

TRAVIS COUNTY PURCHASING OFFICE

Cyd V. Grimes, C.P.M., CPPO, Purchasing Agent

700 Lavaca, Suite 800 Austin, Texas 78701 (512) 854-9700 Fax (512) 854-9185

October 6, 2016

Dear Proposers:

You are invited to submit proposals in accordance with the attached specifications packet, Request For Proposal (RFP) # P1609-008-LC, for **STAR-Vote™: A New Voting System for Travis County, Texas**. All proposals must be submitted with an **Original and five (5) copies plus two (2) electronic copies** (in searchable PDF format on a flash drive) to the Travis County Purchasing Agent, 700 Lavaca, Suite 800, Austin, Texas 78701, no later than **2:00 p.m., December 16, 2016**.

An **optional** pre-proposal conference is scheduled for 12:30 p.m., October 19, 2016 at the Travis County Purchasing Office, Large Conference Room located at 700 Lavaca, Suite 800, Austin, Texas 78701.

FOR ANY INFORMATION RELATED TO THIS RFP, THE PROPOSER MAY CONTACT ONLY CYD GRIMES, PURCHASING AGENT; BONNIE FLOYD, ASSISTANT PURCHASING AGENT; OR LORI CLYDE, PURCHASING AGENT ASSISTANT IV. CONTACT WITH ANY OTHER PERSON ASSOCIATED WITH THIS RFP MAY RESULT IN DISQUALIFICATION OF THE PROPOSAL.

All proposals shall be submitted to the Travis County Purchasing Agent in a sealed envelope marked:

**REQUEST FOR PROPOSAL
STAR-Vote™: A New Voting System
RFP # P1609-008-LC
DO NOT OPEN IN MAILROOM**

Your consideration of this request is appreciated.

Sincerely,
TRAVIS COUNTY PURCHASING OFFICE

Cyd V. Grimes, C.P.M., CPPO
Purchasing Agent

CVG:LC

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**TRAVIS COUNTY
REQUEST FOR PROPOSALS (RFP)
STAR-Vote™: A New Voting System
RFP # P1609-008-LC**

PART I - GENERAL REQUIREMENTS

PART I, SECTION A - GENERAL INFORMATION

1.0 PURPOSE:

This Request for Proposal (RFP) solicits responses from vendors and companies with expertise in technology, government, elections, cryptography, statistics, software development, project management, and human factors engineering to contract with Travis County for the design, development, implementation, maintenance, and continuing evolution of a new voting system we call STAR-Vote™.

Travis County is interested in companies to be a part of a modern and imaginative election solution that incorporates quality software design and development to provide improved security, transparency, accuracy, reliability, usability, accessibility, and affordability in the election process.

STAR stands for Secure, Transparent, Auditable, and Reliable. The STAR-Vote™ system sets new standards using the accuracy of electronic voting, the security of cryptography, the transparency of paper vote records, the auditability of each step of the election process, and the ability to reliably confirm the correct outcomes of each election.

Travis County is eager for STAR-Vote™ to redefine the polling place experience so that it represents today and anticipates the future. The County is building a system that is intuitive for all voters to operate and reflects the kind of technology voters are accustomed to seeing in their daily lives; enhances options for voters with disabilities; and places reasonable operational demands on election workers and administrators.

Travis County has specified a system that can evolve when improved operating systems, software, and hardware enter the marketplace. The County believes the system is flexible and economically adaptive to changes in laws and voter demands, has improved modularity and is affordable for all counties to purchase, maintain, and upgrade.

The STAR-Vote™ system requirements were developed from the ground up with the purpose, among other objectives, of specifying an entire voting system developed under the open source code software model. Building and implementing the complete STAR-Vote™ system requires a wide range of skills that are unlikely to be resident within a single company. Furthermore, the practical reality of budget, time and functionality required the County to evaluate the best approach that will yield the highest likelihood of success. We determined that a phased approach toward complete development and implementation, where first phase is defined by this RFP and builds the in-person voting module of the STAR-Vote™ system, is the optimum strategy. This RFP is requesting responses for development and implementation of the first phase of STAR-Vote™.

The architecture defined in this RFP has been organized to focus on the implementation of the in-person voting polling place system to support Election Day and Early Voting elections. The polling place system, or In-Person Voting/Tabulation module, embodies the STAR-Vote™ design for open

source code, running on COTS hardware and provides a robust security architecture that supports Risk-Limiting Audits (RLAs). An objective of this RFP is to contract for the development of the In-Person Voting/Tabulation module and the corresponding Support Modules as defined by the STAR-Vote™ specifications and requirements. The other open source code components will be developed in a follow-on phase. The STAR-Vote™ In-Person Voting/Tabulation module will be supported by existing, commercially available, EAC-Certified products, which the County is also seeking to procure under this RFP.

Travis County desires to contract with a company that has existing ballot definition/election management, by-mail and tabulation products that are EAC-Certified or that will be EAC-Certified by the time of contract award. This architectural approach minimizes the election expertise necessary to develop the In-Person Voting/Tabulation module and takes advantage of mature election products. The intent is to implement the certified products “as-is” to maintain the certified status. If any requirement contained in this RFP conflicts or does not align with existing, certified functionality, the County urges the Proposer to simply note the exception in its response for evaluation by the County. This RFP intentionally does not provide exhaustive requirements for these products, but is relying on the VVSG and the market to validate the functionality. The interface between the In-Person Voting/Tabulation module and the certified EAC products is straightforward and utilizes a practice that most election products already support: export of an election definition file, and import and aggregation of election results. Greater details of this interface will be defined during contract negotiations with the contract award finalists.

The requirements detailed in this RFP follow directly from the Request For Information (RFI) issued by Travis County in 2015, and the corresponding responses. The body of system requirements has been reorganized to align with the architecture diagram given in Part II, Section 3.1. This RFP allows for multiple awards to different vendors and companies to create different elements of the final product, and it is possible that awards may be given to two or more different enterprises. Multiple awards requires Travis County to provide a system integration function to manage and coordinate the interactions between awardees for the length of the contract. The County is prepared to provide this level of support to the awardee's/awardees' project managers. Further, given the fact that the cryptographic solution for STAR-Vote™ is already designed, Travis County will provide design support expertise for the software development effort for this functionality. The RFP has been set up to solicit separate responses for the different components of the system architecture that will result in separate awards and contracts. The components that are open for responses have been defined as separate Elements of the system, and are:

- Element A; EAC-Certified Modules: Includes election definition, paper ballot formatting, By-Mail voting and scanning, tabulation, data import/export, aggregation of results and election reporting.
- Element B; In-Person Voting/Tabulation and Support Modules: This requires the development of the software for precinct voting for Early Voting and Election Day that runs on COTS hardware and embodies the STAR-Vote™ cryptographic solution. Using the election definition data generated by the EAC-Certified Modules, ballots are formatted, voted and tabulated. Also includes data import/export, report and the production of artifacts necessary to audit and verify the precinct results using the Trustee Utilities and Support Modules, and as otherwise outlined in this RFP.
- Element C; Ballot Box/Scanner: An opportunity exists for a response that includes the use of an existing, EAC-Certified precinct-based digital ballot scanner, with a ballot box, that has new software developed to support the STAR-Vote™ function of scanning the Paper Vote Record

(PVR) generated by the STAR-Vote™ Voting Station or, ground-up development of new hardware and software that is supported by an interim functional solution.

- Element D; Red Team Assurance: The Red Team Assurance is performed by a group of software and security experts who provide independent review of the functional and security elements of the system and test the effectiveness of the security. A proposer that responds to the In-Person Voting/Tabulation and Support Modules may not bid on the Red Team function.
- Element E; Human Factors Evaluation: A limited project budget has been created for solicitation of a human factors evaluation proposal that focuses on development support and assessment of the In-Person Voting function.

To maintain the overall perspective when drafting a response, Travis County urges Proposers to review the complete STAR-Vote™ implementation as given in a paper titled “STAR-Vote™ Voting System paper”, found at:

<https://www.usenix.org/conference/evt2013/workshop-program/presentation/bell>

This Request for Proposal constitutes a solicitation for bids or proposals but does not guarantee that any Proposer will be awarded a contract. Travis County has developed the requirements for this Request for Proposal (RFP) using information from responses to the RFI and Travis County invites all RFI respondents to participate in the RFP process; however, RFI respondents are not provided any advantage in the selection process by virtue of having submitted a response to the RFI. Submission of an RFP response is entirely voluntary and any and all costs of participation in this process will be the complete responsibility of the Proposer. The publication of this RFP does not guarantee that any award(s) will be made.

Travis County cautions Proposers that responses to this RFP will become public information and that Proposers should clearly indicate as proprietary and/or confidential any information provided that is of a proprietary or confidential nature.

2.0 INCURRED EXPENSES:

There is no express or implied obligation for Travis County to reimburse Proposers for any expense incurred in preparing proposals in response to this request, and Travis County will not reimburse anyone for these expenses. Travis County will consider proposals from all responsible Proposers.

3.0 SUBMISSION OF PROPOSAL:

- 3.1 To be considered, an **ORIGINAL SEALED PROPOSAL PLUS FIVE (5) COPIES and two (2) electronic versions** must be received by **December 16, 2016 at 2:00 p.m.**, in the office of the Purchasing Agent. All proposals must to be addressed to:

Cyd V. Grimes, C.P.M., CPPO
Travis County Purchasing Agent
700 Lavaca, Suite 800
Austin, Texas 78701

- 3.2 The envelope in which the proposal is enclosed must be marked:

SEALED PROPOSAL

STAR-Vote™: A New Voting System
RFP # P1609-008-LC

DO NOT OPEN IN MAILROOM

- 3.3 Proposals submitted by electronic transmission will not be considered; however, proposals may be modified by electronic transmission if the notice is received prior to the time and date set for the proposal opening and specific proposal prices are not exposed by the modification.

4.0 PRE-PROPOSAL CONFERENCE:

An **optional** pre-proposal conference is scheduled for all prospective Proposers as follows:

DATE: October 19, 2016

TIME: 12:30 p.m.

PLACE: Travis County Purchasing Office
Large Conference Room
700 Lavaca, Suite 800
Austin, Texas 78751

- (a) Proposers are encouraged to attend the pre-proposal conference and make their attendance a matter of record by completing a sign-in roster identifying the prospective Proposer, name, and title of their attending representative.
- (b) The purpose of the pre-proposal conference is to insure:
 - (i) Proposers have a clear understanding of County needs;
 - (ii) the accuracy of specifications, descriptions, and solicitation terms, conditions, and documents;
 - (iii) Proposers have an opportunity to identify any problems that might hinder or prevent the County from obtaining the proper services or equipment/supplies at a fair and reasonable price, as well as any issues that may inhibit a fair and accurate solicitation or restrict competition.
- (c) Proposers having questions concerning the RFP document shall submit them in writing to the County Purchasing Agent at the address shown on Page 1 of this solicitation. Questions shall be submitted not later than one week preceding the date set for the pre-proposal conference so that appropriate information may be researched and made available during the pre-proposal conference to all concerned.

Any changes resulting from the pre-proposal conference that affect specifications or the scope of work, or that may require an extension to the bid opening date, will be reduced to writing in the form of an amendment to this solicitation. Such amendment will be distributed to all prospective Proposers.

5.0 LATE PROPOSALS OR MODIFICATIONS:

Proposals and modifications received after the time set for the proposal submission will not be considered.

UNOFFICIAL COPY

6.0 WITHDRAWAL OF PROPOSALS:

A proposal may not be withdrawn by the Proposer without the permission of Travis County for a period of one hundred and eighty (180) calendar days following the date designated for the receipt of proposals, and Proposers agree to this by submitting a proposal.

7.0 POINTS OF CONTACT:

Information regarding the purchasing process, the contents of this RFP, or questions concerning the technical requirements in Part II may be obtained from Lori Clyde, Purchasing Agent Assistant IV, Travis County Purchasing Office, 700 Lavaca, Suite 800, Austin, Texas, at telephone (512) 854-4205. Mention the RFP number at the top of this page.

8.0 CLARIFICATION OR OBJECTION TO PROPOSAL SPECIFICATION:

If any person contemplating submitting a proposal for this contract is in doubt as to the true meaning of the specifications or other documents or any part thereof, he/she may submit to the Purchasing Agent on or before TEN (10) DAYS PRIOR to scheduled opening a request for clarification. All such requests shall be made in writing and the person submitting the request will be responsible for its prompt delivery. Any interpretation of the RFP will be made only by RFP Amendment duly issued. In addition to being posted on BidSync, a copy of such RFP Amendment will be mailed or faxed to each person receiving a solicitation who does not have access to electronic means of doing business.

9.0 GENERAL CONDITIONS:

Proposer shall thoroughly examine the specific requirements, schedules, instructions and all other contract documents. Proposals must set forth accurate and complete information as required by this RFP (including attachments). No plea of ignorance by the Proposer of conditions that exist or that may hereafter exist as a result of failure or omission on the part of the Proposer to make the necessary examinations and investigations, or failure to fulfill in every detail the requirements of the contract documents, will be accepted as a basis for varying the requirements of Travis County or the compensation to the Proposer.

By submitting a proposal, the Proposer warrants that he/she is fully satisfied that these specifications, as amended if applicable, accurately describe or indicate that all conditions have been taken into account in determining the offered price(s). There will be no increase in the contract price based upon Proposer's misunderstanding or lack of knowledge about the intent of this solicitation.

10.0 ETHICS POLICY:

10.1 County has adopted an Ethics Policy that controls the way in which County contracts with vendors who have entered into certain transactions with persons who are influential in selecting vendors for a particular contract and in determining the terms and conditions of the contract. The persons that the County considers to be influential in this contract are called Key Contracting Persons and are listed in the Exhibit A to the Affidavit at the end of Part I.

This policy requires Proposers to inform Travis County of covered transactions with the Key Contracting Persons that have occurred in the year before they submit their proposals and to swear and submit the affidavit at the end of this section with their proposal. The transactions that are covered by the Ethics Policy are those described in Section 23.0 of Part IV of this RFP. This policy also requires the selected Proposer to inform County of covered transactions with the Key Contracting Persons that occur at any time during the Contract term. If the selected Proposer does not comply with these information requirements, the selected Proposer must continue to perform the contract and forfeit all of the benefits of the contract as provided in Section 23.0 of Part IV of this RFP.

11.0 **CERTIFICATE OF INTERESTED PARTIES:**

In 2015, the Texas Legislature adopted House Bill 1295, which added section 2252.908 of the Government Code. The law states that a governmental entity or state agency may not enter into certain contracts with a business entity unless the business entity submits a disclosure of interested parties form to the governmental entity or state agency at the time the business entity submits the signed contract to the governmental entity or state agency. The form discloses any interested parties who have a controlling interest (10% or more ownership) in the business entity and those who actively participate in facilitating the contract or negotiate the terms of the contract (broker, intermediary, advisor, and/or attorney), if any. The disclosure requirement applies to a contract entered into on or after January 1, 2016.

The Texas Ethics Commission was required to adopt rules necessary to implement that law, prescribe the disclosure of interested parties form, and post a copy of the form on the commission's website. The commission adopted the Certificate of Interested Parties form (Form 1295) on October 5, 2015 and new rules (Chapter 46) on November 30, 2015.

Filing Process:

Vendors who are awarded contracts requiring an action or vote by the Travis County Commissioners Court for goods or services in an amount of \$50,000 or more, or any contract in the amount of \$1 million or more, will be required to submit a signed and notarized Form 1295. Please follow the process to create a Form 1295 from the Texas Ethics Commission's website at:

https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm

- 1.1 The "identification number" to be used on Form 1295 for this procurement is: P1609-008-LC
- 1.2 The completed and notarized form must be submitted to the Travis County Purchasing Office before a purchase order is issued or a contract is signed.

PART I, SECTION B -REQUIRED DOCUMENTATION

- 1.0 The following documentation must be submitted with the proposal. Paragraph 2.0 describes documentation that will be used in the evaluation of the Proposer's proposal. Paragraph 3.0 lists other documents that must be submitted. **Please note this Section B may not address all documentation required by this RFP. The Proposer is cautioned to read the entire RFP to determine all requirements. TRAVIS COUNTY RESERVES THE RIGHT TO REJECT A PROPOSAL THAT DOES NOT CONTAIN ALL INFORMATION REQUIRED BY THIS RFP.**
- 2.0 To achieve a uniform review process and to obtain a maximum degree of comparability, Travis County requires that proposals be submitted with a **master (marked "Original") and five (5) copies (marked "Copy")**. They are to include the following:
- 2.1 Title Page
- Title page must show the RFP subject; the Proposer's name; the name, address, and telephone number of a contact person; and the date of the proposal.
- 2.2 Table of Contents
- Both physical and electronic versions should include a Table of Contents. In the electronic version the Table of Contents must be linked to each section for ease of navigation. Physical form must be in a 3-ring binder, with tabs dividing the sections.
- 2.3 Transmittal Letter/Executive Summary
- Submit a signed letter briefly addressing the Proposer's understanding of the work to be done, the commitment to do the work detailed within this RFP and a statement explaining why the Proposer believes it is best qualified to do the required work.
- 2.3 Detailed Proposal
- The detailed proposal must address the ability to provide equipment and services for each requirement as set forth in Parts II through IV of this RFP. See especially Part I, Section C, Evaluation factors for information required.
- 2.4 Cost Proposal (Attachment 11 **Error! Reference source not found.**)
- This portion of your proposal contains the cost for your proposed Element(s). All Proposers shall complete **Error! Reference source not found.** 11. The Proposer is responsible for verifying that their cost submission is complete and accurate.
- 2.5 Proposer References
- The Proposer must furnish at least three (3) references similar to County for which the Proposer has provided similar goods or services within the last five (5) years. These references must include (a) a description of the services and location of the contract and (b) the name, address, telephone number and email address of at least one (1) person that represents the Proposer's customer. Travis County may contact or visit any of the listed customers to evaluate the services proposed in response to this RFP. (See Qualifications Questionnaire, Item 12.)

2.6 Description of Proposer

The description must include the full legal name of Proposer, a description of the goods and/or services Proposer provides, the number of Proposer's employees, description and location of Proposer's facilities where work will be performed for this RFP when not onsite, and a description of Proposer's entity status. (See Qualifications Questionnaire).

2.7 Description of Typical Engagements

Describe Proposer's principal area of business practice and revenue generation. Provide an executive level overview of Proposer's project management, product development practices or services engagement that supports the Element(s) Proposer is proposing to provide.

2.8 Proposer Representative

Include the name of the designated individual(s), along with respective telephone numbers, who will be responsible for answering technical, functional, and contractual questions with respect to the proposal.

3.0 Proposer must submit the following documents with the proposal:

3.1 * Ethics Affidavit (and Exhibits "A" and "B")

3.2* HUB Program Subcontracting Declaration

3.3* Qualifications Questionnaire; Firm Experience and Qualifications

3.4 Attachment 10 - Insurance documentation within ten (10) calendar days after award and before beginning work

3.5 Attachment 11 – Schedule of Items (**submit the original in an envelope separate from RFP response and on the flash drive save as a separate file from the RFP response entitled "Attachment 11 Schedule of Items"**)

3.6 All other information required in this RFP

* These documents are included as attachments to this Part I, Section B.

NOTE: FAILURE TO PROVIDE ALL INFORMATION REQUESTED MAY RESULT IN DISQUALIFICATION OF THE PROPOSAL.

STATE OF TEXAS}
COUNTY OF TRAVIS}

ETHICS AFFIDAVIT

Date: _____
Name of Affiant: _____
Title of Affiant: _____
Business Name of Proposer: _____
County of Proposer: _____

Affiant on oath swears that the following statements are true:

1. Affiant is authorized by Proposer to make this affidavit for Proposer.
2. Affiant is fully aware of the facts stated in this affidavit.
3. Affiant can read the English language.
4. Proposer has received the list of key contracting persons associated with this solicitation which is attached to this affidavit as Exhibit A.
5. Affiant has personally read Exhibit A to this Affidavit.
6. Affiant has no knowledge of any Key Contracting Person on Exhibit "A" with whom Proposer is doing business or has done business during the 365 day period immediately before the date of this affidavit whose name is not disclosed in Exhibit "B" to this Affidavit.

Signature of Affiant

Address

SUBSCRIBED AND SWORN TO before me by _____ on _____, 20__.

