pre-marked ballots in test decks as determined in the Election Definition

   b. Cast ballots on PCOS as stated in the Election Definition

   c. Verify results against known expected results stated in the Election Definition

3. Test execution for large Primary Election (PCOS)

   a. Assemble manufacturer pre-marked ballots in test decks as determined in the Election Definition

   b. Cast ballots on PCOS as stated in the Election Definition

   c. Verify results against known expected results stated in the Election Definition

4. Test execution for complex General Election (PCOS)

   a. Assemble manufacturer pre-marked ballots in test decks as determined in the Election Definition

   b. Cast ballots on PCOS as stated in the Election Definition

   c. Verify results against known expected results stated in the Election Definition

5. Test execution for complex Primary Election (PCOS)

a. Assemble manufacturer pre-marked ballots in test decks as determined in the Election Definition

b. Cast ballots on PCOS as stated in the Election Definition

c. Verify results against known expected results stated in the Election Definition

6. Test execution for large Primary Election (Central Count)

a. Assemble manufacturer pre-marked ballots in test decks as determined in the Election Definition

b. Cast ballots on Central Count as stated in the Election Definition

c. Verify results against known expected results stated in the Election Definition

7. Reporting

a. Winners: contest reports review

b. Results: statement of ballots cast, statement of votes cast, statement of votes cast with precincts

8. Testing Acceptance

a. Accuracy in ballot counting and tabulation shall achieve 100% for all votes cast

Accessibility Testing

1. Test parameters

a. Election: Primary Election

b. Marking Pattern: as stated in Election Definition

c. Number of ADA ballots: 100

d. Number of ballot styles: 84

e. Under Test: PCOS, Central Count, ADA

2. Test execution for large Primary Election (ADA)

a. Vote 100 ballots on the manufacturer ADA device to create test deck as determined in the Election Definition (if multiple ADA devices supported combine for total of 100 ballots)

b. Ballots shall be voted using a mixture of all supported peripherals such as ATI, foot pedals, sip and puff, etc. (dependent upon supported devices a minimum of one ballot shall be voted per device supported)

c. Cast ballots once on PCOS as stated in the Election Definition

d. Cast ballots once on Central Count as stated in the Election Definition

e. Verify results against known expected results stated in the Election Definition

3. Reporting

a. Winners: contest reports review

b. Results: statement of ballots cast, statement of votes cast, statement of votes cast with precinct

4. Testing Acceptance

a. Accuracy in ballot counting and tabulation shall achieve 100% for all votes cast

Nominal Marks/Adjudication

1. Test parameters

a. Election: Primary Election

b. Marking Pattern: as stated in Election Definition

c. Number of ballots: 40 (20 = PCOS, 20 = Central Count folded)

d. Number of ballot styles: 84

e. Number of folded ballots: 20 (for Central Count only)

f. Under Test: PCOS, Central Count

2. Test execution for large Primary Election (PCOS & Central Count)

a. Assemble manufacturer pre-marked or hand marked ballots in test decks as determined in the Election Definition (manufacturer may pre-mark ballots below threshold if desired)

b. Cast ballots once on PCOS as stated in the Election Definition

c. Adjudicate all ballots and correct to obtain voter intent (marks should be beneath manufacturer threshold, but clearly able to identify voter intent to obtain expected result)

d. Verify results against known expected results stated in the Election Definition

e. Cast folded ballots once on Central Count as stated in the Election Definition

f. Adjudicate all ballots and correct to obtain voter intent (marks should be beneath manufacturer threshold, but clearly able to identify voter intent to obtain expected result)

g. Verify results against known expected results stated in the Election Definition

3. Reporting

a. Winners: contest reports review

b. Results: statement of ballots cast, statement of votes cast, statement of votes cast with precincts

4. Testing Acceptance

a. Accuracy in ballot counting and tabulation shall achieve 100% for all votes cast