Notary Public, State of _____

Typed or printed name of notary

My commission expires: _____

EXHIBIT A
LIST OF KEY CONTRACTING PERSONS
September 14, 2016

CURRENT

<u>Position Held</u>	<u>Name of Individual Holding Office/Position</u>	<u>Name of Business Individual is Associated</u>
County Judge.....	Sarah Eckhardt	
County Judge (Spouse)	Kurt Sauer	Kelly Hart LLP
Chief of Staff.....	Peter Einhorn	
Executive Assistant	Loretta Farb	
Executive Assistant	Joe Hon	
Executive Assistant	Maya Reisman	
Commissioner, Precinct 1	Ron Davis	
Commissioner, Precinct 1 (Spouse)	Annie Davis	Seton Hospital
Executive Assistant	Deone Wilhite	
Executive Assistant	Felicitas Chavez	
Executive Assistant	Sue Spears	
Commissioner, Precinct 2	Brigid Shea	
Commissioner, Precinct 2 (Spouse)	John Umphress	Austin Energy
Executive Assistant	Barbara Rush	
Executive Assistant	Kristian Caballero	
Executive Assistant	Melissa Velasquez	
Commissioner, Precinct 3	Gerald Daugherty	
Commissioner, Precinct 3 (Spouse)	Charyl Daugherty	Consultant
Executive Assistant	Bob Moore	
Executive Assistant	Martin Zamzow	
Executive Assistant	Madison A. Gessner	
Commissioner, Precinct 4	Margaret Gomez	
Executive Assistant	Edith Moreida	
Executive Assistant	Norma Guerra	
County Treasurer.....	Dolores Ortega-Carter	
County Auditor	Nicki Riley	
County Human Resources Interim	Todd L. Osburn*	
County Executive, Administrative	Vacant	
County Executive, Planning & Budget	Jessica Rio	
County Executive, Emergency Services	Danny Hobby	
County Executive, Health/Human Services	Sherri E. Fleming	
County Executive, TNR	Steven M. Manilla, P.E.	
County Executive, Justice & Public Safety	Roger Jefferies	
Director, Facilities Management	Roger El Khoury, M.S., P.E.	
Chief Information Officer	Tanya Acevedo	
Director, Records Mgmt & Communications	Steven Broberg	
Travis County Attorney	David Escamilla	
First Assistant County Attorney	Steve Capelle	
Executive Assistant, County Attorney	James Collins	
Director, Land Use Division	Tom Nuckols	
Attorney, Land Use Division	Julie Joe	
Attorney, Land Use Division	Christopher Gilmore	
Director, Transactions Division	John Hille	
Attorney, Transactions Division.....	C.J. Brandt*	
Attorney, Transactions Division.....	Ann-Marie Sheely	
Attorney, Transactions Division.....	Barbara Wilson	
Attorney, Transactions Division.....	Jennifer Kraber	
Attorney, Transactions Division.....	Tenley Aldredge	
Director, Health Services Division.....	Beth Devery	
Attorney, Health Services Division.....	Elizabeth Winn	
Attorney, Health Services Division.....	K. Nicole Aquino*	
Attorney, Health Services Division.....	Prema Gregerson	
Attorney, Health Services Division.....	Barbara E. Misle	
Attorney, Health Services Division.....	Ruben Baeza, Jr.	

Attorney, Health Services Division..... Holly Gummert*
 Purchasing Agent Cyd Grimes, C.P.M., CPPO
 Assistant Purchasing Agent..... Elaine Casas, J.D.
 Assistant Purchasing Agent Marvin Brice, CPPB
 Assistant Purchasing Agent..... Bonnie Floyd, CPPO, CPPB
 Purchasing Agent Assistant IV CW Bruner, CTP, CPPB
 Purchasing Agent Assistant IV Lee Perry
 Purchasing Agent Assistant IV Jason Walker
 Purchasing Agent Assistant IV Patrick Strittmatter, CPPB
 Purchasing Agent Assistant IV Lori Clyde, CPPO, CPPB, CTPE
 Purchasing Agent Assistant IV Scott Wilson, CPPB
 Purchasing Agent Assistant IV..... Jorge Talavera, CPPO, CPPB
 Purchasing Agent Assistant IV Loren Breland, CPPB
 Purchasing Agent Assistant IV John E. Pena, CTPM, CPPB
 Purchasing Agent Assistant IV Kimberly Roohms
 Purchasing Agent Assistant IV Jonathan Harris*
 Purchasing Agent Assistant IV Veronica Frederick*
 Purchasing Agent Assistant III..... Logan Brown, CTCM, CTPM*
 Purchasing Agent Assistant III..... David Walch
 Purchasing Agent Assistant III..... Jean Liburd
 Purchasing Agent Assistant III..... Sydney Ceder
 Purchasing Agent Assistant III..... Ruena Victorino
 Purchasing Agent Assistant III..... Rachel Fishback
 Purchasing Agent Assistant II..... L. Wade Laursen
 Purchasing Agent Assistant II..... Sam Francis
 HUB Coordinator..... Allen J. Roberts, MBA, CTP*
 HUB Specialist..... Betty Chapa
 HUB Specialist..... Jerome Guerrero
 HUB Specialist..... Paula Ann Pitifer
 Purchasing Business Analyst Scott Worthington
 Purchasing Business Analyst Rosalinda Garcia
 County Clerk..... Dana DeBeauvoir
 County Clerk's Office Ron Morgan
 County Clerk's Office Scott Flom
 County Clerk's Office Candi Semple
 County Clerk's Office Michael Winn
 County Clerk's Office Geetha Lingham
 Consultant/Project Director..... Neil McClure
 Project Consultant Bryce Eakin
 Project Consultant Susan Bell
 Technical Consultant..... Dan Wallach, Rice University
 Technical Consultant..... Neil McBurnett
 Technical Consultant..... Olivier Pereria, UC Louvain, Belgium
 Technical Consultant..... Ronald Rivest, MIT
 Technical Consultant..... Josh Benaloh, Microsoft, Inc.
 Technical Consultant..... Mike Byrne, Rice University
 Technical Consultant..... Phil Kortum, Rice University
 Technical Consultant..... Philip Stark, UC-Berkeley
 Election Study Group..... Nan Clayton, Texas League of Women Voters
 Election Study Group..... Alcia DelRio, Austin Community College
 Election Study Group..... Arthur De Bianca, Travis County Libertarian Party
 Election Study Group..... Maria Jimenez, Presiding Judge – Democratic Party
 Election Study Group..... Jannette Goodall, City of Austin
 Election Study Group..... Sherri Greenberg, LBJ School of Public Affairs
 Election Study Group..... Zoe Griffith, Austin ISD
 Election Study Group..... Jim Henson, UT Department of Government
 Election Study Group..... Reuben Leslie, Travis County Democratic Party
 Election Study Group..... Ron Lucey, Austin Mayor's Committee for People with Disabilities
 Election Study Group..... Lorenzo Sadun, UT Department of Mathematics
 Election Study Group..... James Dickey, Chair, Travis County Republican Party
 Election Study Group..... May Schmidt, Early Voting Deputy
 Election Study Group..... Bill Stout, Green Party of Texas

Election Study Group Robert Sheldon, Election Day Judge
 Election Study Group Vincent Harding, Chair, Travis County Democratic Party

 Election Study Group Karen Renick, VoteRescue
 Election Study Group Daniel Biering, Election Judge
 Election Study Group Mike Conwell, Election Judge/Political Activist
 Election Study Group Wilhelmena DeMarco, Former State Representative
 Election Study Group Susan DeMarco
 Election Study Group Jim McNabb, Retired Journalist
 Election Study Group Madeline Perasall, Political Candidate
 Election Study Group Sabine Romero, Attorney, City of Austin

FORMER EMPLOYEES

<u>Position Held</u>	<u>Name of Individual Holding Office/Position</u>	<u>Date of Expiration</u>
Attorney, Health Services Division.....	Randy M. Floyd.. ..	10/03/16
Purchasing Agent Assistant IV	Richard Villareal	10/31/16
Purchasing Agent Assistant III.....	Anthony Webb	02/05/17
Purchasing Agent Assistant IV	Jesse Herrera.....	03/04/17
County Human Resources	Debbie Maynor... ..	03/17/17
Attorney, Transactions Division.....	Daniel Bradford.. ..	06/01/17
HUB Coordinator	Sylvia Lopez.....	07/31/17

* - Identifies employees who have been in that position less than a year.

EXHIBIT B

DISCLOSURE

Proposer acknowledges that Proposer is doing business or has done business during the 365-day period immediately prior to the date on which this proposal is due with the following Key Contracting Persons and warrants that these are the only such Key Contracting Persons:

If no one is listed above, Proposer warrants that Proposer is not doing business and has not done business during the 365-day period immediately prior to the date on which this proposal is due with any key contracting person.

HISTORICALLY UNDERUTILIZED BUSINESS (HUB) PROGRAM SUBCONTRACTING DECLARATION**SECTION 1 BIDDER AND SOLICITATION INFORMATION**

Bidder Company Name:		State of Texas VID#:	
Address:	City:	State:	Zip Code:
Contact:	Phone No.:	Fax No.:	E-mail:
Project Name:	Total Bid Amount:	Solicitation #:	
Is your company a certified HUB? <input type="checkbox"/> Yes <input type="checkbox"/> No	Indicate Gender & Ethnicity:		
Certifying Agency (Check all applicable):	<input type="checkbox"/> State of Texas (HUB)	<input type="checkbox"/> City of Austin (M/WBE)	<input type="checkbox"/> Texas Unified Certification Program (TUCP) (DBE)
Definitions:			
HUB – Historically Underutilized Business ▪ M/WBE – Minority/Women-Owned Business Enterprise ▪ DBE – Disadvantage Business Enterprise			

The policy of the Travis County Purchasing Office is to ensure a "Good Faith Effort" (GFE) is made to assist certified HUB vendors and contractors in receiving contracts in accordance with the HUB Program policies and the Minority and Woman-owned Business (M/WBE) goals adopted by the Travis County Commissioners Court. Travis County encourages all Bidders to register as a County vendor through the County's online vendor registration.

**Prime Contractors who are awarded contracts with the County are required to make a "Good Faith Effort" to subcontract with HUBs. This includes professional services associated with the projects.*

SECTION 2 SUBCONTRACTING INTENTIONS

Percentage to be subcontracted to Certified HUBs:			
Total MBE Dollars:	Total MBE Percentage:	Total WBE Dollars:	Total WBE Percentage:
Check the box that applies to the Bidder:			
<input type="checkbox"/> We are able to fulfill all subcontracting opportunities with our own resources. If circumstances necessitate the use of any subs, I agree to seek the timely authorization by the County and adhere to the submission of any required documentation. (Complete Sections 5, 6 and 8)			
<input type="checkbox"/> We plan to subcontract some or most of the opportunities of this project and meet or exceed the set goals. (Complete Sections 3, 4, 6 and 8)			
<input type="checkbox"/> We plan to utilize subcontractors on this project, but will not meet the set goals. (Complete Sections 3, 4, 5, 6 and 8)			

The HUB Program policies and Minority and Woman-Owned Business **subcontracting goals** shall be applicable to the eligible procurement dollars spent in the areas of Construction, Commodities, Services, and Professional Services.

<input checked="" type="checkbox"/> COMMODITIES	Overall MBE Goal: 3.5%	Sub-goals: 0.3% African-American 2.5% Hispanic 0.7% Asian/Native-American	Overall WBE Goal: 6.2%
<input type="checkbox"/> CONSTRUCTION	Overall MBE Goal: 13.7%	Sub-goals: 1.7% African-American 9.7% Hispanic 2.3% Asian/Native-American	Overall WBE Goal: 13.8%
<input type="checkbox"/> SERVICES	Overall MBE Goal: 14.1%	Sub-goals: 2.5% African-American 9.9% Hispanic 1.7% Asian/Native-American	Overall WBE Goal: 15.0%
<input type="checkbox"/> PROFESSIONAL SERVICES	Overall MBE Goal: 15.8%	Sub-goals: 1.9% African-American 9.0% Hispanic 4.9% Asian/Native-American	Overall WBE Goal: 15.8%

SECTION 3 DISCLOSURE OF CERTIFIED HUB SUBCONTRACTORS

(Duplicate as necessary)

Travis County exercises the right to verify subcontractors listed on this project. It is the County's practice to consider ethnicity before gender when distinguishing HUB certifications and calculating goal achievement.

Note: To be considered "certified" with the State of Texas, City of Austin or the Texas Unified Certification Program, please attach a current and valid certificate. Sub-goals are included to assist you in diversifying your subcontractors.

Sub Company Name:		State of Texas VID#:	
Address:	City:	State:	Zip Code:
Contact:	Phone No.:	Fax No.:	E-mail:
Subcontract Amount:	Percentage:	Description of Work:	
Is your company a certified HUB? <input type="checkbox"/> Yes <input type="checkbox"/> No	Indicate Gender & Ethnicity:		
Certifying Agency (Check all applicable):	<input type="checkbox"/> State of Texas (HUB)	<input type="checkbox"/> City of Austin (M/WBE)	<input type="checkbox"/> Texas Unified Certification Program (TUCP) (DBE)

Sub Company Name:		State of Texas VID#:	
Address:	City:	State:	Zip Code:
Contact:	Phone No.:	Fax No.:	E-mail:
Subcontract Amount:	Percentage:	Description of Work:	
Is your company a certified HUB? <input type="checkbox"/> Yes <input type="checkbox"/> No	Indicate Gender & Ethnicity:		
Certifying Agency (Check all applicable):	<input type="checkbox"/> State of Texas (HUB)	<input type="checkbox"/> City of Austin (M/WBE)	<input type="checkbox"/> Texas Unified Certification Program (TUCP) (DBE)

Sub Company Name:		State of Texas VID#:	
Address:	City:	State:	Zip Code:
Contact:	Phone No.:	Fax No.:	E-mail:
Subcontract Amount:	Percentage:	Description of Work:	
Is your company a certified HUB? <input type="checkbox"/> Yes <input type="checkbox"/> No	Indicate Gender & Ethnicity:		
Certifying Agency (Check all applicable):	<input type="checkbox"/> State of Texas (HUB)	<input type="checkbox"/> City of Austin (M/WBE)	<input type="checkbox"/> Texas Unified Certification Program (TUCP) (DBE)

Sub Company Name:		State of Texas VID#:	
Address:	City:	State:	Zip Code:
Contact:	Phone No.:	Fax No.:	E-mail:
Subcontract Amount:	Percentage:	Description of Work:	
Is your company a certified HUB? <input type="checkbox"/> Yes <input type="checkbox"/> No	Indicate Gender & Ethnicity:		
Certifying Agency (Check all applicable):	<input type="checkbox"/> State of Texas (HUB)	<input type="checkbox"/> City of Austin (M/WBE)	<input type="checkbox"/> Texas Unified Certification Program (TUCP) (DBE)

SECTION 4 DISCLOSURE OF NON-HUB SUBCONTRACTORS

(Duplicate as necessary)

Travis County exercises the right to verify subcontractors listed on this project.

Sub Company Name:		State of Texas VID#:	
Address:	City:	State:	Zip Code:
Contact:	Phone No.:	Fax No.:	E-mail:
Subcontract Amount:	Percentage:	Description of Work:	

Sub Company Name:		State of Texas VID#:	
Address:	City:	State:	Zip Code:
Contact:	Phone No.:	Fax No.:	E-mail:
Subcontract Amount:	Percentage:	Description of Work:	

Sub Company Name:		State of Texas VID#:	
Address:	City:	State:	Zip Code:
Contact:	Phone No.:	Fax No.:	E-mail:
Subcontract Amount:	Percentage:	Description of Work:	

Sub Company Name:		State of Texas VID#:	
Address:	City:	State:	Zip Code:
Contact:	Phone No.:	Fax No.:	E-mail:
Subcontract Amount:	Percentage:	Description of Work:	

SECTION 5 NON-COMPLIANT FOR MEETING SET HUB GOALS CHECKLIST

If you were unable to meet the set goals for this project, select the box by the response(s) that best fits your situation.

- ☐ All subs to be utilized are "Non-HUBs."
☐ HUBs solicited were not competitive.
- ☐ HUBs solicited did not respond.
☐ HUBs were unavailable for the following trade(s):

SECTION 6 DETERMINATION OF "GOOD FAITH EFFORT" (GFE) CHECKLIST

The following checklist shall be completed by the Bidder and returned with the response. This list contains the minimum efforts that should be put forth by the Bidder when attempting to achieve or exceed the HUB goals. The Bidder may go beyond the efforts listed below. If additional information is needed, the Bidder will be contacted by the HUB Program Staff. Select the box that describes your efforts.

- ☐ Divide the contract work into the smallest feasible portions to allow for maximum HUB Subcontractor participation, consistent with standard and prudent industry practices.
- ☐ Notify HUBs of work that the prime contractor plans to subcontract, allowing sufficient time for effective participation?
 The HUB Program encourages that three or more HUBs be notified per scope of work and given no less than five working days to respond. (The notification should contain adequate information about the project i.e. plans, specifications, and scope of work; Bonding and insurance requirements of the HUB subcontractor; and a point of contact within the Bidders organization.)
- ☐ If a bid was requested from a HUB and then rejected, was a written rejection notice detailing the reasons why they were not selected issued?
 If yes, provide a copy of the rejection letter.
- ☐ Provide notices of opportunities to minority or women trade organizations or development centers to assist in identifying potential HUBs by disseminating the information to their members/participants? If yes, attach correspondence.
- ☐ Bidder has (0) zero HUB participation. Provide an explanation

SECTION 7 RESOURCES

TRADE ASSOCIATIONS	PHONE (512)	FAX	E-mail/website
Asian Construction Trade	926-5400	926-5410	www.acta-austin.com
Austin Black Contractors	467-6894	467-9808	www.abcatx.com
Austin Metropolitan United Black Contractors	784-1891	255-1451	unism@sbcglobal.net
Natl. Assoc. of Women in Construction	476-5534	476-8337	
US Hispanic Cont. Assoc. de Austin	922-0507	374-1421	www.ushca-austin.com
CERTIFYING AGENCIES TRAVIS COUNTY RECOGNIZES	CERTIFYING AGENCIES VENDOR DATABASE WEBSITES		
State of Texas Centralized Master Bidders List	www.cpa.state.tx.us/business.html		CMBL includes certified HUBs.
City of Austin Minority Vendor Database	www.austintexas.gov/department/small-and-minority-business		Certified Vendors Directory
Texas Unified Certification Program	www.dot.state.tx.us/business		TUCP DBE Directory

SECTION 8 AFFIRMATION

As evidenced by my signature below, I certify that all the information provided is correct to the best of my knowledge. I am an authorized representative of the Bidder listed in SECTION 1, and that the information and supporting documentation submitted with HUB Forms are correct and true to the best of my knowledge.

Bidder understands and agrees that, if awarded any portion of the solicitation:

- The Bidder must either utilize Travis County HUB Programs Vendor Tracking System (VTS) to report payments to sub-contractors on a monthly basis or submit monthly Payment Reports as requested by the HUB Program Coordinator.
- The Bidder must seek pre-approval from the HUB Program Coordinator prior to making any modifications to their HUB Sub-contracting Plan. The Bidder must complete a HUB Subcontractor/Subconsultant Change Form obtained from the HUB Program Staff. Return form via fax to 512-854-9185 or email hubstaff@co.travis.tx.us.
- Travis County HUB Program Staff will perform a Good Faith Effort (GFE) Review, documenting the efforts put forth by the Bidder.

Name and Title:	Date:
E-mail Address:	Signature:
Provide contact information for the individual in your office who will handle invoicing for this project:	
Name and Title:	E-mail Address:
Phone No.:	Fax No.:

Please be reminded that Travis County is not party to your agreement executed with the subcontractors and subconsultants.

QUALIFICATIONS QUESTIONNAIRE

This questionnaire is to be completed in its entirety. No modifications to the wording is permitted. Proposals submitted with Qualifications Questionnaires that are incomplete or incorrect, or that have been altered, are subject to rejection.

1. Name of Firm:

2. Address of Headquarters:

3. Address of Local Office If Different:

4. Date of Organization (Month/Year)_____

5. Names And Dates of Predecessor Organization (s):

6. Type of Organization: _____
Individual, Partnership, Association, Corporation, or other form

7. Business Telephone and Fax Number (s): _____

8. List of Principals, Titles, Degrees:

FIRM EXPERIENCE AND QUALIFICATIONS

9. **Years of Experience** - Number of years performing proposed services: _____
10. **Firm experience** - Briefly describe three or more projects of similar content for each of the Elements contained in your proposal and include approximate duration and dollar value of the projects.

Table 1: Projects illustrating firm's relevant experience

Duration of Project	Project Description	Dollar Value

11. **Project References** - Describe at least three projects for each Element your proposal includes on which the firm has provided similar products or services within the last five years. Include a description of the products or services, location of project, and the name, address, and telephone number of at least one person representing the client who received the products or services. If proposing more than one Element, add additional tables as required.

Table 4: Project Reference #1

Location:		Date(s) of Work:
Description of Goods and Services:		
Reference Contact Information:		
Company Name:		
Contact Full Name:		
Contact Mailing Address:		
Contact Email Address:		
Contract Telephone Number		

Table 4: Project Reference #2

Location:		Date(s) of Work:
Description of Goods and Services:		
Reference Contact Information:		
Company Name:		
Contact Full Name:		
Contact Mailing Address:		
Contact Email Address:		
Contract Telephone Number		

Table 4: Project Reference #3

Location:		Date(s) of Work:
Description of Goods and Services:		
Reference Contact Information:		
Contact Full Name:		
Contact Mailing Address:		
Contact Email Address:		
Contract Telephone Number		

12. Attach a Management Chart showing the Project team members, areas of responsibility, and team organization structure.

13. **Project Staff** – List the name of the person who will be directly responsible for performance of the Project services and indicate the number of years of experience managing projects of similar size. Attach resume(s) describing specific related experience.

Table 5: List of Project Staff[illegible]

PART I, SECTION C - ADDITIONAL INFORMATION

1.0 OBJECTIVE:

The Travis County Purchasing Agent is requesting competitive proposals from qualified entities for a set of components and modules that, collectively, will result in the functional implementation of STAR-Vote™ as defined in this RFP. The components and modules are:

- Element A: EAC-Certified Modules
- Element B: In-Person Voting/Tabulation and Support Modules
- Element C: Ballot Box/Scanner
- Element D: Red Team Assurance
- Element E: Human Factors Evaluation

2.0 PRE-AWARD SURVEY:

After proposal opening and prior to award, County reserves the right to make a pre-award survey of Proposer's facilities and equipment to be used in the performance of this work. Proposer agrees to allow all reasonable requests for inspection of such facilities with two (2) business days advance notice. Failure to allow an inspection shall be cause for rejection of proposal as non-responsive. County reserves the right to reject facilities or equipment as unacceptable for performance as a result of the pre-award survey.

3.0 PROPOSAL DISCLOSURE:

Proposals will be opened so as to avoid disclosure of the contents to competing Proposers. Proposals will be kept secret during the process of negotiation. However, all proposals will be open for public inspection after award. If identified by the Proposer, County will make reasonable efforts to protect information that qualifies as trade secrets and/or confidential information under the Texas Public Information Act.

4.0 SELECTION CRITERIA/EVALUATION FACTORS:

Travis County will consider several evaluation factors, of which price is only one. Proposers may offer/propose solutions which meet the “spirit” of the listed requirements, but should note that only the proposed solution/service that meets or most closely meets all of the specifications will be recommended for award.

The selection process will be based on the responses to this RFP, and any interviews/demonstrations required to verify the ability of Proposer to provide the services/products proposed in response to this document, along with reference checks. Evaluation factors and associated point values are listed in order of importance:

1	Completeness of Proposal Relative to Requirements: <ul style="list-style-type: none">• Part I – Contractor Qualifications• Part II – Project Management• Part II – Detailed Responses• Part II – Contractor Requirements• Part II – Contract Requirements	40%
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2	Cost: <ul style="list-style-type: none"> • Total Purchase Cost • Per Hour Rate for Proposer's Technical Resources • Per Hour Rate for Technical Management Resources • Hourly rate for County requested requirements change 	30%
3	Quality of Proposer Credentials, Technical Capabilities and Services: <ul style="list-style-type: none"> • Performance History • Years of Experience • References • Demonstrated expertise, personnel proposed (resumes, qualifications) • Level Competence for the proposed Element(s) 	20%
4	Subjective Evaluation: <ul style="list-style-type: none"> • Response exhibits overall understanding of the system • Response embodies overall system objectives • Response addresses future implementations 	10%

5.0 METHOD OF AWARD:

- 5.1 The award of the contracts shall be made to the responsible Proposer for each specific Element, whose proposal is determined to be the best evaluated offer for that Element resulting from negotiation, taking into consideration the relative importance of price and other evaluation factors set forth herein.
- 5.2 Prompt payment discounts will not be considered in determining low proposals and making awards.
- 5.3 In considering the proposals, Travis County reserves the right to select one or more responsible Proposers.
- 5.4 Travis County reserves the right to award only a portion of the RFP or selected Elements.

PART I, SECTION D - NEGOTIATIONS

1.0 NEGOTIATIONS:

- 1.1 The Purchasing Agent shall supervise all negotiations.
- 1.2 Discussions may be conducted only with responsible Proposers who submit proposals determined to be reasonably susceptible of being selected for award. All Proposers will be accorded fair and equal treatment with respect to any opportunity for discussion and revision of proposals. Revisions to proposals may be permitted after submission and before award for the purpose of obtaining best and final offers.
- 1.3 Proposers may be required to submit additional data during the process of any negotiations.
- 1.4 Travis County reserves the right to negotiate the price and any other term with the Proposers.
- 1.5 Any oral negotiations must be confirmed in writing prior to award.
- 1.6 The RFP contains several technical requirements whose final specification will be defined during negotiations between Proposers of separate Elements. All Proposers agree to participate in these technical negotiations in good faith with the understanding that failure to reach agreement between the parties can result in a Proposer being removed from further consideration for contract award.

2.0 DEVIATIONS:

Requirements stated in this RFP shall become part of the contract resulting from this RFP unless the Proposer requests a deviation. Any requests for deviations from these requirements must be specifically defined by the Proposer in the proposal. If accepted, the deviation shall become part of the contract. Travis County reserves the right to modify the requirements of this RFP.

3.0 REJECTION OF PROPOSALS:

- 3.1 County expressly reserves the right to:
 - 3.1.1 waive any defect, irregularity or informality in any proposal;
 - 3.1.2 reject or cancel any proposal or parts of any proposal;
 - 3.1.3 award contracts to one or more Proposers; or
 - 3.1.4 procure the services in whole or in part by other means.

4.0 **PROTESTS:**

Protests before award must be submitted in writing to the Purchasing Agent not later than six (6) calendar days after proposal opening, and protests after award must be submitted within ten (10) calendar days after award by Commissioners Court. The Purchasing Agent shall rule on the protest in writing within ten (10) calendar days from date of receipt. Any appeal of the Purchasing Agent's decision must be made within ten (10) calendar days after receipt thereof and submitted to the Purchasing Agent, who shall present the matter for final resolution to the Commissioners Court. Appellant shall be notified of the time and place the appeal is to be heard by Commissioners Court and afforded an opportunity to present evidence in support of the appeal.

PART I, SECTION E – BACKGROUND and GENERAL INFORMATION

1.0 BACKGROUND

1.1 STAR-Vote™ Origin

In 2002, Travis County moved from an aged optical-scan, central-count election system to the Hart Intercivic DRE and Ballot Now ballot-by-mail system. This system has functioned well over the years, and the County currently utilizes 1,725 eSlate voting stations, 355 Disabled Accessibility Units, 461 Judges Booth Controllers, 30 Demo Units, and 3 Ballot Now stations that include 2 high-speed scanners and 2 ballot printers.

In preparation for the purchase of a new voting system, the Travis County Clerk (the “Clerk”) convened a citizens group in 2009 to begin discussions regarding the type of voting system the community wanted for the future. This group is comprised of approximately 45 members representing broad, diverse segments of the community. A similar group was formed around 1990 when the County moved from a punch-card system to optical scan and again around 2000 when the County adopted a DRE system.

The Travis County Clerk’s Elections Study Group spent many hours learning about topics such as:

- The nuts and bolts of election administration;
- How election systems function for By-Mail voting, Early Voting, Mobile Voting, Precinct-Based Election Day Voting, and Vote Centers;
- The challenges of current federal and state certification processes – the extent to which they protect the voter, the extent to which they interfere with election integrity (e.g., by making effective audits unnecessarily difficult), and their effects on cost and competitiveness (they are costly, slow, and discourage innovation and market participation);
- The problems associated with the current election system market, including secretive programming and design methods, vendors’ responses of “trust me” to the public when questions arise, disincentives in the market for vendors to update and improve their equipment, vendors’ decisions to not follow other technology models where prices decrease after a technology is in broader use or has become dated, and high maintenance charges that are required but yield little benefit;
- The types of election problems and concerns encountered across the nation including security, court decisions, the difficulties of determining voter intent, and recounts;
- Viewpoints from activists and academia on computer security, usability, and accessibility; and
- The different types of voting systems that are available.

The group also had in-depth discussions and demonstrations from vendors and users of DREs, voter-verifiable paper audit trail (VVPAT), optical scanning, digital scanning, and hand-count paper-ballot systems. These discussions were followed by an analysis of the purchasing and operating costs of these systems.

At the end of the process, the Study Group determined that Travis County would best be served by a system that uses an electronic count and paper ballots. The group found that no system on the market meets the needs of Travis County, and directed the Clerk to secure a system that met the standards the group found important and underrepresented in existing systems – security; transparency; auditability; reliability; cost effectiveness; usability; accessibility; and use of high-quality, up-to-date software design with improved functionality.

When the Travis County Clerk elections team took up this challenge, they found that counties across the nation were facing similar circumstances. To break through the gridlock that had election administrators, academics, and activists at odds with one another, the team challenged these groups to work with her to craft the requirements for a new system that could best answer everyone's concerns.

The County Clerk received support from across the country and was especially honored that a distinguished professor at Rice University's Department of Computer Science agreed to join this effort and garner the help of some of the country's most revered experts in computer security, statistics, and usability.

In long sessions with frequently rambunctious discussions, a group of election administrators, usability experts, and computer and statistical academicians came together to forge the idea of STAR-Vote™. A paper detailing the results of this effort was presented by the Rice University professor at the 2013 meeting combining the Electronic Voting Technology Workshop, the Workshop on Trustworthy Elections, and the USENIX Journal of Election Technology and Systems (EVT/WOTE/JETS). A copy of that paper can be found at:

<https://www.usenix.org/conference/evtwote13/workshop-program/presentation/bell>

As interest grew and specific requirements for STAR-Vote™ became more defined, other counties began serious inquiries about participating in the process. At this point, the County Clerk decided to create and issue an initial RFI for gaining input into the STAR-Vote™ concept and further determining a plan for development and implementation.

1.2 Demographics

Austin, the State Capital, is located in Travis County. Travis County is in central Texas and is just over 1000 square miles. It has a population of over 1.063 million of which 623,000 are registered voters. Austin, the proud capital of Texas, covers a vast area of Travis County and is surrounded by numerous smaller cities, towns, villages, and unincorporated areas. As a center for the State's governmental activity, the community has a higher-than-average interest and understanding of politics and election issues.

Travis County is the home of the University of Texas and Austin Community College. The University of Texas has over 50,000 enrolled students and Austin Community College follows with an enrollment of 40,000. Travis County is also home to other high quality learning institutions such as St. Edwards, Huston-Tillotson, and Concordia Universities.

Austin and Travis County are growing rapidly. According to the Census Bureau, Austin had the fastest population growth in the United States in 2013. Surrounding cities within 30 miles of Austin just outside of Travis County (San Marcos, Cedar Park, etc.) ranked among the top most rapidly growing cities with populations of 50,000 or more.

Travis County features a diverse population. The area has become a majority-minority city, where no ethnic or demographic group has a majority of the population. Austin's Anglo population dropped below 50% around 2005. Austin's current Hispanic population is around 35%. Growing the most rapidly is Austin's Asian population. In 1990, it was around 3.3%, and it now stands at around 6.5%. It is important that all election related materials be offered in English and Spanish. We anticipate that in the near future, an Asian language will need to be incorporated. Delaying an immediate change is the uncertainty as to which Asian language(s) will best serve the voters.

Travis County has a large number of young people. A 2014 report by the Community Advancement Network (CAN) reports that Travis County has a comparatively young population. About 76% of the population is over 18. 18% are between the ages of 25 to 34 and only about 8% of the population is 65 years of age or older.

Travis County has approximately 85,000 to 116,000 persons with disabilities. Estimates of the number of people with disabilities in Travis County vary between studies. This may have to do with how the term "disabled" is interpreted. Some sources show there are about 85,000 individuals; others estimate the number to be about 11% of the population. Regardless of the exact count or definition, the Travis County Clerk's Office has a long history of doing whatever is possible to provide accessible voting, create a voting experience that is the same or similar to that of everyone else, and give persons the right to a private vote.

1.3 Election Data

Travis County has 247 election precincts and over 120 political subdivisions. County elections encompass federal, state, and local races. In addition to County elections, the County Clerk offers election services to over 120 local jurisdictions, including:

- Cities;
- A community college;
- A transportation authority; and
- School, utility, emergency service, library, and aquifer districts.

The number of entities conducting an election on one date has varied from 2 to 35. Entities often have boundaries that do not follow election precinct lines and create a situation called "split precincts." In addition, entities may have at-large races and/or district races. Each precinct and its unique configuration of elections and races constitute a precinct/ballot style. As a result, the number of different precinct/ballot styles generated for one election date has ranged from 250 to 850. The length of a ballot varies dramatically. Ballots in large elections have contained as many as 34 separate elections and included 154 races with 412 voter options.

Turnout varies from 7.5 to more than 66 percent. Turnout is affected by community interest in particular issues or races; however, general trends occur based on the type of election. National elections draw far more voters than primaries or local elections. See the diagram at the end of this section for statistics on Primary and November elections.

The Travis County Clerk conducts joint primaries for the Democratic and Republican Parties. Primary elections are held in March of even-numbered years with Primary runoffs occurring in May. At this time, only the Democratic and Republican Parties hold primary

elections in Texas. Travis County runs joint primaries where both parties vote in the same location and share all voting system equipment.

Texas voters do not register as members of a specific political party. They declare party affiliation when they arrive to vote in a primary election. Upon check-in at a polling location, a voter requests and votes a ballot for either the Democratic or Republican Party. The voter must vote in the same party if voting in the Primary runoff and may not crossover vote in the opposing party's runoff election.

Other political parties like the Green and Libertarian Parties conduct conventions to determine their candidates for the General Election. A person who does not claim a political party can file as an independent candidate on the General Election ballot.

Straight party voting is allowed. Straight party voting is a ballot option in the November General election of even-numbered years. Voting "straight party" is not mandatory, and if the Straight Party race is selected, the voter may remove or change selections in any races on the General ballot.

Some entities allow voters to select more than one candidate within a race. While most races are determined by voting for one candidate or choice, some entities have races where voters can select two or more candidates or choices (for example, "vote for one, two, or three of the following candidates").

The Clerk's Elections Division usually conducts three to six elections per year. Odd-numbered years will likely consist of a May election with a possible June runoff and a November election. Even-numbered years likely consist of March Democratic and Republican primary elections with a possible May runoff, a May local election with a possible June runoff, and a November election with a possible December runoff. Other special elections and an odd-year December runoff election are also possible.

Certain voters can vote by mail. Voters must qualify to vote by mail in Texas. Requirements for eligibility are that voters be:

- 65 years of age or older;
- Out of the county during the entire election period;
- Sick or disabled; or
- Confined in jail but eligible to vote.

Uniformed service members, their families, and citizens residing outside of the United States are also eligible to vote using a Federal Post Card Application (FPCA).

The volume of ballots voted by-mail in Travis County has been on the rise. The number of by-mail ballots in the 2014 Gubernatorial Primaries increased by more than 192% from the 2010 Gubernatorial Primaries (from 2,011 to 5,877). If this trend toward voting by-mail continues, the volume in the 2016 Presidential election could grow from 18,844 ballots voted and returned in 2012 to more than 31,355.

Texas law provides for the use of provisional and limited ballots. Both these instances require election workers to follow special procedures and for voting equipment to accommodate these unique situations. Provisional voting (Section 63.011 of the Texas Election Code) allows a voter whose name does not appear on the list of registered voters (due to possible administrative error) to vote. Provisional ballots are kept separate from the regular

ballots until a review of the voter's records can be performed. Limited ballots (Chapter 112 of the Texas Election Code) are only issued when a voter has moved to a new county and has not re-registered. A ballot must be created to provide the federal, statewide, and local district races that are similar between the voter's new and old county.

Early Voting is popular. Early Voting for each election typically runs 9 – 12 days, with 40% - 60% of ballots cast during this period, although this figure has been as high as 75%. The County runs 25 to 35 Early and Mobile Voting locations. Great effort is made to place these locations in areas of convenience and high foot traffic such as retail stores, mobile buildings and lobby areas. This sometimes creates logistical challenges with small or oddly shaped spaces, sparse electricity, and unreliable network connections.

The County currently employs numerous security measures and plans to adapt and apply these to the new system. For example, law enforcement officials deliver the “electronic ballot boxes” to a secured area each night and return them to the polling locations the next morning.

Travis County offers Election Day Vote Centers but must maintain the ability to conduct precinct voting. In November 2011, the County began using Vote Centers on Election Day. Vote Centers have proven to be highly appreciated by voters, but the County also must be prepared to provide traditional precinct voting elections.

Unlike precinct voting where voters must vote only in their precinct, Vote Centers give any eligible Travis County voter the ability to vote at any polling location in Travis County on Election Day. Every polling location has every ballot style available for use. In a countywide election, approximately 190 to 210 polling locations are utilized. These polling locations typically have 3 to 20 voting stations. Large elections may sometimes necessitate the use of “Mega sites” that offer 20 to 50 voting stations.

The infrastructure and technology that makes Vote Centers possible is the internet connection polling locations have to Travis County's Voter Registration System through a Voter Check-In Station that is independent from the voting system. Therefore, Election Day operates similarly to Early Voting in that polling locations continuously give and receive live updates of information to the Voter Registration System. This allows voters the convenience of voting at any polling location and the security to prevent persons from casting a vote in more than one place on Election Day.

On Election Night, judges are required to bring equipment and election materials to a Receiving Substation. Travis County currently uses four to five Receiving Substations. After the materials are checked in at the substations, law enforcement officials continuously deliver the electronic media with the tabulation information to the Central Counting Station. Currently, no electronic transmission of election result data occurs between the polling locations, Substations and the Central Counting Station. (However, STAR-Vote™ provides additional checks and balances by utilizing both electronic and physical delivery of this data. Data transmission is done on systems separate from the STAR-Vote™ voting and tabulations modules.)

Many laws and mandates dictate the conduct of elections. There are many complex laws and requirements that pertain to voting. Most relating to this RFP can be found in federal laws; Texas law and Attorney General opinions; guidelines and advisories set forth by the Texas Secretary of State; local charters; and procedures written by the Travis County Clerk.

Travis County Election Turnout Statistics

Election Date	Election Type	Registered Voters	Ballots Cast			Percent of Ballots Cast		Percent of Registered Voters Voting			Turnout by Election Type (% of Reg Voters Voting)				
			Ballots Cast in Early Voting	Ballots Cast on Election Day	Total Ballots Cast	% of Ballots Cast in Early Voting	% of Ballots Cast on Election Day	% of Reg Voters Voting Early	% of Reg Voters Voting Election Day	% of Reg Voters Voting	Presidential	Gubernatorial	Constitutional	Democratic Primary	Republican Primary
March 4, 2014	Dem Primary	627,347	23,756	24,739	48,495	48.98	51.02	3.79	3.94	7.73				7.73	
March 4, 2014	Rep Primary	627,347	17,584	17,447	34,031	50.01	49.99	2.80	2.78	5.58				5.58	
November 5, 2013	Constitutional	618,200	35,243	49,762	85,005	41.45	58.55	5.70	8.05	13.75			13.75		
November 6, 2012	Presidential	635,300	239,619	152,089	391,708	61.11	38.89	37.72	23.94	61.66	61.66				
May 29, 2012	Dem Primary	595,269	18,119	24,318	42,437	42.70	57.30	3.04	4.09	7.13				7.13	
May 29, 2012	Rep Primary	595,269	17,905	24,389	42,294	42.33	57.67	3.01	4.10	7.11					7.11
November 8, 2011	Constitutional	581,831	21,067	29,707	50,774	41.49	58.51	3.62	5.11	8.73			8.73		
November 2, 2010	Gubernatorial	603,964	134,427	106,318	240,745	55.84	44.16	22.26	17.60	39.86		39.86			
March 2, 2010	Dem Primary	585,010	15,879	23,036	38,915	40.80	59.20	2.71	3.94	6.65				6.65	
March 2, 2010	Rep Primary	585,010	20,785	29,997	50,782	40.93	59.07	3.55	5.13	8.68					8.68
November 3, 2009	Constitutional	581,585	13,468	30,081	43,549	30.93	69.07	2.32	5.17	7.49			7.49		
November 4, 2008	Presidential	609,230	302,426	100,406	402,832	75.07	24.93	49.64	16.48	66.12	66.12				
March 4, 2008	Dem Primary	555,865	97,706	88,963	186,669	52.34	47.66	17.58	16.00	33.58				33.58	
March 4, 2008	Rep Primary	555,865	18,501	22,608	41,109	45.00	55.00	3.33	4.07	7.40					7.40
November 6, 2007	Constitutional	536,317	19,973	43,266	63,239	31.58	68.42	3.72	8.07	11.79			11.79		
November 7, 2006	Gubernatorial	555,759	99,945	128,354	228,299	43.78	56.22	17.98	23.10	41.08		41.08			
March 7, 2006	Dem Primary	542,797	7,926	12,923	20,849	38.02	61.98	1.46	2.38	3.84				3.80	
March 7, 2006	Rep Primary	542,797	6,506	10,269	16,775	38.78	61.22	1.20	1.89	3.09					3.09
November 8, 2005	Constitutional	533,242	56,696	80,245	136,941	41.40	58.60	10.63	15.05	25.68			25.68		

2.0 GENERAL INFORMATION

2.1 Developing a New Business Structure

Moving to a phased development and implementation impacts the STAR-Vote™ timeline but does not change the overall, long-term objectives. The near term objective and the subject of this RFP is development of the In-Person Voting/Tabulation module and implementing it in a live election. This accomplishment will drive the follow-on phases to complete the rest of the system. The long-term goals remain intact and include protecting the integrity of STAR-Vote™, reducing the need for Travis County to solely cover the cost of developing the complete system; providing a structure that encourages system and software openness, development of new ideas, and analyzed improvements; and offering STAR-Vote to other entities at a low cost.