3.4 Reviews and Test Cases

Test Case	Approach	Result
Review-01, TDP	Summary: documentation assessment of the provided system TDP.	Passed
Review-02, PCA	Receipt Inspection and PCA of EUT delivered to the testing site.	Passed
Review-03, Security	Summary: security assessment of the provided system certification reports, documents, and equipment.	Passed

Review-04, Accessibility	Summary: Accessibility assessment of the provided system certification reports, documents, and equipment.	Passed
Review-05, Code	Summary: code assessment of the provided system certification reports, documents, and equipment.	Passed
TC-100, Pre-op	Each component to be tested was given an abridged pre-test to ensure that the system was set up and working properly	Passed
TC-101, Wake County Primary (By Styles)	With representatives of NC observing and the test utilizing a real NC election, 2520 ballots, representing a number of a ballot styles were cast in turn through Varity Scans and then the Verity Count. Results were afterward taken back into the Verity Data / Build / Count Workstation for verification and review.	Passed
TC-102, Cleveland County Primary (By Precinct)	With representatives of NC observing and the test utilizing a real NC election, 90 ballots, representing a number of different precincts were cast in turn through Varity Scans and then the Verity Count. Results were afterward taken back into the Verity Data / Build / Count Workstation for verification and review.	Passed
TC-103, Wake General (By Precinct)	With representatives of NC observing and the test utilizing a real NC election, 495 ballots, representing a number of different precincts were cast in turn through Varity Scans and then the Verity Count. Results were afterward taken back into the Verity Data / Build / Count Workstation for verification and review.	Passed

TC-104, Cleveland General (By Style)	With representatives of NC observing and the test utilizing a real NC election, 70 ballots, representing a number of ballot styles were cast in turn through Varity Scans and then the Verity Count. Results were afterward taken back into the Verity Data / Build / Count Workstation for verification and review.	Passed
TC-105, Wake General (By Styles)	With representatives of NC observing and the test utilizing a real NC election, 90 ballots, representing a number of ballot styles were cast in turn through Varity Scans and then the Verity Count. Results were afterward taken back into the Verity Data / Build / Count Workstation for verification and review.	Passed
TC-106, Nominal Marks	With representatives of NC observing and the test utilizing a real election, 20 ballots were created on the Verity Write BOD, hand marked and then cast in turn through Varity Scans. The ballots were then folded and unfolded and cast through the Verity Count. Results were afterward taken back into the Verity Data / Build / Count Workstation for verification and review.	Passed
TC-107, Electronic Ballot Marker	With representatives of NC observing and the test utilizing a real NC election, Verity Touches were set up as ADA stations and used to mark 100 ballots. These were then cast in turn through Varity Scans and then the Verity Count. Results were afterward taken back into the Verity Data / Build / Count Workstation for verification and review.	Passed
TC-108,Multi-Page Ballot	With representatives of NC observing and the test utilizing a real NC election, 10 multi-page	Passed

	ballots were voted on Verity Scan were then cast in turn through Varity Scans and then the Verity Count. Results were afterward taken back into the Verity Data / Build / Count Workstation for	

3.5 Test Results

The voting system was evaluated against the North Carolina Election Systems Certification Program. Throughout this test campaign, Pro V&V executed tests, inspected resultant data and performed technical documentation reviews to ensure that each applicable requirement was met.

3.6 Conditions of Satisfaction

The voting system or equipment must comply with the provisions in of North Carolina law governing voting equipment and any applicable rule, regulation, or policy issued by the State Board of Elections. For each requirement in the Conditions of Satisfaction checklist, the voting system must completely meet the conditions of satisfaction listed below.

	Requirement	Conditions of Satisfaction
1.	The voting system must be able to configure, collect, process, tabulate, and store election results data in a manner that allows reporting by a voter's proper voting precinct and the method by which the ballot was cast. The system must be able to accommodate a minimum of five reporting groups or voting methods, in addition to reporting the total number of votes for each ballot choice. Any or all of reporting must be made available on an as-needed basis.	✓ All results reports provide the correct/expected results for the test ballots inserted. ✓ Public counter increments for each ballot ✓ Protected counter increments for each sheet ✓ Election scenarios are fully supported by voting system without anomaly or burden. ✓ The voter is allowed to vote as intended and otherwise permissible. ✓ Overvotes/undervotes are correctly handled and reported. ✓ Blank ballots are correctly handled and reported. ✓ Write-Ins are correctly handled and reported.