The completion of the contracts likely to be awarded as a result this RFP will facilitate development of a complete voting system that can arguably operate many years into the future. It is also a system that can be adopted and purchased by other counties. Travis County supports this adoption of STAR-Vote™ by other entities and believes the best way to move any opportunity forward is for interested counties to form a consortium with Travis County. To be able to extend the use of STAR-Vote™ to other counties, Travis County (or a consortium of other STAR-Vote™ counties) must retain all intellectual property and proprietary rights in and to the STAR-Vote™ Elements B, C (only the custom software/firmware for existing hardware) and all legally protectable elements and components of it. This ownership position excludes any rights in Element A, the EAC-Certified products, procured as part of this RFP.

In this scenario:

- Travis County (and/or a consortium) would own the copyright and all other IP rights (patents, trademarks, etc.) with the vendor disclaiming any of their prior patent (or other IP) coverage over STAR-Vote™;
- Vendors would be contracted to provide services as independent contractors who will assign, transfer and set over to Travis County all right, title and interest in and to the STAR-Vote™ work product;
- Source code for all modules would be published, but usage rights for actual elections as well as derivative rights (as in using the code to create a derivative voting system) would be controlled by Travis County (and/or consortium) with a view toward ultimately releasing usage and derivative rights under a “suitable” (as determined by Travis County and/or consortium) open source license that would allow and encourage preparation of third-party derivative work, recognizing that voting systems must be state and federally certified;
- Source code for specific modules relating to third-party verification of the bulletin board and related published election artifacts would be published under a "suitable" (as determined by Travis County and/or consortium) open source license; and
- During the period in which usage and derivative rights are retained by Travis County (and/or consortium), Travis County (and/or consortium) will commit to licensing all elements of STAR-Vote™ on a Reasonable and Non-Discriminatory (RAND) basis.

- However, Travis County understands that this method of developing and implementing a voting system is new; therefore, the County is willing to discuss alternate business models that accomplish the same outcome during contract negotiations.

2.2 Ownership of and Rights to Data Generated by STAR-Vote™ System

Travis County will own all data generated or produced by the STAR-Vote™ system, or any element of it, when it is used by Travis County, regardless of the nature or form of the data and regardless of the medium in which the data are generated or produced. Upon their creation, the data will automatically become the sole and exclusive property of Travis County without limitation or restriction of any kind and regardless of whether the data are legally protectable as confidential or proprietary.

2.3 Voter Registration Data

In Travis County, the County Clerk's Elections Division conducts elections and the Tax Assessor-Collector's Voter Registration Office maintains the voter registration system and its data. The Tax Assessor-Collector's Voter Registration Office uses a system called EZVote that was designed by and is supported by Hamer Enterprises of Texas. EZVote takes the GIS data of all county districts and compiles the district information into unique ballot combinations. There are instances in this RFP where information must be communicated between the Voter Registration System and STAR-Vote™ modules. The voter checkin module, which looks up voters in the registration system and prints out a code for the voter indicating the voter's ballot style, is provided by Travis County however.

2.4 Travis County's Election Night Return System (ENR)

The Travis County Clerk uses a real-time election reporting system that was designed by the Travis County Clerk's Office and developed by Hamer Enterprises. It is referred to as the Election Night Reporting System or ENR. This public tool uses statistics, maps, and graphics to display voter turnout and cumulative and precinct-by-precinct election results. ENR provides these results throughout Election Night, reports updates and the final canvass, and archives past election results for interactive viewing. This tool allows the public to create and produce customizable, downloadable reports in a variety of formats.

At this time, the Clerk's Office manages ENR within its own cloud at an off-site hosting company using a site-to-site VPN tunnel. This solution is subject to change and any proposed system must be able to operate within premise on-site hosting or off-site with a hosting provider. Respondents to this RFP may submit alternative recommendations for consideration.

The system developed by this RFP must be able to provide the County's ENR with near real-time, continuously-updated election data and final official results in a means and format that operates rapidly and seamlessly for the public's use.

The Travis County ENR site is at www.traviselectionresults.com.

2.5 Phased Implementation

The STAR-Vote™ system requirements were developed from the ground up with the purpose, among other objectives, of specifying an entire voting system developed under the open source code software model. Building and implementing the complete STAR-Vote™ system requires a wide range of skills that were unlikely to be resident within a single company. Furthermore, the practical reality of budget, time and functionality required us to evaluate the best approach that yields the highest likelihood of success. The County determined that a phased approach

toward complete development and implementation, where the first phase builds the in-person voting module of the STAR-Vote™ system, is the optimum strategy. This RFP is requesting responses for first phase of development and implementation of STAR-Vote™.

The architecture has been organized to focus on the implementation of the in-person voting polling place system to support Election Day and Early Voting elections. The polling place system, or In-Person Voting/Tabulation module, embodies the STAR-Vote™ design for open source code, running on COTS hardware, and provides a robust security architecture that supports Risk Limiting Audits (RLAs). An objective of this RFP is to contract for the development of the In-Person Voting/Tabulation module and the corresponding Support Modules as defined by the STAR-Vote™ specification and requirements. The other open source code components will be developed in a follow on phase. The first phase of the STAR-Vote™ Precinct Voting and Tabulation module will be supported by existing, commercially available, EAC-Certified products, which this RFP is also seeking.

Travis County desires to contract with a company that has existing ballot definition/election management, by-mail and tabulation products that are EAC-Certified. This architectural approach minimizes the election expertise necessary to develop the Precinct Voting and Tabulation module and takes advantage of mature election products. The intent is to implement the certified products “as-is” to maintain the certified status. If any requirement contained in this RFP conflicts or does not align with existing, certified functionality, the County urges Proposers to note the exception in their response as a deviation (see Part I, Section D, paragraph 2.0) for evaluation by the County. The County intentionally did not provide exhaustive requirements for these products but is relying on the VVSG and the market to validate the functionality. The interface between the Precinct Voting and Tabulation module and the EAC-certified products is straightforward and utilizes a practice that most election products already support: export of an election definition file, and import and aggregation of election results. Greater details of this interface will be defined during contract negotiations with the contract award finalists.

This RFP allows for multiple awards to different vendors and companies and it is very likely that awards will be given to two or more different enterprises. Multiple awards requires Travis County to provide a system integration function to manage and coordinate the interactions between awardees for the length of the contract. The County is prepared to provide this level of support to the awardee’s project managers for the project. Further, given the fact that the cryptographic solution for STAR-Vote™ is already designed,

Travis County will provide design support expertise for the software development effort for this functionality. The County anticipates this RFP will result in awards for the STAR-Vote™ In-Person Voting/Tabulation and Support Modules, Ballot Box Scanner software and/or hardware development, EAC-Certified products; and possible awards for the Red Team Assurance requirements and Human Factors evaluation as outlined in the body of the RFP.

2.6 Red Team Assurance

Development, testing and implementation of the STAR-Vote™ In-Person Voting/Tabulation and Support modules includes the use of a “Red Team”. The Red Team is a group of software and security experts who: (i) provide independent review of the functional and security elements of the STAR-Vote™ system and test the effectiveness of the security and controls; (ii) identify vulnerabilities; and (iii) recommend changes to reduce risks. The Red Team Assurance requirements of this RFP are offered as a separate component that is open for proposals by qualified vendors other than respondents of the In-Person Voting/Tabulation module. Vendors responding to the In-Person Voting/Tabulation portion of this proposal must

agree to the use of a Red Team. The vendors will coordinate tasks and schedules as part of the contract discussions for RFP awards. Any disputes between the Red Team and the In-Person Voting/Tabulation vendor over the course of the project will be adjudicated by Travis County.

Qualified entities or organization are encouraged to submit a proposal for the Red Team Assurance function based on the product requirements outlined in this RFP. Proposals should address both the development stage of the In-Person Voting/Tabulation and Support modules and run-time testing. These tasks may include:

- Requirements Review: Review and input for system requirements to identify additional security requirements prior to any code development.
- Design: Review software design and component architecture to identify security issues and recommend mitigations.
- Coding and Implementation: Be cognizant of components and code blocks used by developers and advise on potential inherent vulnerabilities; provide guidance on secure coding practices and other mitigation strategies.
- Verification: Design, develop and execute a set of runtime tests that includes specific security tests and likely includes penetration testing.

These types of Red Team tasks generally reside within the “application security” field and relate to the In-Person Voting/Tabulation software that will be developed as part of this RFP. The In-Person Voting/Tabulation module has three principal “software applications”, which are compiled code blocks that perform the Voting Station, Ballot Controller Station and Ballot Box/Scanner functions. For the purposes of submitting a Red Team Assurance proposal, Proposers should assume the COTS hardware platform for the software application is a generic tablet computer. Adjustment in project tasks for variation in the hardware platform will be made during contract negotiations.

There are other system elements, components and modules that are a part of the STAR-Vote™ implementation outside of the software applications referenced above that present potential security risks and require review and testing. While the STAR-Vote™ system does not include any public-facing websites or web applications, the various components and modules operate on a networked architecture. Proposals for the Red Team Assurance function should address the networked aspects of the interconnected modules and propose a security review and testing program that encompasses the In-Person Voting/Tabulation module, Support Modules and the interface with the EAC-Certified Modules. The types of tasks that may be included in this review and testing are:

- Overall Software Security Strategy
- Architecture Analysis
- Dynamic Application Security Testing (DAST)
- Static Analysis Security Testing (SAST)
- System Assessment, which may include;
 - Documentation review
 - Log file review
 - Ruleset and system configuration review
 - Network sniffing
 - File integrity checking
- Target Identification and Analysis

- Testing using automated tools
- Identify systems, ports, services, and potential vulnerabilities
- Network discovery
- Vulnerability scanning
- Wireless scanning
- Vulnerability Validation
 - Password cracking
 - Penetration testing
 - Social engineering
 - Application security testing

Travis County is seeking Red Team Assurance proposals that are tailored for STAR-Vote™. Proposals should be modularly priced so the Red Team Assurance effort can be further refined to align with the development of the In-Person Voting/Tabulation module and the overall project budget.

2.7 Human Factors Evaluation

A principal goal of STAR-Vote™ is to be highly accessible and intuitively usable by all voters. This RFP embodies state-of-the-art accessibility and usability requirements but citing these references does not ensure STAR-Vote™ will exemplify these performance qualities. In an effort to highlight the importance of accessibility and usability, Travis County intends to procure services from qualified providers to provide human factors evaluations, oversight, testing and general User Centered Design guidance for development of the In-Person Voting/Tabulation module defined in this RFP.

The County recommends that human factors evaluation proposals address the following types of topics:

- User interfaces for the voter that are intuitive, straightforward and logical;
- Assessment of suitable COTS equipment for user familiarity;
- Flow of voters through the polling locations;
- Ballot design follows Anywhere Ballot and AIGA Design for Democracy;
- Design process employs UCD-based iterative design methodologies, and;
- Content and delivery of any instructions for voters and poll workers.

The County envisions this human factors evaluation effort as primarily the application of existing information and research that has been performed for accessibility and usability of voting systems. Further, the County recommends that proposals follow the NIST Voting Performance Protocol (VPP), which can be found at:

<http://www.nist.gov/itl/vote/upload/Usability-Benchmarks-080907.doc>

The County further recommends that the results be reported in the NIST Voting Common Industry Format (NIST VCIF) found at:

http://www.nist.gov/itl/vote/upload/Guidelines_CIF_Template_Laboratories.pdf

This protocol should be followed with two exceptions:

- 1) The County recommends that the test ballot and the directed voting lists given in Attachment 9 of this RFP be used instead of the test ballot contained in Appendix A of the NIST references. The reason for this substitution is that there is a large body of

benchmark data for systems that have used this ballot, so reliable comparisons can be made.

2) The County recommends that the System Usability Scale [see Bangor, A., Kortum, P. T., & Miller, J. T. (2008). "An empirical evaluation of the system usability scale." *Intl. Journal of Human-Computer Interaction*, 24(6), 574-594.] be used at the end of the test to measure satisfaction (in addition to the measure recommended by NIST). The reason for this addition is that there is a large body of benchmark literature for voting systems and other commercial products that is highly informative as to the usability of the system.

The County recognizes that STAR-Vote™ may have some unique features not previously addressed by the existing body of knowledge and that some research may be required; however, the County believes this would be a limited effort that will help minimize costs. Human factors evaluation proposers should expect to work side-by-side with other vendors and Travis County staff to apply usability and accessibility concepts and practices. Travis County will serve as the systems integrator and will moderate the relationships between vendors.

Human factors evaluation proposals should outline project tasks based on the design and development requirements for the In-Person Voting/Tabulation module. Task durations in the form of a Gantt chart or some other suitable representation of the level of effort required should be provided along with general task sequence or relationship. The final schedule will be determined during contract negotiation by working with Travis County and the other STAR-Vote™ vendor(s). Human factors evaluation proposers are expected to provide project management skills to manage their interface with the rest of the project.

2.8 Use of Current and Commercially Available Hardware and Software

Proposals must incorporate a plan for the predominant use of commercial off-the-shelf hardware and associated software and include a proposed hardware platform to satisfy the requirements of this RFP. Commercial off-the-shelf (COTS) hardware and software are products that do not require custom development before installation and that are generally available and user-friendly.

The proposed hardware must be current-generation off-the-shelf hardware that maximizes security, ease of use, function, flexibility, reliability, and portability. Pricing, availability and supplier(s) must also be included for the proposed hardware.

The proposal must also assume and plan for ways to adopt and adapt to continuously improving technology. Since future COTS platforms will have new hardware and software features that cannot be completely anticipated, the Proposer may want to propose, as part of an ongoing maintenance contract, fees and services for porting and otherwise updating STAR-Vote™ to operate with new COTS devices as they arise.

Other than Element C, Ballot Box/Scanner, if proposed hardware is not COTS, a specific justification must be provided that explains why a non-COTS solution is required, a breakdown of the components of the recommended hardware with notations by the parts within it that are COTS, and an outline as to how the price for this customized hardware was derived and a plan for product development, testing and manufacturing. Additional information regarding warranties, replacement, and cost may be requested if a solution requires COTS equipment to be located inside of or attached to a non-COTS structure.

The proposed solutions must provide explanatory information if any equipment and/or related furniture, components, etc. do not meet VVSG or accessibility requirements.

2.9 Recommendation for Use of Thermal Printers

Travis County's research indicates that thermal printers in the polling location provide the best solution, and their use is described throughout this RFP. Thermal printers:

- Are small and lightweight;
- Print at an acceptable rate of speed;
- Do not rely on ink cartridges or toner;
- Produce clear, readable, crisp, dark text;
- Are able to run for long periods of time on battery power;
- Are less expensive to purchase, maintain, and operate; and
- Can last longer with frequent handling than other types of printers.

Our information shows that relatively new types of high-quality thermal paper can withstand reasonably high levels of heat and UV rays and maintain its quality for at least two years (the required retention period).

Vendors should consider the potential weather conditions in Texas when proposing hardware and consumables.

Sheet fed thermal paper is preferred to continuous feed paper due to usability considerations, such as reloading, user tear-off errors, misfeeds, and alignment issues.

Alternatives to thermal printers will be considered if the proposal demonstrates that requirements can be met and costs are reasonable.

2.10 Accessibility Is a Priority

Giving all voters the right to vote using the same voting device is an important principle that drives the design of the STAR-Vote™ system. Creativity and ideas based on the latest technology and philosophies are encouraged.

There are many outstanding resources on this topic, for example:

- Georgia Tech Research Institute: The Information Technology and Innovation Foundation Accessible Voting Technology Initiative Working Paper Series #7
(<http://elections.itif.org/wp-content/uploads/AVTI-017-GTRI-VSAPEval-2013.pdf>)
- Numerous papers provided by the Caltech/MIT Voting Technology Project
(<http://vote.caltech.edu/wparchive>)
- Work being done by the Los Angeles County Clerk
(<http://apps1.lavote.net/voter/VSAP/>)
- Jill Piner's dissertation on design of an accessible audio voting system
(<http://chil.rice.edu/gpiner/PinerDissertation.pdf>)

2.11 Voluntary Voting System Guidelines Compliance

2.11.1 In-Person Voting/Tabulation module

Any proposed solution to fulfill the In-Person Voting/Tabulation module specified in this RFP must be developed to fully comply with all elements of the 2012 Draft VVSG pertaining to voter interaction and accessibility, except for those items listed in Attachment 2 as incompatible with STAR-Vote™. In addition, the successful proposal must comply with all aspects of the 2005 VVSG 1.0, except in such places as discussed in Attachment 2 as not being compatible with STAR-Vote™. The Proposer must agree to work with Travis County in an effort to resolve any incompatibles.

Unless otherwise specified herein, all references to the Voluntary Voting System Guidelines (VVSG) refer to the VVSG 1.1, the 2012 draft revision. At the time of this RFP's writing, a copy of the 2012 VVSG revision can be found at:

<http://www.eac.gov/assets/1/Documents/VVSG%20Version%201.1%20Volume%201%20Public%20Comment%20Version-8.31.2012.pdf>

This should be the VVSG Version 1.1 Draft dated 8/31/2012. If the document is not available or does not match that version or date, please contact Lori.Clyde@traviscountytexas.gov for a copy of the correct document.

Should a newer version of the VVSG become available, the vendor must continue to function within the guidelines of the 2012 draft referenced above unless instructions are issued from Travis County to the contrary. If the Proposer believes that some aspect of this document is in conflict with VVSG recommendations, this document takes precedence, but the Proposer must notify Travis County of the conflict so that it may be considered and the RFP can be amended if necessary.

2.11.2 EAC-Certified Modules

Any products proposed to satisfy the RFP requirements for the EAC-Certified modules must include a copy of the Certificate of Conformance issued by the EAC that identifies the product name, version number and the version of the VVSG that the product was certified against. If proposed products are not currently certified by the EAC at the time the RFP responses are due, the Proposer must submit the proposed products and provide proof of EAC certification submission at contract negotiations. Any new certification requires compliance with the VVSG as well as any advisories and requirements set forth by the EAC.

2.12 Texas Election Law and Secretary of State Voting System Guidelines

2.12.1 In-Person Voting/Tabulation module

Any system proposed as a solution to fulfill the In-Person Voting/Tabulation module specified in this RFP must be developed to fully comply with all elements of Texas law as well as any advisories and requirements set forth by the Texas Secretary of State, except for those items listed in the Gap Analysis in Attachment 3 as incompatible with STAR-Vote™. The Proposer shall agree to work with Travis County in an effort to resolve any incompatibles.

2.12.2 EAC-Certified Modules

Any products proposed to satisfy the RFP requirements for the EAC-Certified modules must either be certified by the Texas Secretary of State or, if not certified, include a plan and timeline that outlines the process to attain Texas certification prior to the completion of the contract. Any new certification requires compliance with Texas law as well as any advisories and requirements set forth by the Texas Secretary of State, except for those items listed in the Gap Analysis in the Attachment 3 as incompatible with STAR-Vote™. The Proposer shall agree to work with Travis County in an effort to resolve any incompatibles. Proposers are contractually required to submit and attain certification by the Texas Secretary of State, and failure to achieve this requirement will result in contract termination.

3.0 An Overview of the STAR-Vote™ System

The following is a brief description of how the County imagines STAR-Vote™ functioning in practical application. The County's goal is to give Proposers an understanding of Travis County's current elections processes and provide a narrative of the County's overall vision of a new system. The narrative outlines the functional implementation of this phase of the system and the County urges Proposers to review the STAR-Vote™ Voting System paper referenced elsewhere in the RFP for the long-term implementation of the complete system.

3.1 Before the Election

The election cycle begins with the Administrator entering data into the STAR-Vote™ Election Definition and Ballot Generation module. The Administrator has access to a site for confirmation of the voter registration system's district/precinct information and utilizes data entry screens to input ballot text and record audio information in the EAC-Certified product. The module uses this information to build the ballots and produces approximations of how the ballot will look and sound.

This Election Definition and Ballot Generation module uses district/precinct information from the voter registration database and the ballot information derived from the active contests and races to create ballot styles. After everything has been carefully proofed, reviewed, and formally accepted, the Administrator generates the Election Definition File and exports it to a secure, non-volatile data distribution medium.

The Administrator loads the Election Definition file into the EAC-Certified component for By-Mail Ballot Generation and the STAR-Vote™ In-Person Voting/Tabulation module where the file is used to build and format ballots for use in the election. The In-Person Ballot Assembly and Generation module provides formatting templates to arrange the ballot data for display on the target Voting Station hardware. The templates also enforce formatting rules so the ballots comply with usability and accessibility requirements. This process also integrates the audio data supplied with the Election Definition file and allows the text and audio to be proofed synchronously.

After the ballots are proofed and generated for Precinct Voting, the Precinct Voting Election Definition file is loaded onto a subset of computers, Ballot Control Stations, and Voting Stations to be used in testing. On a separate computer, the Test Data Generator prepares sets of trial data for extensively testing the hardware, software, and ballot programming. When testing is complete with 100% accuracy, the Administrator's staff downloads the Precinct Voting Election Definition file to the remaining equipment and prepares it for deployment.

Before Early Voting, Voting Stations are delivered to and secured at the polling places. Election Judges pick up the Ballot Control Stations and other election materials before voting begins. At the end of each day of the Early Voting period, a team of law enforcement officials picks up the Ballot Control Stations and transports them back to a secured area in

the Administrator's office. In the morning, these officers return and transport the Ballot Control Stations back out to the Early Voting locations.

Prior to Election Day, the Voting Stations are delivered to and secured at the polling locations. Election Judges pick up the Ballot Control Stations and election materials a day or more before Election Day. On Election Day, Judges arrive at the polls with the Ballot Control Stations, connect and test all devices, complete setup of the locations, and begin processing voters at 7:00 a.m.

3.2 **In-Person Early Voting and Election Day Polling Locations**

Each polling location has at least one Voter Check-In Station, at least one Ballot Controller Station (BCS), at least one Voting Station, Audio Ballot Reader(s), and at least one Ballot Box/Scanner. The BCS, Voting Stations, and the Ballot Box/Scanner are networked together via a standard Ethernet wired network so that they can communicate with one another. The number of devices in a polling location is dependent upon the estimated number of voters, the space limitations of the facility, and the number of Voting Stations that can be safely and efficiently managed by poll workers when networked to a BCS. (Please note that Early Voting equipment is rarely reused on Election Day.)

Voter Check-In Station: This system resides outside of the STAR-Vote™ architecture and is connected to the jurisdiction's voter registration system, which is used to qualify and check in each voter. When the voter leaves the Voter Check-In Station, he or she receives a slip of paper called the Ballot Style Token that contains a barcode of the voter's ballot style. The Voter Check-in Station is provided by the County and not part of this RFP.

Ballot Control Station (BCS): The BCS is the control center for the polling place. When a voter presents a Ballot Style Token at the BCS, it scans the Token's ballot style barcode and generates a 5-digit passcode called a Voting Ticket. This station also manages provisional and spoiled/challenged ballots, monitors connections and activities of the Voting Stations, stores encrypted copies of all voter selections, and validates voters' records as they are placed into the Ballot Box/Scanner.

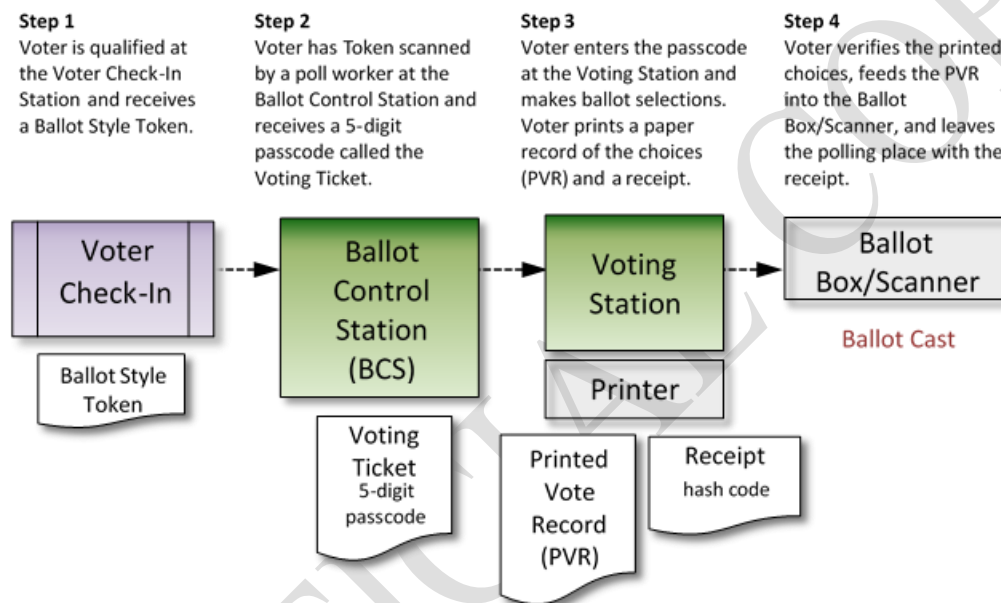
Voting Stations: Voters make ballot selections on Voting Stations either by using a touch-screen or an accessibility-enabling device. After the voter reviews a summary screen and confirms ballot choices, the system creates an encrypted Electronic Vote Record (EVR). The Voting Station then prints two documents. The first is a printed record of the voter's choices with a barcode identifier. This is called the Printed Vote Record (PVR). The second is a printed Receipt that the voter keeps for reference, and which is printed in such order that, when picked up by the voter, it will be on top of the PVR for privacy. In addition to the information resident on each Voting Station, every Voting Station stores the data from all other Voting Stations, BCSs, and Ballot Box/Scanners connected to it.

Ballot Box/Scanner: A Ballot Box/Scanner is a barcode scanner with a paper feeder affixed to a ballot box. The voter takes his or her printed summary of choices (the PVR) and feeds it through the scanner. This scanner reads only the barcode identifier on the PVR. It does not read the content of the voter's choices. Once the Ballot Box/Scanner successfully reads the PVR barcode, it relays a message to the BCS to consider the related EVR as cast. The BCS returns a message to the Ballot Box/Scanner indicating either to accept or reject the PVR. If accepted, the paper feeder advances, deposits the PVR into the secure ballot box and adds identifying information to the electronic manifest for the contents of the ballot box. If rejected, the BCS indicates the reason for the rejection and notifies the Ballot Box/Scanner to eject the PVR.

Audio Ballot Readers: This is not to be confused with the headset that may be used directly on a Voting Station to read instructions and ballot choices to a voter. Instead, this allows a voter with visual challenges a separate and independent method of reviewing PVR content before feeding the PVR into the Ballot Box/Scanner. Audio Ballot Readers are independent stations that are not connected to the Voting Stations, but can be part of a Voting Station setup. An Audio Ballot Reader scans the PVR text and utilizes a headset to audibly read the PVR content to the voter. This is an optional step for the voter, but it gives a person with a visual impairment the same opportunity any sighted voter would have to verify the electronically printed ballot choices before the vote is cast.

3.3 How a Voter Moves Through the Polling Place

From the voter's point of view, the process can be accomplished in four steps:



Here is a more detailed explanation of the dynamics at work:

Step 1: The voter checks in with a poll worker. The poll worker uses the Voter Check-In Station (not a part of this RFP) to confirm the voter is properly registered and determine the voter's precinct. The Voter Check-In Station then generates a piece of paper called the Ballot Style Token that contains an alpha-numeric and 1-D barcode representation of the appropriate ballot style. See Attachment 4 for current samples of Ballot Style Tokens.

If the voter's registration cannot be verified, the voter provides the poll worker with required information, and the poll worker gives the voter a Ballot Style Token that indicates both the proper ballot style and the provisional status of the ballot (Texas Election Code 63.011). Nothing on this token is secret, nor is the ballot style unique to any individual voter.

Step 2: The voter takes the Ballot Style Token to a poll worker at a BCS. The poll worker scans the barcode and the BCS prints a Voting Ticket, a piece of paper printed with a 5-digit passcode. The Ticket also indicates if the voter is voting a provisional ballot.

Step 3: The voter selects any available Voting Station and scans or enters the code from the Voting Ticket into the Voting Station. The Voting Ticket Code identifies the assigned precinct/ballot style including the designation of a provisional ballot. Once the voter enters the code, it is transmitted over the local network to the BCS. The BCS immediately

invalidates the use of that code on the other devices. The code's status (issued, in use, voted, expired, cancelled, etc.) can be checked at the BCS at any time during the voting period. Each BCS generates access codes randomly subject to the constraint that no code is repeated within a polling location during a voting period, which requires coordination among BCSs if multiple units are operating in the same polling locations. Codes are not permanently linked to the voting record or the voter, as that could compromise voter anonymity.

The voter makes selections on the touchscreen or with the aid of an accessibility-enabling device. When the voter completes making ballot selections, the Voting Station displays a review screen (and/or its auditory equivalent) for the voter to confirm all selections before printing a paper record.

When the voter finishes making selections, the Voting Station encrypts and stores this information as an Electronic Vote Record (EVR), and prints two documents using a printer:

- A Printed Vote Record (PVR): This is a single or multi-page printed vote record that includes a human-readable summary of the voter's selections and a barcode encoding four types of numbers - a random (non-sequential) page identifier (PID) unique to each page, a (possibly sequential) page casting identifier (PCID) used only inside the polling location and unique to each page, the precinct/ballot style, and the page number. These numbers are printed under the barcode in plain text. See Attachment 5 for an example of a PVR.
- A paper take-home receipt: This receipt identifies the Voting Station used and the date and time of the vote, and contains a short (16-20 character) hash code that serves as a commitment to the vote but does not reveal its contents. See Attachment 6 for an example of a Receipt.

The voter reviews the PVR to confirm the ballot selections. Voters who cannot read the paper may use an Audio Ballot Reader. The Audio Ballot Reader is configured with the audio file from the Election Definition File for the election and is able to scan the paper and read the contents back to the voter via headphones. The Reader is an independent standalone device that does not communicate with the Voting Station.

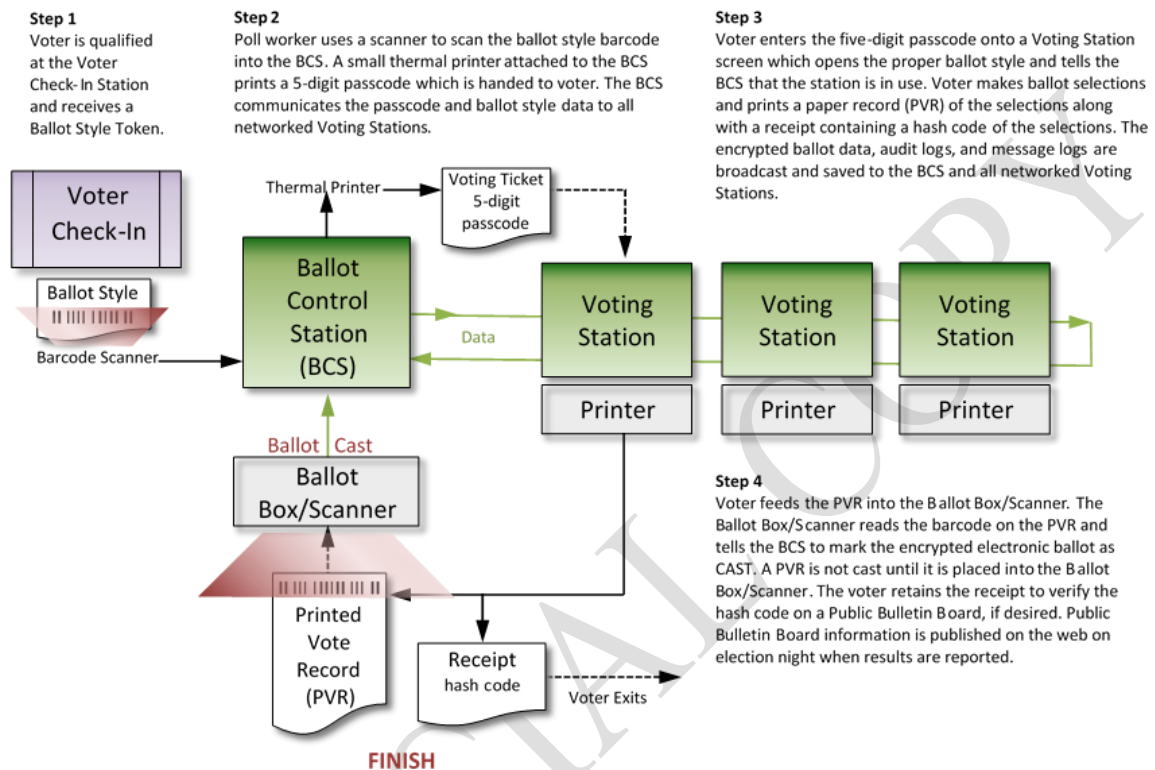
Step 4: If the voter is ready to cast the ballot, he or she takes the printed vote record (PVR) to the Ballot Box/Scanner. The Ballot Box/Scanner has a paper feeder and simple barcode scanner that reads the page casting identifier (PCID) from the composite barcode on each page of the PVR and communicates this to the BCS. This allows for the validation of the electronic vote (EVR). The BCS confirms that the PCID corresponds to a valid PVR page (produced by a properly registered voter, not provisional) and transmits a hash of the Electronic Vote Record that is associated with the PCID to all devices on the network.

This process creates a record of which ballots are cast (deposited in the Ballot Box/Scanner), and therefore, which ballots should be tabulated. An Electronic Vote Record is not considered cast and is not included in the tally unless, and until, its corresponding PVR has been deposited in the Ballot Box/Scanner. If the voter places only some pages of a multiple-page PVR into a Ballot Box Scanner, the final tally includes only the votes on those pages. The Ballot Box/Scanner ejects PVRs with invalid PCIDs, PVRs corresponding to provisional ballots, and PVRs that are expired. When the EVR is accepted, the PCID(s), PID and ballot precinct name/number for the cast ballot is added to a Ballot Manifest managed by the Ballot Box/Scanner.

The voter exits the polling location with the paper receipt containing the hash code for the ballot placed in the Ballot Box/Scanner, in a human readable format, divided into blocks of

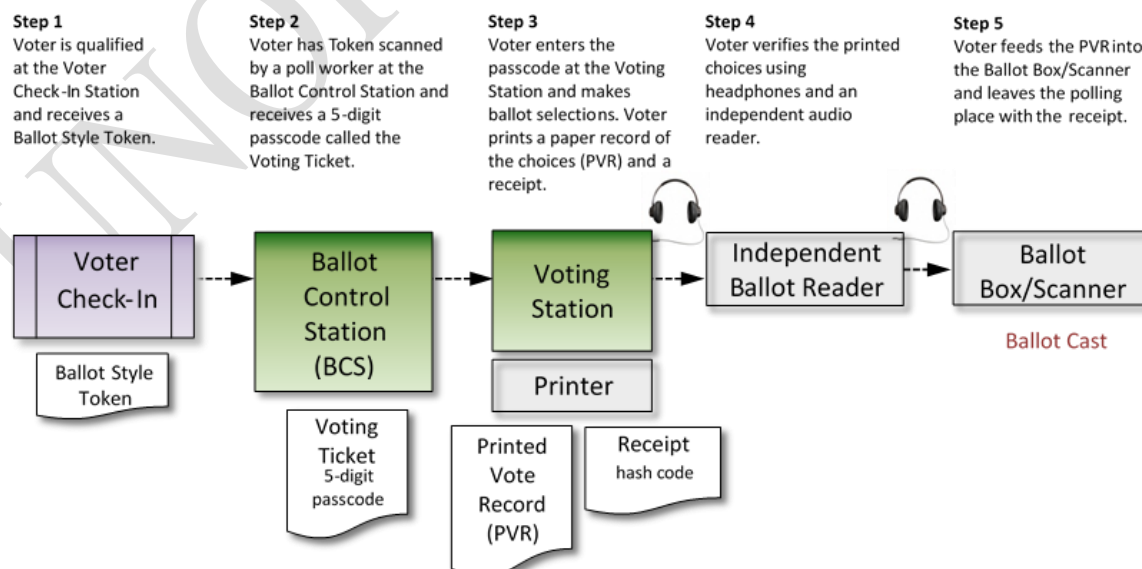
3-4 characters to facilitate manual data entry. After results are published on election night, the voter may go to the County offices to access the Bulletin Board, enter his or her hash code and verify the status of the ballot(s). The receipts should also contain a QR code with a direct link to the bulletin board with the hash pre-filled.

Data flow for the polling location process is as follows:



3.4 Polling Place Flow for Voter Using the Audio PVR Reader

The polling location includes an option for voters who wish to use an audio reader to review their Printed Vote Records (PVRs). The following diagram illustrates how this additional step occurs.



3.5 **Spoiled Ballots or Ballots that Are Challenged for the Parallel Testing Process**

If a voter wishes to change his or her ballot selections after the PVR has been printed and before it is placed in the Ballot Box/Scanner, a voter may “spoil” a PVR and vote a new ballot (Texas Election Code 64.007). In STAR-Vote™, a voter may use this process to “challenge” a ballot using the same procedures in order to test whether the voting station is recording votes correctly (a new process not currently addressed in law).

To spoil or challenge a ballot, the voter, before going to the Ballot Box/Scanner, takes the PVR and the receipt to a poll worker at the BCS and asks to spoil or challenge the ballot. The poll worker indicates on the face of the PVR and the receipt that they are spoiled/challenged. The poll worker scans the PCID of the PVR into the BCS, and the BCS records that the PVR is spoiled/challenged. A message appears on the BCS asking the poll worker if the voter is requesting a new ballot. If the voter wants a new ballot, the poll worker prints a new Voting Ticket with a new 5-digit passcode, and the voter returns to a Voting Station to vote a new ballot.

Any Electronic Vote Record (EVR) page whose paper record (PVR) is not read by the Ballot Box/Scanner is designated as spoiled or challenged. In Texas, the voter can spoil up to three ballots. Once the voter places the PVR into the Ballot Box/Scanner, the voter cannot make any changes.

If a voter spoils or challenges a ballot, that ballot is used in a post-election audit. Depending on the specific procedures of the audit, every spoiled or challenged ballot, or a sample number of these ballots, is checked against the corresponding Electronic Vote Record to confirm the accuracy of the system. This process creates a means for performing a live, parallel test of the Voting Stations in the field.

Depending on varying state laws and guidelines, the Bulletin Board can display the decrypted content of these ballots. At this time, Travis County is not planning to offer the decrypted content of the spoiled/challenged ballots on the Bulletin Board.

The workflow for a spoiled/challenged ballot at the polling location is as follows:

Step 1

Voter makes ballot selections and prints a PVR and receipt. Voter asks a poll worker to spoil/challenge the ballot.

Step 2

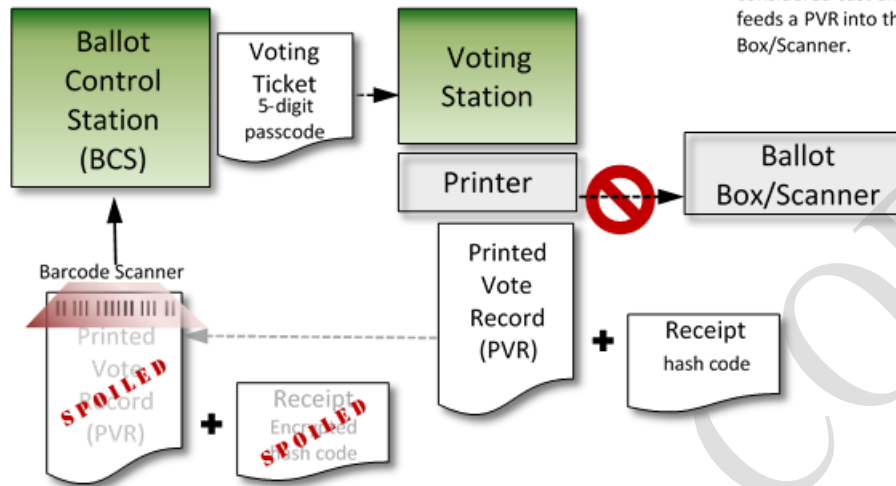
Instead of feeding the PVR into the ballot box/scanner to cast the ballot, the voter hands the PVR and receipt to the poll worker.

Step 3

Poll worker stamps SPOILED on both items and scans the PVR barcode into the BCS to identify the PVR as spoiled. The poll worker retains the spoiled PVR and hands the receipt back to the voter. The PVR is reviewed during the post-election audit.

Step 4

When the BCS is notified of a spoiled ballot, it asks the poll worker if a new ballot is to be issued. If so, the poll worker prints a new passcode and the voter returns to a Voting Station to continue the voting process. A ballot is not considered cast until the voter feeds a PVR into the Ballot Box/Scanner.



3.6 Provisional Ballots

If it is determined that a voter must cast a provisional ballot (Section 63.011 of the Texas Election Code), the poll worker at the Voter Check-In Station assists the voter to complete the provisional ballot form/envelope. The voter then receives a Ballot Style Token that provides the ballot style and an indication that it is for a provisional vote. See Attachment 4 for an example of a provisional Ballot Style Token.