2.	The voting system must be able to configure, collect, process, tabulate, and store election results data involving a multi-page ballot	✓ The voter is allowed to vote as intended and otherwise permissible. ✓ All results reports provide the correct/expected results for the test ballots inserted. ✓ Public counter increments for each ballot ✓ Protected counter increments for each sheet
3.	The voting system must permit the generation and proper tabulation of ballots such that each voter can be presented a single ballot containing all contests for which he or she is eligible to vote, and no contests for which he or she is not eligible to vote.	✓ Voter is shown questions based on eligibility (i.e. precinct) ✓ Voter is only shown questions (s)he is eligible to vote on ✓ Voter is not shown questions (s)he is not eligible to vote on ✓ Voter is permitted to select for correct number of options on each question.
4.	The voting system must allow the definition of ballot formats for partisan primary elections, non-partisan primary elections, general elections, special elections, election runoffs, and referendum elections	✓ Support all election scenarios requested without undue variations to the voting operation for the election official or voter ✓ Generated ballots include questions and candidates for the corresponding election district and no other ✓ Generated ballots follow the guidance provided by the North Carolina SBE
5.	The voting system must permit the voter to verify, in a private and independent manner, the vote selected by the voter on the ballot before the ballot is cast and counted	✓ Audit logs contain no record of voter's identity ✓ Ballot can be kept reasonable private through the use of a privacy sleeve ✓ Ballot box provides secrecy protections and access controls ✓ Voter is not required to have assistance when voting

6.	The voting system must have the ability to notify the voter discretely that he or she has selected more than the allowed number of candidates for any single office, inform the voter of the effect of casting multiple votes for a single office, and provide the voter an opportunity to correct the ballot before it is cast and counted.	✓ Voting system discretely notified voter of overvote ✓ Voting system informed the voter of the effect of casting multiple votes for a single office ✓ Voting System provided the voter an opportunity to correct the ballot before it is cast and counted
7.	Where applicable, the voting system must be accessible for individuals with disabilities in a manner that provides the same opportunity for access and participation, including protection of privacy and independence, as is made available for other voters	✓ Voting System was accessible for individuals with disabilities in a manner that provides the same opportunity for access and participation ✓ Voting System provides BMD
8.	The voting system must maintain the integrity of the vote by, at minimum, establishing processes and mechanisms necessary to secure the security of electronic tabulation processes, the paper ballot, and to prevent unauthorized access to any critical component of the voting system.	✓ All results reports provide the correct/expected results for the test ballots inserted. ✓ Accurately record vote count for each candidate ✓ Record number of overvotes, undervotes, write-ins, and blank votes for each question ✓ Poll workers are provided a sufficient mechanism to open polls and determine the state of the device ✓ Poll workers are provided a sufficient mechanism to close polls and place the device in a state such that further voting is not permitted ✓ Each component provides physical and logical access controls. ✓ Each component prevents unauthorized individuals from manipulating voting system configurations, controls, or tabulated results

9.	The voting system must be capable of accepting a flat file directly from the Statewide Elections Information Management System (SEIMS) securely and without use of an intervening third-party software (such as Microsoft Access) and populating all necessary election definitions.	✓ The voting system successfully accepted a flat file directly from SEIMS securely and without use of an intervening third-party software (such as Microsoft Access)
10.	The voting system must 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.	✓ Each precinct-based tabulator should query the voter when an under vote or overvote is detected on the ballot as to whether the voter intended on casting such a vote selection. ✓ The tabulator should respond appropriately to the voter's response by either returning the ballot to the voter or casting it as is

4 Conclusions

Based on the results obtained during the test campaign, Pro V&V determines the Verity 2.2 Voting System, as presented for evaluation, meets the requirements for voting systems of the State of North Carolina.