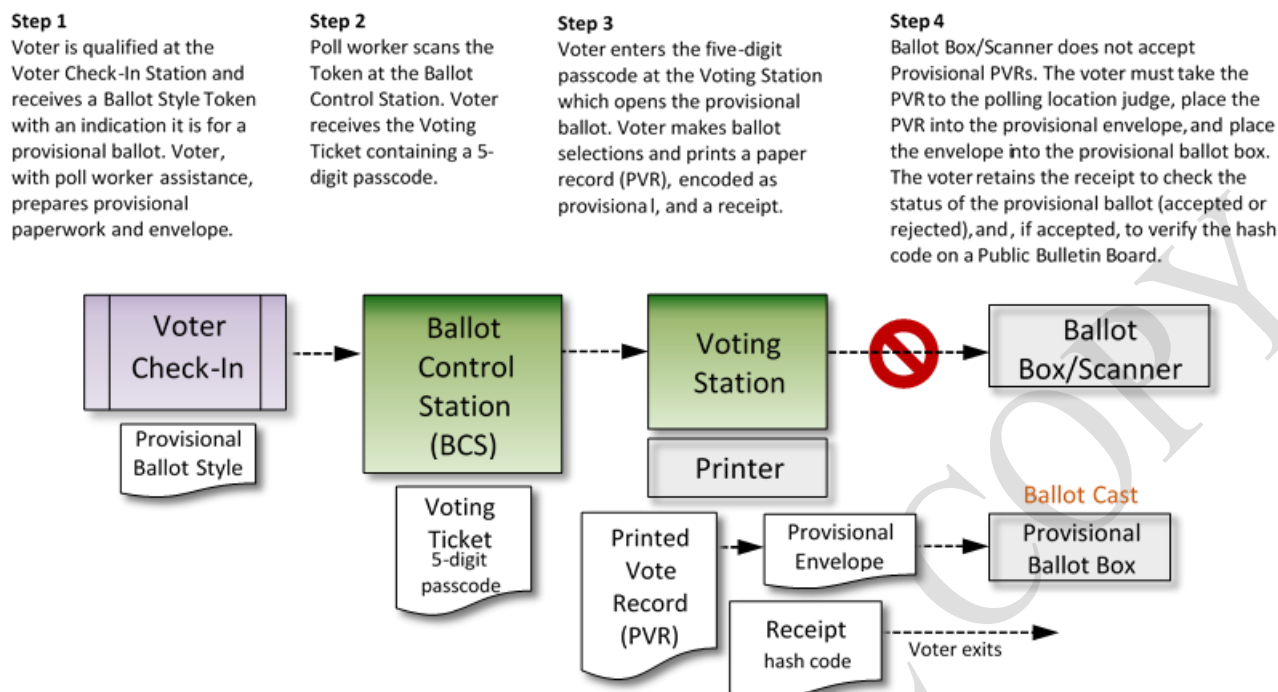
When the Token is scanned at the BCS, the BCS issues a 5-digit passcode that alerts the system of the ballot's provisional status. At the Voting Station, the voter enters this passcode and makes ballot selections. The system creates an Electronic Vote Record (EVR) of the voter's choices and marks it as "provisional pending." The Voting Station prints out the PVR and the voter's receipt. The identifiers on these documents designate this vote as provisional.

The voter returns to the poll worker table and seals the PVR into a privacy envelope. The poll worker seals the privacy envelope into the provisional ballot form/envelope and secures it in a ballot box specifically for provisional PVRs. If a voter attempts to place a provisional PVR in the Ballot Box/Scanner, it is ejected. The voter retains the provisional ballot receipt and can use it to see if the ballot is eventually accepted and counted.

After Election Day, the Voter Registrar reviews all of the provisional voters' registration information and sends the findings to the Early Voting Ballot Board (EVBB) for final consideration. The EVBB opens the accepted provisional ballot form/envelopes and places the PVRs, contained in privacy envelopes, into a ballot box.

The EVBB then opens the ballot box and removes the provisional PVRs from the privacy envelopes. They feed these PVRs into a Ballot Box/Scanner, the system records them as "accepted provisionals," and includes the votes in the tally.

The workflow for a provisional ballot within the polling place is as follows:



3.7 Emergency Paper Ballots

In the case of an emergency, such as a power outage or an incident that causes the evacuation of a polling location, Election Judges are instructed to use emergency paper ballots. If this occurs, the paper ballots are deposited in a special ballot box and are managed at the Counting Station using an emergency paper ballot process using the the By-Mail Scanning and Resolution module.

3.8 When the Polling Location Closes

When the polls close and the Election Judge notifies the system that the last voter has voted, the BCS produces three copies of a paper receipt containing a string of numbers that includes important auditing data (for example: the BCS ID, the number of access codes issued, the number of PVRs cast, the number of provisional ballots cast, the number of spoiled/challenged ballots issued, the time the last voter cast a ballot, etc.) and a hash of the sum of the entire set of EVRs on the BCS. This number is in human-readable format as well as a 1-D barcode. This is called the Election Data Integrity Hash.

The Election Judge uses an application that resides on the computer at the Voter Check-in Station used for qualifying voters. It prompts the Judge to scan the Election Data Integrity Hash barcode and transmit this information to the Receiving Substations and Central Counting Station. The Election Judge posts one copy of the paper receipt on the door of the polling location, retains one copy, and includes one copy with the other election forms delivered to the Receiving Substation.

Using a method (to be recommended by the proposer) such as employing large tamper-resistant evidence bags, the Election Judge seals and secures the BCS and a randomly selected Voting Station. The Judge seals the opening(s) for the Ballot Box/Scanner and, if applicable, the provisional and emergency ballot boxes. Two election workers transport the

BCS, a Voting Station, the Ballot Box Scanner, and the provisional and emergency ballot boxes (if applicable) to a designated Receiving Substation.

During Early Voting, a similar process occurs at the end of each day, but law enforcement officers deliver the daily audit data, the BCSs, and the Ballot Box/Scanners to the Administrator's office instead of Receiving Substations and the Central Counting Station. At the beginning of each day, law enforcement transports these items back to the Early Voting locations. The Administrator may choose to return the same Ballot Box/Scanner to an Early Voting location each day until it is full and in need of replacement.

3.9 At the Receiving Substation (RSS) on Election Night

On Election Day, the Administrator utilizes satellite Receiving Substations (RSS) positioned throughout the County as collection sites. After the polling locations close, teams of at least two poll workers per location drive to a Receiving Substation. There, they transfer custody of election documents, the BCS, the Voting Station, the Ballot Box/Scanner, and the other sealed ballot boxes (if applicable) to RSS workers.

A possible scenario is that for each polling location, the RSS worker:

- Validates all seals;
- Prints out a receipt from the Voting Station of the barcode containing the audit information and the Election Data Integrity Hash;
- Scans the barcode into the Data Collection and Audit Module on a computer at the RSS. This application confirms that the hash code sum of the EVRs pulled from the Voting Station at the RSS is identical to the hash code pulled from the BCS at the polling location and transmitted to the RSS. The RSS worker reviews the poll workers' paperwork and enters additional data, such as the number of signatures on the poll lists. The RSS worker transmits this information along with the Election Data Integrity Hash to the Data Collection and Audit Module at the Central Counting Station;
- Presents law enforcement officers with the BCS, the Ballot Box/Scanner with the cast PVRs, and the provisional and emergency ballot boxes (if applicable). All of these items are sealed at the polling location and remain sealed during the transfer to the Central Counting Station. The law enforcement officers make frequent runs to deliver these items to the Central Counting Station throughout the night; and
- Electronically transfers all of the encrypted vote results on the Voting Station, validates that the hash matches the hash from the BCS receipt above, and transmits the data to the Central Counting Station for eventual import into the Tabulator module. After confirming the transmission, the RSS worker reseals and secures the Voting Station.

3.10 At the Central Counting Station (CCS) on Election Night

At the Central Counting Station (CCS), the Election Trustees meet. The Election Trustees are a diverse group of individuals from the community who represent civic organizations, different political parties, the media, etc. Each Trustee has possession of an electronic device that contains a private/public key pair. When a pre-determined minimum number of the Trustees sign on to the STAR-Vote™ Trustee System as a group, they are able to jointly decrypt the vote tallies and provide verifications for these tallies, as well as supporting audit data.

After the polls close, two different modules collect data. The Data Collection and Audit Module collects the Election Data Integrity Hash codes and other information from the polling locations and matches them against the information from the Receiving Substations. The CCS workers review and compare this data for inconsistencies.

RSS workers transmit the election result data from the Receiving Substations to the Data Collection and Auditing Module at the Central Counting Station. CCS workers download the data from this module onto a write-once data storage device (non-volatile memory device or medium) and manually load it into the stand-alone In-Person Voting/Tabulation module Tabulator. In the event of transmission problems at an RSS, or if the Administrator wants to perform a more thorough check, CCS workers download the data from the physically transported BCSs onto a write-once data storage device or directly into the Tabulator for comparison and/or use.

The Trustees decrypt this data for tabulation throughout the night. As tallies are computed, CCS workers periodically write the data to a write-once data transfer device and load that data onto a separate system. As In Person Voting results become available, the Tabulator exports unofficial cumulative and precinct totals to the Results Aggregation module to merge this information with the By-Mail results. When all locations are counted, the Tabulator module exports final unofficial cumulative and precinct reports for consumption by the Results Aggregation module.

The Tabulator produces several reports for the In-Person Voting/Tabulation module that come in a variety of formats. The reports include, but are not limited to, an EVR hash code report of the hash computation of results from each location (a comprehensive report of all locations and by batch); a comprehensive report of all elections and races; locations reported/not reported (comprehensive of all locations and batch reports); the number of votes cast per location based on the results data; number of provisional ballots (comprehensive and by location); raw data for import into the Results Aggregation module; electronic files that are the ballot manifest for each Ballot Box/Scanner; and Bulletin Board postings that are for internal use only.

3.11 **Ballot-By-Mail Processing**

Processing ballots by mail begins early during the election cycle. The Administrator may receive and accept Military and overseas Federal Postcard Applications (FPCAs) at any time during a calendar year, and standard ballot by-mail applications between 60 and 11 days prior to an election. Long before ballot content is finalized, the Administrator's Ballot-by-Mail staff processes the applications and prepares accompanying materials to ensure a fast turnaround as soon as ballots are available.

A by-mail voter with an accepted standard application receives his or her paper ballot in the mail. The voter hand marks his or her choices on the ballot and returns it using the mail or a common courier. A person who falls under the Uniformed and Overseas Citizens Absentee Voting Act (UOCAVA) and files an FPCA application can opt to receive either a paper ballot to hand mark and return by-mail or an emailed electronic image of a ballot to print, hand mark, and return by mail.

Ballots Sent and Returned by Mail: The Early Voting Ballot Board (EVBB) convenes for the first time toward the end of the Early Voting period. They inspect, qualify, and perform signature validation on all incoming voted by-mail ballots using the outside carrier envelopes and any enclosed forms or documents. Once the EVBB accepts a ballot, they separate the pink privacy envelope (that holds the voted ballot) from the carrier envelope and place it in a ballot box.

Next, the EVBB opens the ballot box and begins to process the voted ballots. The EVBB opens the pink envelopes and reviews each ballot for potential "intent of the voter" conflicts. Intent of the voter problems occur when a voter marks his or her ballot in a way that might cause the digital scanner to incorrectly record the way the voter intended to vote (for example, stray marks on a ballot). On occasion when a ballot arrives torn or otherwise damaged, the EVBB must remake the ballot in accordance with election law.

The STAR-Vote™ EAC-Certified By-Mail Scanning and Resolution product digitally scans the ballots and records voters' selections. System settings can help to segregate out the ballots that need resolution. The EVBB may detect and manually sort ballots for resolution by the system, or the Administrator may activate settings, such as detecting undervotes and overvotes, that the system automatically pinpoints and resolves.

The system records actions taken by the EVBB on ballots that require resolution. Whenever the EVBB directs an action that requires a change on the system to prepare a ballot for tabulation, the system maintains an easily retrievable scanned image of the original ballot prior to resolution and an explanation of all changes.

The Ballot Board convenes several times throughout the election period including Election Day/Night and eight days after Election Day to process late FPCA ballots and Election Day provisionals.

Ballots Sent Electronically and Returned by Mail: A UOCAVA voter using an FPCA application may request an electronic ballot sent by email that the voter prints, hand marks, and returns by mail. When processing the FPCA request, the Administrator inputs the application information, including the choice of an email ballot, into the voter record in the Voter Registration Ballot-by-Mail Module (not a part of STAR-Vote™). With access to a set of PDF ballots from the STAR-Vote™ By-Mail Ballot Generator, the Administrator uses the Voter Registration Module to transmit the ballot. The Voter Registration Module bundles the PDF ballot image with other required electronic documents and makes them available through a secure, voter-specific, online portal. The voter opens the portal and prints the documents including the ballot. The STAR-Vote™ By-Mail Ballot Generator assigns and prints a unique serial number on the ballot in accordance with the Texas Election Code. The voter hand marks the ballot and returns it by mail. The By-Mail Scanning and Resolution product must be able to read the unique serial number and directly process this ballot without using remake procedures.

3.12 Election Results

The outcome of the election is reported in a variety of formats that range from summary results to detailed views of data down to the precinct level. The By-Mail results are tabulated separately from the In Person Voting results and the two are brought together by the Results Aggregation function. When the two sets of results are merged, the detailed level combines the information at the precinct level such that the By-Mail returns are sorted by precinct to match the corresponding precinct returns from the In Person Voting returns. Precinct returns list detailed results by voting method and provide cumulative results along with other parameters associated with the outcome of the election. Once the returns are aggregated at the precinct detail level, the returns are passed to the Report Creation, Formatting and Publishing module for formatting the data into a wide variety of report structures for publication and distribution. The raw, aggregated data is also used for input to the Election Night Reporting application that supports web-based publication of the returns. Reports are produced in both paper and electronic format and the electronic versions are posted to the Administrator's website.

3.13 Post-Election Day Processes

Back Up and Archiving: When the BCSs and Voting Stations are returned to the Administrator's Office, the Administrator backs up and archives the data on all of the devices. Should a contest of election or further need for inspection arise, there must be clear, easy, and rapid methods for recalling data, records, and reports for use as forensic evidence in order to reconstruct and review the entire election, if necessary.

Late Mail and Provisional Ballot Processing: After the election, the EVBB convenes for the final count and tabulation of accepted late by-mail and provisional ballots, and reviews write-in votes for inclusion in the tally.

Audits: The Administrator examines all data, investigates inconsistencies, performs a risk limiting audit to establish statistical confidence that the outcome of the election is accurate, and matches a sample number of spoiled/challenged paper records (PVRs) to their corresponding electronic vote records (EVRs).

Canvass Reports: The Administrator finalizes the results and generates the final canvass for the election. These reports are marked as “final” or “official.”

3.14 **Highlights of STAR-Vote™’s Cryptographic Features**

A sophisticated use of cryptography gives STAR-Vote™ significant layers of security and transparency and minimizes the risk for election tampering. In addition, it allows for the use of Risk Limiting Audits to provide an even higher degree of confidence that the outcome of the election is accurate.

The use of cryptography in this system offers the following advantages:

- **All electronic records are protected with multiple layers of tamper-evidence.**

Sending a hash of vote data from each polling location to the Receiving Substation when the polls close provides a way to confirm that tampering is not occurring during the transport of the electronic data.

This information is also a tool that can detect if alterations of the paper vote records are attempted. When the polls close, the BCS produces the Election Data Integrity Hash. The Voter-Check-in Station computer at the polling location scans the Election Data Integrity Hash barcode and electronically sends the information to the Receiving Substations and the Central Counting Station. When an Election Judge surrenders custody of the electronic data, the Voting Station (randomly selected at the polling location by the poll workers), the BCS and the Ballot Box/Scanner at the Receiving Substation, RSS workers print a new hash code from the Voting Station. This hash code is compared with and must be identical to the one originally sent from the polling location.

The technique of hash chaining is a key technology for providing electronic tamper evidence. Each individual vote record contains a hash of the previous vote record cast on the same device on that day. As a result, even a voter who votes after the altered electronic record is created and checks his or her ballot can detect whether tampering has occurred.

- **An individual or a couple of individuals cannot conspire to decipher the encrypted data.**

A diverse group of individuals from the community (representing civic organizations, different political parties, the media, etc.) form a group of Trustees. In a secure environment, each of these Trustees generates a private/public key pair, and together they participate to generate the Election Public Key. Unless a predetermined minimum number of members of the group act together, the vote count cannot be decrypted, and vote data cannot be accessed or modified.

- **Coded vote counts can be combined so vote totals can be determined without decrypted individual ballots.**

The cryptographic system makes use of a property called additive homomorphism. This allows the votes to be totaled and audits conducted without the chance of infringing on the secrecy of the ballot. When a voter makes his or her choices at the voting station, the

software uses an algorithm to turn it into an encrypted code. The additive homomorphism property makes it possible to combine the encrypted votes and come up with an encrypted sum. When that sum is decrypted, it is the same number as the total calculated from the non-encrypted data.

- **Accuracy of the totals can be confirmed without decrypting them. The validity of ballot contents can be independently checked without divulging voter selections.**

The cryptographic system employs a technology known as commitment consistency. The system utilizes NIZK (Non-Interactive Zero Knowledge) proofs throughout to allow independent verification (without providing the decryption key) that all ballots correspond to the rules of the election (no overvotes/undervotes) and to validate with mathematical certainty that the officially-provided tallies are correct decryptions of the vote totals. Therefore, an independent observer can check a mathematic proof that the tabulated results correctly reflects the totals of the ballots cast by the voters.

- **Patterns cannot be detected in the encrypted codes.**

All encryption makes use of cryptographic randomization in order to make sure that a vote for the same candidate on a different ballot does not look the same to an observer.

- **Risk-limiting audits test the accuracy of election outcomes and verify the consistency between the Electronic Vote Record (EVR) and the Printed Vote Record (PVR). The risk-limiting audit offers two significant advantages.**

First, a risk-limiting audit provides an efficient method to test that the electronic versions of voters' selections (EVRs) match the voter-verified paper records (PVRs) placed into the Ballot Box/Scanners. The audit consists of randomly selecting ballot serial numbers (PCIDs), locating the PVRs with those PCIDs, and comparing the EVRs to the corresponding PVRs.

Second, it provides statistical confidence that the outcomes of the election are accurate. The audit team uses a statistical calculation to determine the number of PVRs that must be inspected to prove within a specified margin of error that tabulation correctly reported the winners in a race. If two candidates have vote totals that are not close, the audit team checks a small number of PVRs to demonstrate with a high degree of certainty that the results outcome is correct. If two candidates have vote totals that are close, the team examines a higher number of PVRs. If the team finds any discrepancies between PVRs and EVRs, they increase the sample size and repeat the process until they complete a round without errors, or until they perform a full hand recount. This process also tests the accuracy of the decryption and the content of the EVRs.

- **Cryptography allows the public to participate in confirming the accuracy of an election through the use of an electronic Bulletin Board accessible at the Election headquarters.**

The Travis County Clerk's website and every voter's receipt contains instructions on how to access the Bulletin Board. On election night and thereafter, the Bulletin Board posts unofficial returns and information regarding the election. This includes a list of the encrypted EVRs of all cast ballots. People who have no basic knowledge of cryptography and individuals or organizations that do may use this data in a variety of ways. Some examples of how they may examine this data are:

- **A voter can verify that his or her ballot is included in the count.**

After a voter makes his or her selections, the Voting Stations prints a PVR and a separate receipt. The receipt contains a mathematically computed number (a hash) that is based on the ballot content. Using that number, the voter can look on the Bulletin Board and verify that the system correctly read the EVR and included it in the tabulation. This number is not on the ballot and can never be used to read the actual ballot content of a cast ballot.

More importantly, because of the additive homomorphic property of the encryption, independent individuals or Entities can take the individual encrypted records that the County claims are cast and combine their encrypted votes together to make an encrypted tally. Thanks to the commitment consistency already described, an independent Entity can validate mathematically that the official tally is a correct decryption of that encrypted tally they have independently calculated. By doing so, they have independently verified that every record the County claims is cast was actually cast and is part of the final tally. Combined with the ability of a voter to look up his or her specific record, this provides unprecedented confidence to the voter that his or her votes made it into the official tally.

- **A voter or a Parallel Testing Audit Team can perform live, on-site parallel testing to make certain that electronic votes are being recorded as voted. This is done through the use of “challenged” ballots.**

The procedures for creating a challenged ballot are the same as those for creating a spoiled ballot. The voter makes ballot selections but does NOT put the PVR into the Ballot Box/Scanner (therefore, not officially casting the ballot). Instead, the voter takes the PVR to a poll worker who stamps it as a “Spoiled or Challenged Ballot.”

After the election, the system decrypts these EVRs that are created but NOT formally completed and cast. The Administrator performs an audit by using the PCID on any or all of these PVRs to locate (using a search function) the EVRs with a matching hash code. The Administrator compares the content of the PVR with the EVR to confirm that the system correctly captured the voters’ selections.

Depending on a state’s guidelines and laws, the Administrator may post the decrypted ballot information from the Spoiled/Challenged Ballots on the Bulletin Board for public examination.

- **An independent party can develop an “app” to validate the vote totals.**

An individual or organization may employ someone with cryptographic skills to develop an application that independently calculates an encrypted tally to verify against the official tally without ever decrypting the content of the EVRs. The requirements in this proposal include the creation of certain components for release as open source to the public. These components provide the necessary ingredients for anyone to build an application that confirms the correctness of the tallies and the integrity of the encryption.

3.15 **Risk-Limiting Audit Support**

STAR-Vote™ employs the use of risk-limiting audits after each election to ensure, with a high level of confidence, an accurate outcome of an election. After each election and before the final canvass, an audit team performs the risk-limiting audit for the purpose of ensuring confidence that there is a perfect 1:1 representation between the electronic vote records (EVRs) used to tally the election and the selections stored on the printed vote records (PVRs) held in Ballot Box/Scanners. Risk-limiting audits are statistically meaningful audits of the outcome, not recounts.

To enable this goal, the Trustees produce a list after the election that contains a plaintext copy of each vote from each EVR. The vote order is randomized so that it is impossible to connect a given vote back to any specific EVR without additional information.

A code is paired with each plaintext vote. This code is a hash of two things: the PCID of the page of the PVR on which that vote should appear and the race ID for the race in which that vote is cast. A Mix-net produces and distributes the decryption by the Trustees as part of the general tabulation/decryption process. The Mix-net, in this instance, must be verifiable (each step in the Mix-net must provide a proof that there is a 1:1 correlation between inputs and outputs).

This list represents a commitment to a 1:1 relationship between the individual plaintext votes on physical pieces of paper and individual encrypted votes in cast EVRs. The publication of this list enables public observers in the Risk Limiting Audit process to use a list they know tallies correctly and to which the election authority has committed.

At the time of the audit, election personnel and public observers gather and generate a random seed (employing a method that generates a genuinely random number) and use it to seed a pre-specified, publicly available random number generator.

Election personnel use counting scales to establish the actual number of sheets of paper in each ballot box. This provides an upper limit on the number of unexpected PVR pages (pages without a corresponding EVR) it is possible to encounter. Using this upper limit, knowledge of the number of the margin of victory in each race, and knowledge of which races are on which ballot style pages, it is possible to calculate the minimum number of pages of each ballot style page type that must be identical to their electronic record in order to meet a pre-specified threshold of statistical confidence. A sample implementation of these calculations may be found at this url:

<http://www.stat.berkeley.edu/~stark/Vote/auditTools.htm>

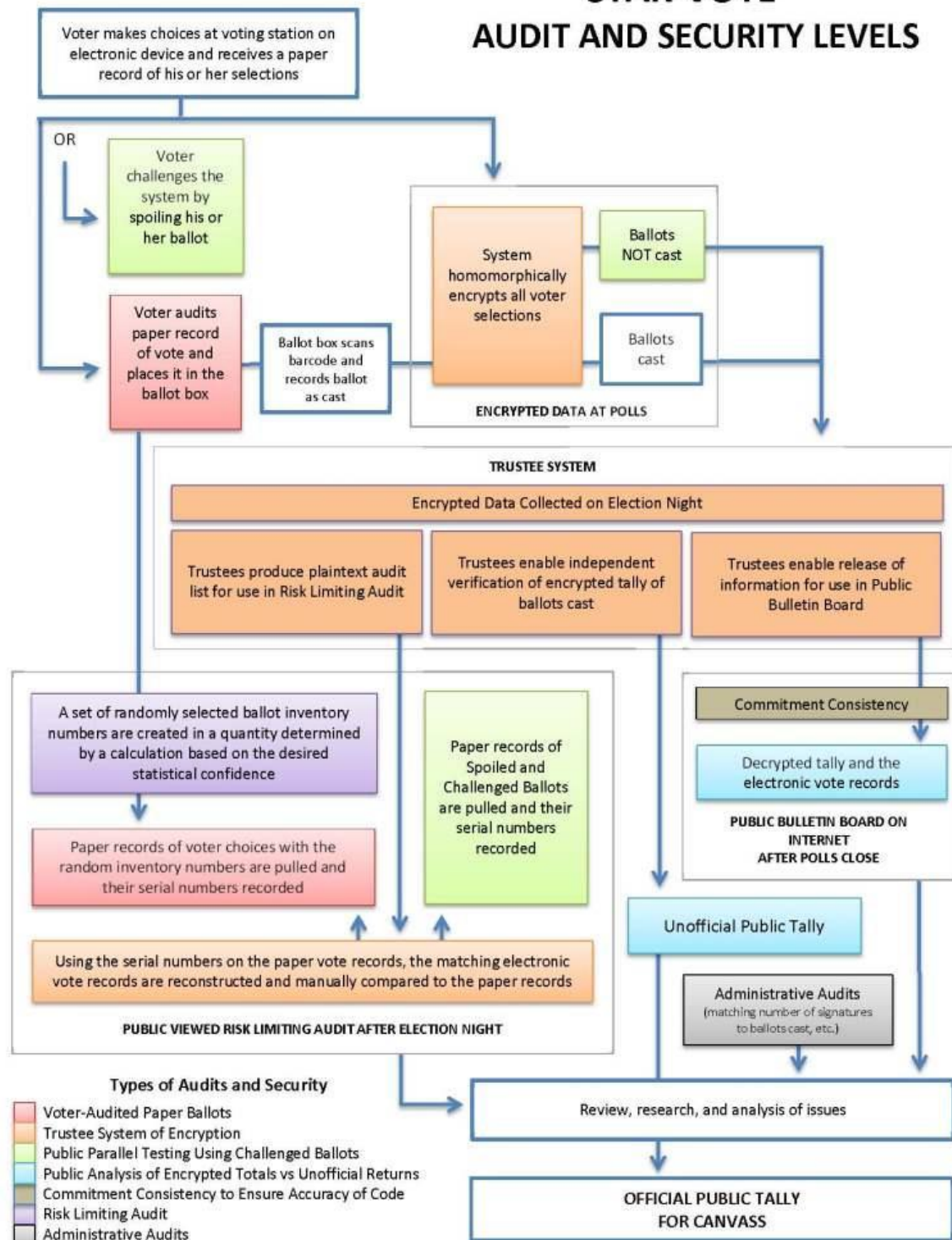
Audit support software implements these calculations and, using the random number generator seeded earlier, generates a complete list of the ballots to pull for audit in the first sample. This is specified, for example, by saying “The page with PCID xxxxxxxx, in ballot box yy”. The process of finding the page with the correct PCID in a given ballot box is aided through the use of custom-modified high-speed scanners (or similar device) that can make use of this data encoded into the barcode of each page.

When the audit team pulls the PVR, it is shown to the public observers, making its PID known. Using this value and the race IDs known to correspond to races on that ballot style page, the software calculates all of the hash codes associated with the votes on that page from the plaintext list. A quick lookup of these codes should reconstruct the electronic record associated with that page perfectly. The team checks these votes against the selections on the printed page. If no discrepancies exist, the audit proceeds to the next randomly selected page. If discrepancies exist, the team notes the races in which the discrepancies occurred and the impact of the discrepancy on the tally.

When the team completes its review of the full set of PVRs required by the initial calculation, and if all EVRs perfectly match, the team declares the electronic tally as audited and statistically consistent with the paper record. If the team finds any errors, they recalculate the sample sizes and draw new ballots to reach those larger sample sizes. If the team finds successive errors, it repeats the process until either there is a round with no errors or a full hand recount of the paper records is completed.

The following chart illustrates how different audit and security levels are used in STAR-Vote™.

STAR-VOTE™ AUDIT AND SECURITY LEVELS



4.0 Desired Operational and Performance Characteristics

The following section outlines the desired operational and performance characteristics for the STAR-Vote™ system. The paragraphs describe the features, functions and objectives of various components of the system and the desired behavior. Some of these items have been converted into system requirements in Part II of this RFP; others are informational and convey operational and performance objectives of the County. Proposer's detailed response, requested in Part II, should attempt to incorporate the information that follows in applicable sections of the Proposer's response. The evaluation of proposals includes a subjective assessment of Proposer's

overall understanding of the system and how well the response embraces the spirit of STAR-Vote™.

- 4.1 Offers the accuracy and speed of an electronic vote count and the accountability of a paper ballot. For example:
 - 4.1.1 The system must provide rapid and accurate electronic vote counts and a paper record of each voter's choices that can be verified by the voter; and
 - 4.1.2 The system must allow the use of both the electronic and paper records of voters' choices for resolving issues and questions regarding the vote count and for audits (including risk-limiting audits), recounts, and contests, while retaining voter anonymity.
- 4.2 Sets a new, higher standard of security for the use of electronic and paper vote records and vote counting. For example:
 - 4.2.1 The system must incorporate extensive security methods such as end-to-end verifiability, trusted platform management, and system connection strategies that mitigate the risks associated with electronically voted and counted ballots;
 - 4.2.2 The system must utilize technology and physical security methods to ensure electronic and paper vote records are not tampered with from the time voting materials leave the polling location to the time they are tallied at the Central Counting Station;
 - 4.2.3 The system must address security risks that include, but are not limited to: the introduction of malware or a malicious machine, forging votes at a voting station, tampering with a ballot box, ballot box stuffing, chain voting, power or network connection disruption, compromise of voter privacy, denial of service, misdeeds by election workers/officials, tampering during transport of balloting materials, and theft of voting station equipment or ballot boxes;
 - 4.2.4 The system must offer a means for identifying that a problem has occurred, whether accidental or malicious, isolate the area of attack, and provide detailed data on the events;
 - 4.2.5 The system must be built to defend against insider attacks – including attacks both from election personnel and from system vendor personnel; and
 - 4.2.6 The system must be able to prove the accuracy of the results it provides.
- 4.3 Utilizes new and current methods of transparency at every stage of the process. For example:
 - 4.3.1 The system must provide and promote transparency where possible using non-tech, low-tech, and high-tech strategies;
 - 4.3.2 The system must provide testing processes that ensure the accuracy of important components such as ballot language, ballot styles, tabulation, cryptographic functions, reporting, management of spoiled and provisional ballots, and audit reconciliations. The processes must be thorough, beyond the requirements of the law, and openly available for public viewing;

- 4.3.3 The system must provide a Bulletin Board for internal County use only that still promotes transparency and trust in the vote count. This allows the public to participate in testing the accuracy of the vote count without violating voter privacy. This internal Bulletin Board must be accessible from the Administrator's webpage and must contain a list of encrypted electronic vote records. Voters must be able to verify that their ballots were cast and included in the vote count by using a code on a receipt printed in the polling location. These codes are hash codes that are calculated based on the full content of the ballot but do not allow anyone to reconstruct any information about the voters' selections; and
- 4.3.4 The system must give voters interested in participating in the auditing process the choice to vote a Spoiled/Challenge ballot in addition to casting a regular ballot. Spoiled/Challenge ballots are not included in the final tally process, but are included in the group of ballots where all or a sample number are pulled for direct comparison with the electronic records after the election.
- 4.4 Incorporates numerous strategies for auditability throughout the process for every election. For example:
 - 4.4.1 The system must provide efficient and rapid methods for performing audits throughout the election cycle to ensure that errors or problems are found, documented, and resolved as quickly as possible;
 - 4.4.2 To reduce the chance of tampering or theft of election equipment prior to the opening of the polls and during transportation after the polls have closed, the system must provide a means to pinpoint the location of key election equipment and detect and mark the time that the seals/locks containing election equipment are set and opened;
 - 4.4.3 The system must incorporate the use of risk-limiting audits, a particularly powerful tool providing an independent check to verify the accuracy of an election's outcome.
- 4.5 Provides the best methods possible for assisting persons with disabilities and meeting established accessibility guidelines. For example:

The system must provide the best methods possible for voting accessibility and be versatile enough to adapt to new technologies as they become available to assist persons with sight, hearing, and/or mobility challenges. Giving all persons, regardless of disability, the chance to vote in the same manner using a secret ballot is of paramount importance.
- 4.6 Provides multiple layers of redundancy to ensure available and reliable sources of data. For example:
 - 4.6.1 The system must have both electronic and paper vote records. The system must store the full set of voter choices in a polling location on all Ballot Control Stations (BCSs) and on all Voting Stations; and
 - 4.6.2 The system must have multiple sources available for use in determining the true vote count, if a problem occurs in the polling place.
- 4.7 Has the flexibility to efficiently perform in different election environments. For example:

- 4.7.1 The system must be able to efficiently operate in election situations that include Early Voting, Election Day Precinct Voting, and Election Day Vote Centers. This includes physical adaptability to a wide variety of polling location environments and technical adaptability to a wide range of circumstances;
- 4.7.2 The system must be able to manage a variety of needs from those of small polling locations to large mega-voting sites; and
- 4.7.3 The system must be able to manage a large number of ballot formats and elections that include a variety of Entities with potentially different voting options and tabulation methods (primaries, straight part voting, and varying choice selection instructions).
- 4.8 Utilizes a Red Team to maximize system security, creates new testing procedures, and develops a response plan in the event of an attack. For example:
 - 4.8.1 The Red Team looks for flaws and vulnerabilities in system design, coding, software practices, and implementation.
 - 4.8.2 The Red Team works in cooperation with the vendor throughout the development of the system and provides feedback to the Administrator at the completion of each phase of the project. The vendor makes requested improvements before moving on to subsequent phases.
 - 4.8.3 For use during implementation and regular operation of the system, the Red Team works in cooperation with the vendor and the Administrator to develop strategies to test whether an attack has been attempted; assess the type and degree of any damage that occurs; and establish an action plan for stopping an attack, restoring operations, and creating documentation on the event.
 - 4.8.4 The County will separately contract for the services of the Red Team. The Administrator will independently select the members of the Red Team. The vendors for the other Elements will not participate in the selection of Red Team members.
 - 4.8.5 The Administrator adjudicates disagreements between the vendor and the Red Team.
- 4.9 Incorporates a plan to be used throughout the development process that provides evidence that high quality standards were used in the design, development, documentation, and implementation were used.
 - 4.9.1 The system must be well designed; engineered using best practices; secure, robust and scalable; usable and accessible; and agile enough to steadily evolve through software and hardware upgrades;
 - 4.9.2 The vendor must implement a plan to measure the successful completion of each phase and to demonstrate quality design, in-depth testing, adherence to all laws and requirements governing elections systems, the use of best practices, and maintenance of thorough and current documentation and version control.
- 4.10 Has reasonable development, maintenance, and support costs. For example:

- 4.10.1 The system must provide Travis County and other possible STAR-Vote™ counties with a voting system that meets their needs while protecting the interests of their taxpayers. The system must be designed with efficiency and cost savings recognized during all stages of the project - from development to ongoing use;
- 4.10.2 The system must have reasonable purchase, maintenance, and support costs;
- 4.10.3 The costs for the upgrade of software must be minimal or part of the maintenance agreement;
- 4.10.4 The costs for replacing or adding hardware must be reasonable; and
- 4.10.5 Support services must have variety, depth, and reasonable costs.
- 4.11 Is developed by vendors with high ethical standards and policies, a history of reputable business dealings, a sound financial structure, a depth of required expertise, and a proven record for completing large scale, complicated projects on time and within budget. For example:
 - 4.11.1 Vendors working on this project must agree to openness and full disclosure, and maintain a very high standard of ethics in fact and perception. It is imperative that a project of this size and sensitivity be conducted by vendors who are willing and able to withstand a high degree of scrutiny. Travis County and the other participating counties are determined to ensure the success of this project, protect any invested financial and human resources, and safeguard the trust we have earned from the voters; and
 - 4.11.2 Vendors must provide information to demonstrate throughout the project that they are financially sound and can devote the appropriate resources to this project.
- 4.12 Is designed for the use and evolution of commercially available hardware and associated software whenever possible. When it is not possible, the vendor must provide reasonable explanations, descriptions, and pricing detail for any proposed proprietary equipment. For example:
 - 4.12.1 To improve costs, voter usability standards, and allow for beneficial improvements in technology, the system must make use of commercially available hardware and associated software wherever possible;
 - 4.12.2 Unless no other choice is possible, this RFP discourages proprietary hardware or commercially available hardware and associated software packaged in a proprietary “box”; and
 - 4.12.3 The vendor must consider when designing and anticipate to the greatest degree possible inevitable changes in platforms, software modifications, and hardware.
- 4.13 Assumes and plans for effective and efficient change so that the system benefits from new technology without requiring reinvention or major overhaul. For example:
 - 4.13.1 Interoperability is a fundamental principle in the development of STAR-Vote™. When hardware and software technologies change, the system should require minimal redesign;

- 4.13.2 The system must be adaptable to a variety of platforms, some of which may not exist today;
 - 4.13.3 Modules must be decoupled to the greatest degree possible, and interact only using documented file formats, software interfaces, and communication protocols; and
 - 4.13.4 The system must be extensible, and, when possible, every component must be interoperable with other versions of the same component from other vendors. For example, if the Administrator adopts a new voter registration system or a different vendor develops a better variant of the ballot design tools, the Administrator must be able to license it from that vendor and integrate it into their STAR-Vote™ deployment with little or no modification of STAR-Vote™ code.
- 4.14 Definitively records voter intent. For example:
- The system requires the use of paper ballots. Those ballots must be marked in such a way that the intent of the voter is never in question. The County knows from experience and from watching numerous vote contests throughout the nation that in a hand marked, paper ballot election, there is always a subset of ballots with ambiguous vote markings. This results in a situation where election workers (or the courts) must attempt to discern what the voter is trying to indicate. To alleviate this, the system must provide the voter with a computer marked and printed record, and give each voter the opportunity to review the printed paper record of his or her choices before placing it in the ballot box.
- 4.15 Employs open standards where possible in software development. For example:
- 4.15.1 Wherever possible, the system design must leverage existing, open standards and data formats. Where such standards do not exist or are insufficient, the County encourages expanding on existing standards and technologies with an eye toward establishing a new industry standard or even new published open standards;
 - 4.15.2 The system must not use any technology, standard, or data format that would preclude Travis County (or a consortium of counties) from retaining exclusive rights to the system's source code if it chooses to do so.
- 4.16 Utilizes technology that is intuitive and familiar to voters, incorporates usability design principles for electronic and paper ballots, and allows for an efficient flow through the polling place that is friendly and easy to understand. For example:
- 4.16.1 The system must use interfaces for the voter that are straightforward and logical and technology that is able to process rapidly. The system must utilize equipment that has the feel of a technology familiar to most people (for example, a smart phone or tablet), and it must help voters accurately record their preferences when making ballot selections;
 - 4.16.2 The flow of voters through the polling location must be intuitive and time efficient to ensure that lines are minimized and efficiency maximized;
 - 4.16.3 Ballot design, with a few exceptions, must follow the guidelines set by Anywhere Ballot and AIGA Design for Democracy. These organizations have developed standards to improve the way government and citizens communicate and have

made enormous progress in establishing standards for accessible and trusted ballot formats;

- 4.16.4 The design process should employ User Centered Design (UCD)-based iterative design methodologies, with evidence provided of multiple rounds of formative evaluation and a report of the summative usability evaluation at the end; and
- 4.16.5 In general, systems should be so intuitive that instructions are not required. In cases where instructions are required, they should be concise, clear, and unambiguous. Pictorial representations may be used, provided they have demonstrated 100% understandability. Furthermore, any instructions should be delivered when and where they are needed, not in one block at the beginning.
- 4.17 Uses an electronic system to coordinate and streamline the collection and application of ballot language and district/precinct data. For example:

The system must allow Administrator for election services to work directly in an interactive electronic format for the setup and intensive review of the visual and audio content of the ballot.
- 4.18 Allows for the operation of the system independent of the vendor. For example:

The system must allow the Administrator to operate it entirely without vendor support unless maintenance or support is requested or is part of an agreed-upon maintenance plan.
- 4.19 Is lightweight, durable, and easy for election workers to transport, set up, operate, and break down. For example:
 - 4.19.1 The system's hardware components and peripherals must be easy to set up and break down at the polling location;
 - 4.19.2 Certain components, such as the BCS and the Voting Stations, must be easy to secure and transport in a small car. This implies that all equipment be lightweight, mobile, and easy to assemble and disassemble;
 - 4.19.3 The system hardware must have the strength and durability to remain undamaged through frequent handling and transportation;
 - 4.19.4 Operation of the system must be clear and logical so that a poll worker with one day or less of training and limited knowledge in technology can confidently manage a polling location; and
 - 4.19.5 The system must utilize interfaces that help poll workers detect any problems that occur and provide instructions on their resolution.
- 4.20 Produces rapid, versatile, and easily customizable reports. For example:
 - 4.20.1 The information collected by the system must be easily converted to report formats and styles that meet the broad range of needs dictated by the Elections Division, media, and the public;
 - 4.20.2 The system must provide easily customizable reports for a wide variety of purposes including the reporting of partial election returns throughout election night, final unofficial election returns, and canvass reports;

- 4.20.3 The system must produce easily customizable reports containing any audit data or other information collected by the system; and
- 4.20.4 Data must be organized and exported in a variety of formats including but not limited to TXT (tab-delimited), CSV, XLSX, PDF, XML/JSON or other Human Readable format and easily uploaded to the Administrator's Election Night Return System, the Texas Secretary of State, the media, and any other customers.
- 4.21 Ensures voters receive the correct ballot format. For example:
- To minimize or eliminate human error, the system must utilize automated methods to provide the voter with the correct ballot format.
- 4.22 Demonstrates flexibility in the polling place by allowing the continuation of voting in disruptive circumstances. For example:
- The proposal must include strategies for sustaining or immediately resuming voting in the event of a disruptive situation. Potential issues include but are not limited to total or partial loss of power, locked polling locations (requiring relocation or the use of emergency paper ballots), equipment failure, and attempted malicious activity.
- 4.23 Consists of reliable, low cost consumables. For example:
- Proposals must include a list of all consumable supplies necessary for the proper operation of the voting system, including estimated usage rates and costs. Proposers must consider the ease of replacing these items at any time, especially by election workers in the polling place, and the requirements by Texas law that all election records including paper records be archived for 22 months.
- 4.24 Complies with Voluntary Voting System Guidelines (VVSG).
- As currently envisioned, STAR-Vote™ complies with almost all of the elements of the 2012 Draft VVSG and 2005 VVSG. The County believes a few exceptions are necessary to allow for STAR-Vote™'s enhanced security, transparency, auditability, and reliability. These are noted in Attachment 2. Any system proposed to fulfill this RFP must fully comply with all elements of the 2012 Draft VVSG pertaining to voter interaction and accessibility, except for those items listed in Attachment 2 as incompatible with STAR-Vote™.
- In addition, the successful proposal must comply with all aspects of the 2005 VVSG 1.0, except in such places as discussed in Attachment 2 as not being compatible with STAR-Vote™.
- 4.25 Complies with Federal and Texas Election Laws and Texas Secretary of State Guidelines and Advisories.
- As currently envisioned, STAR-Vote™ complies with almost all Federal and State requirements. A few exceptions are necessary because of STAR-Vote™'s enhanced security, transparency, auditability and reliability. These are noted in Attachment 3. Travis County will engage in discussions with Texas Secretary of State to define a method for accepting, certifying, and establishing policies for the use of STAR-Vote™.
- 4.26 Adapts to Changes in Laws and Requirements. For example:

As technology changes over time, laws and guidelines that govern elections also change. Additionally, there is the future potential that many different jurisdictions may want to use this system, but they may prescribe very different requirements. This requires that every aspect of the system is as easy and low cost to modify or extend as possible, even in ways that cannot be anticipated today; that every aspect of the software is designed in a modular fashion, using coding best practices including thorough and meaningful comments and documentation; and that the system is engineered for straightforward extensibility and interoperability with external components.

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NOTE: PARTS II, III, AND IV, ALONG WITH THE PROPOSER'S PROPOSAL, AND ANY DEVIATION TO WHICH TRAVIS COUNTY HAS AGREED, IN WRITING, WILL BECOME THE CONTRACT.

PART II - GENERAL REQUIREMENTS

1.0 SCOPE OF WORK:

The Travis County Purchasing Agent is requesting competitive proposals from qualified entities for a set of components and modules that, collectively, will result in the functional implementation of the first phase of STAR-Vote™ as defined in this RFP. The components and modules are:

- Element A: EAC-Certified Modules
- Element B: In-Person Voting/Tabulation and Support Modules
- Element C: Ballot Box/Scanner
- Element D: Red Team Assurance
- Element E: Human Factors Evaluation

The following general requirements are provided to assist Proposers in understanding the objectives of the County and in submitting a thorough response. Specific requirements are provided in the Appendices.

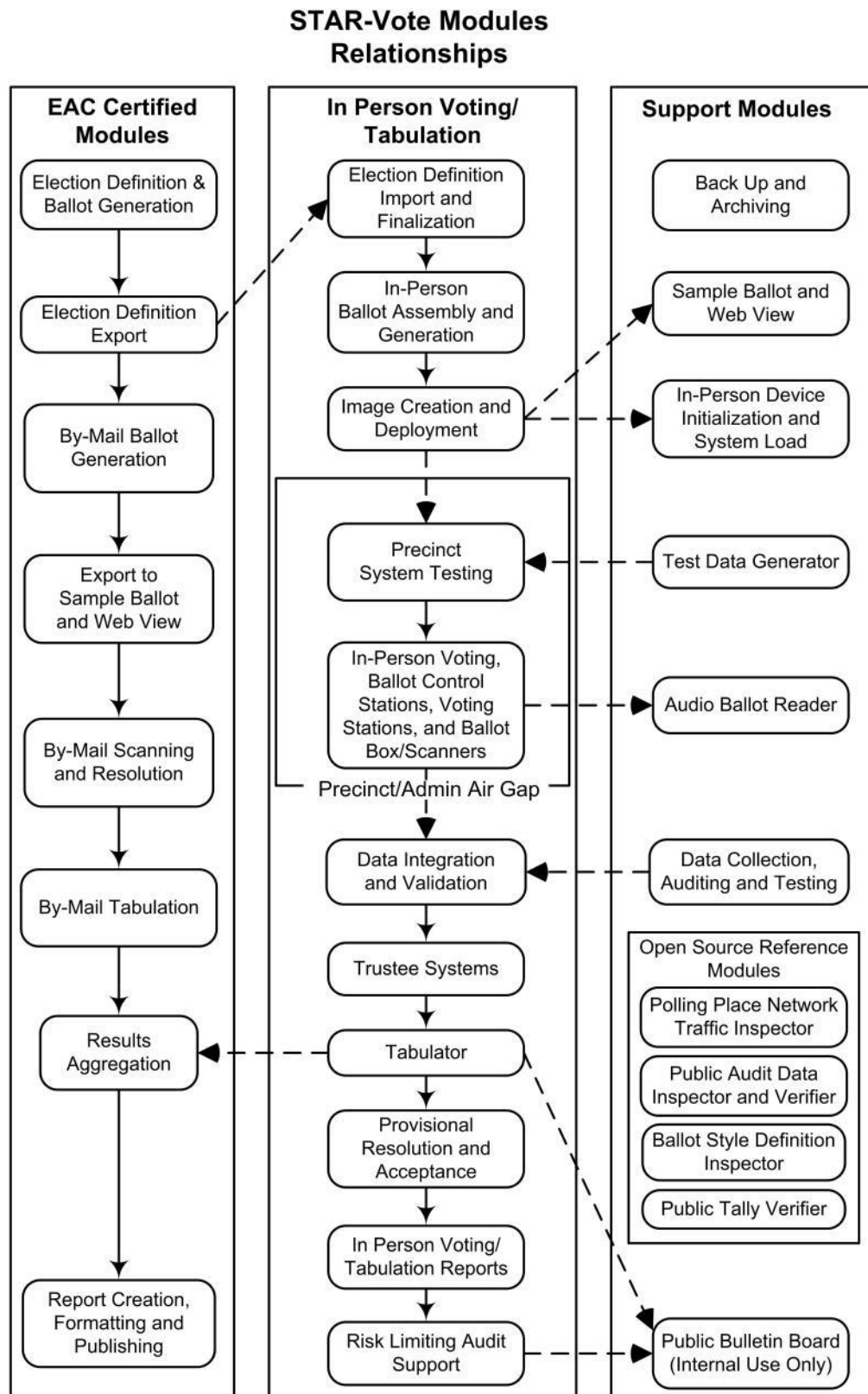
- 1.1 Applicability of Requirements: The RFP breaks down the requirements into the Elements listed above to align the requirements with fields of expertise where the overall goal of the RFP is to acquire the entire system defined herein. Only those Proposers who comply with the requirements in Appendices A-G will be considered for contract award, and all such requirements will be a part of any resulting contracts. However, the RFP does not require all Proposers to provide detailed responses to the requirements in Appendices A-G as long as all Proposers satisfy those requirements. Detailed responses requirements are given below.
- 1.2 Detailed Responses for Appendices: Appendices A, B and C break down the system requirements into categories that align with the system diagram given in paragraph 3.0 below, Appendices D through G provide additional non-functional requirements and Appendices E and F provide system-level cryptographic and hardware requirements, respectively. Proposers submitting proposals on Elements A, B and C are required to provide detailed responses to the Appendices as defined below. Many of the line items in the Appendices do not require descriptive responses, but the successful Proposer must acknowledge that the requirement is included in its cost proposal. Given this, recommended response types for the line items in the Appendices are provided below in an effort to simplify the response. These recommendations should be followed if a detailed response is required for a given Element and are as follows:
 - 1.2.1 Response: Acknowledged; If the line item requirement is accepted and included in the cost proposal, no further response is required.
 - 1.2.2 Response: Acknowledged with interpretation; There are many line items that can be implemented in different ways and if the cost proposal assumes a particular implementation, a description of the selected implementation must be described.
 - 1.2.3 Response: Acknowledged with objection; If all or part of the line item requirement presents an impediment or support issue, provide alternate wording of the requirement, a description of the implementation approach and a justification for the deviation. Only use this response option if the intent of the requirement is satisfied.

- 1.2.4 Response: Do not support; If a line item requirement cannot be supported and is not included in the cost proposal, state so and provide a reason for the inability to support.

- 2.0 DETAILED RESPONSE FOR PROJECT MANAGEMENT (All Elements)** A description of the proposed project team, including the number of team members, disciplines, roles and responsibilities, and project management practices. The County is providing an enterprise-wide system project manager to oversee and coordinate integration of the Elements, so Proposers should include a description of how they will interact with this resource.
- 2.1 Provide high-level project schedule that breaks down any proposed Element into stages of implementation and note any dependencies on the availability on other Elements of the RFP. Identify key milestones and deliverables for each stage of the proposed Element implementation project plan.
- 2.2 Describe the strategies used to ensure the project remains on schedule and within budget. Also provide a description of how schedule issues are discovered and reported to the County.
- 2.3 Outline test methodologies to ensure deliverables meet the RFP requirements for each proposed Element. This should include a description of applied quality assurance practices. Test methodologies should include component and system level testing and address whether these tests are performed under live or virtual conditions.
- 2.4 Maintaining update status and progress on each Element will be critical success factor for the project. Describe the proposed project status reporting format, frequency and content.
- 2.5 Describe how changes and modifications to requirements would be managed.
- 2.6 Describe type of a structure Proposer would suggest for providing on-going support, maintenance, and upgrades to the system.

3.0 OVERVIEW OF MODULES

3.0 Diagram of Modules



3.1 **Summary of Module Functions**

3.1.1 **EAC-Certified Modules**

- 3.1.1.1 **Election Definition and Ballot Generation Module** is a commercially available software product that supports current industry requirements for election definition and ballot generation function and is certified by the EAC.
- 3.1.1.2 **Election Definition Export** is a utility that is preferably an integrated function within the Certified Election Definition Module that generates an Election Definition file in a specified format for import into the In-Person Voting/Tabulation components.
- 3.1.1.3 **By-Mail Ballot Generation** provides the ability to format By-Mail ballots using the Election Definition data into commercially accepted file formats for on-demand or batch printing.
- 3.1.1.4 **Export to Sample Ballot and Web View** supports publication of sample ballots identified by either precinct or ballot style and in paper and electronic formats.
- 3.1.1.5 **By-Mail Scanning and Resolution** is a commercially available EAC-Certified software product that supports current industry requirements for scanning by-mail and other paper ballots, allows for digital resolution of hand marked paper and write-ins, and generates By-Mail cast vote records.
- 3.1.1.6 **By-Mail Tabulation** is a commercially available EAC-Certified software product that supports current industry requirements for tabulation of the By-Mail cast vote records produced by the Certified By-Mail Scanning and Resolution Module.
- 3.1.1.7 **Results Aggregation** is a utility that is preferably an integrated function within the Certified By-Mail Tabulation Module and combines the By-Mail results and In-Person Voting/Tabulation results into a single, unified election results data element.
- 3.1.1.8 **Report Creation, Formatting, and Publishing Module** receives the Aggregated results and formats and publishes the results in accordance with the requirements of the elections division and various consumers including AP, news agencies, and other media.

3.1.2 **In-Person Voting/Tabulation modules**

- 3.1.2.1 **Election Definition Import and Finalization** module imports electronic and audio data, allows files to be locked down for testing, finalizes the Election Definition File, and exports the Election Certification Authority used in creating it.
- 3.1.2.2 **In-Person Ballot Assembly and Generation** module is an automated process that uses the data contained in the finalized Election Definition file and formats the ballot styles for each precinct that will be displayed on the Voting Station. This process also generates control files for the BCSs to manage the Voting Stations, Ballot Box/Scanners and other logic necessary to conduct In-Person voting at Polling Places and Early Voting sites.
- 3.1.2.3 **Image Creation and Deployment Module** takes in the Election Definition File and Election Certification Authority; allows configuring (or loading pre-

configured) System Images for BCSs, Voting Stations, and Ballot Box/Scanners. This module enables provisioning each device permitted to partake in the election, pushing the System Image onto that device, and generating and deploying a valid certificate for the election to that device (or, rather, having the device generate a certificate and signing it).

3.1.2.4 **Precinct System Testing Module** provides the ability to test the system in standalone, and fully-simulated election scenarios.

3.1.2.5 **In-Person Voting**

3.1.2.5.1 **Ballot Control Station (BCS) Module** communicates with and collects information from all devices in the polling location, makes proper ballot styles available on voting stations, manages provisional and spoiled/challenged ballots, records votes, and enables poll workers to monitor and administer election duties at the polls.

3.1.2.5.2 **Voting Station Module** allows in-person voters to select, record, and print their ballot choices to paper and receive a printed receipt.

3.1.2.5.3 **Ballot Box/Scanner Module** notifies the system when a voter places his paper record in the ballot box, creating a record that it has been cast.

3.1.2.6 **Data Integration/Validation Module** integrates data from polling locations, provisional resolution, and performs initial validation on the data.

3.1.2.7 **Trustee Systems Module** administers distributed cryptographic processes used for tally decryption and generation of audit data.

3.1.2.8 **Tabulator Module** administers decryption of tallies and creation of public and internal audit data by the Trustees.

3.1.2.9 **Provisional Resolution and Acceptance Module** provides a system to register each accepted Provisional for inclusion in the final tally.

3.1.2.10 **In-Person Voting/Tabulation Reports Module** generates a series of reports that are specific to In-Person Voting/Tabulation and allows verification/tracking of equipment, system performance and results, which become part of the overall election audit.

3.1.2.11 **Risk-Limiting Audit Support Module** supports the Risk-Limiting Audit by generating random samples, reconstructing electronic records for comparison, and handling statistics. This module will also support the decryption of all or a sample number of Spoiled/Challenged ballots after the election to confirm that the paper records match the associated electronic vote records.

3.1.3 **Support Modules**

3.1.3.1 **Back Up and Archiving Module** This module provides for the storage and rapid retrieval of all data captured during an election process.

3.1.3.2 **Sample Ballot and Web View Module** creates sample ballots using the same software component used to generate election ballot, by ballot style/precinct, a comprehensive sample ballot, and sample ballot data for the County Clerk's website.

- 3.1.3.3 **In-Person Device Initialization and System Load Module** deploys a clean System Image of the system to each polling location device.
- 3.1.3.4 **Test Data Generator Module** creates combinations of voting data that can be compared to the same data manually entered on the system in order to ensure the accuracy of the programming.
- 3.1.3.5 **Audio Ballot Reader** allows visually impaired voters to verify their printed selections. The Reader scans the text of a Printed Vote Record (PVR) and audibly reads the content to a voter utilizing a headset.
- 3.1.3.6 **Data Collection, Auditing and Testing Module** collects audit information and the Election Data Integrity Hashes from each polling location at the end of each day of Early Voting and at the end of Election Day. At the end of Election Day, this information is sent to the Receiving Substations and the Counting Station. When the election workers deliver the Voting Stations to the RSS, the data is again entered and compared. Data collected from the polling locations and the Receiving Substations are also continuously transmitted to the Central Counting Station for analysis. At the Counting Station, this data is downloaded and then manually loaded into the Tabulator Module.
- 3.1.3.7 **Bulletin Board Module** (internal use only) receives the postings of hash codes from the Tabulator/Trustee Control Module and allows voters to look up and verify if a ballot is cast. The output of this module will be for internal use only.

3.1.4 **Open Source Reference Modules**

- 3.1.4.1 **Polling Location Network Traffic Inspector Module** correctly processes and displays all network traffic in a polling location to which it is connected.
- 3.1.4.2 **Public Audit Data Inspector and Verifier Module** consumes the public audit data, validates hash chains, and verifies that ballots are well formed.
- 3.1.4.3 **Ballot Style Definition Inspector Module** reads a ballot style definition and displays it by correctly using the Ballot UI.
- 3.1.4.4 **Public Tally Verifier Module** consumes the official tallies and the public audit data, calculates independent encrypted tallies and, using these, verifies that the public audit data successfully verifies all official tallies.

4.0 DETAILED RESPONSE; ELEMENT A: EAC-Certified Modules

- 4.0 Propose a file specification for an Election Definition Export file and a preferred interface for exporting data to third-party systems.
- 4.1 Provide a file specification for a Tabulator import file and a preferred interface for importing data from third-party systems into the Results Aggregation utility.
- 4.2 Provide a functional description of a Results Aggregation utility that accumulates election results from two or more voting methods.
- 4.3 Provide an example ballot generated from the proposed By-Mail Ballot Generation function and explain the purpose of any non-election related indicia on the ballot. Detail how the printed indicia are controlled and the range of variability afforded. Describe the process for transitioning from a test environment to a production environment.
- 4.5 Propose a structure for providing on-going support, maintenance, and upgrades to the system.
- 4.6 Outline a process for a Risk-Limiting Audit process for the proposed By-Mail product.
- 4.7 Outline any limitations of the proposed EAC-Certified product in meeting the requirements given in this RFP and propose alternate solutions or workarounds to address any limitations.
- 4.8 Provide detailed responses to the items in Appendix A and applicable section of Appendices F and G.

5.0 DETAILED RESPONSE; ELEMENT B: In-Person Voting/Tabulation and Support Modules

- 5.1 Propose a file specification for an Election Definition import file and a preferred interface for importing data from a third-party system.
- 5.2 Propose a file specification for a Tabulator export file and a preferred interface for exporting the data to third-party systems into the Results Aggregation utility. To simplify the design, development and testing of Element B, the RFP is requesting successful proposers to choose and propose specific COTS hardware to satisfy the requirements for the various hardware components identified in the RFP. Identify the selected COTS hardware computing platform(s) and devices for all functions within Element B, justify the selections, name the manufacturer, model and the process for quantity acquisition.
- 5.4 Provide a written hardware upgrade plan that projects selected COTS hardware computer platform(s) end-of-life and outlines alternate or new make and model for hardware replacement.
- 5.5 The successful Proposer for Element B is required to work with the Red Team from Element D. Provide an outline of a plan for working with the Red Team.
- 5.6 Describe the various technologies proposed to be used during any development, including: programming language(s)/software libraries; test frameworks; algorithms (where these aspects are unusual or important to the design, including the selected cryptographic algorithms); and software backend for web-services and any implied hosting requirements. Reference items from Appendix D where possible.
- 5.7 Describe Proposer's approach to system and software design. Include any development tools and methodologies employed to ensure this project is engineered using best practices and that the resulting system is secure, robust, and scalable. Reference items from Appendix D where possible.

- 5.8 Describe the process and any tools used for configuration management for control of source code, methods for continuous integration for automated build and testing and any tools used for defect tracking and reporting. Also address methods used for version control and tracking of documentation.
- 5.9 Describe the process for transitioning from a test environment to a production environment.
- 5.10 Propose a structure for providing on-going support, maintenance, and upgrades to the system.
- 5.11 Equipment in the polling location must remain operational on battery power for at least four hours. A full precinct must be able to be operated by the power provided by a typical gas-power generator supplying about 2000 watts. Propose a test protocol to demonstrate this system capability.
- 5.12 Propose a file specification and transfer method for a configuration import file produced by the In-Person Voting/Tabulation Election Definition Import and Finalization module to initialize the Ballot Box/Scanner prior to the election to meet the functional and operational requirements and descriptions for the Ballot Box/Scanner as defined in this RFP.
- 5.13 Propose a bi-directional data interface between the Ballot Control Station (BCS) and the Ballot Box/Scanner (Element C).
- 5.14 Propose a data file specification and interface for transferring the Ballot Box/Scanner election data following the close of polls to the Back Up and Archiving module defined in Element B of this RFP.
- 5.15 Proposals must include a list of all consumable supplies necessary for the proper operation of the voting system, including estimated usage rates and costs. Provide detailed responses to the items in Appendix B, C, D, E and applicable sections of Appendix F and G.

6.0 DETAILED RESPONSE; ELEMENT C: Ballot Box/Scanner

- 6.0 Propose a file specification and transfer method for a configuration import file produced by the In-Person Voting/Tabulation Election Definition Import and Finalization module to initialize the Ballot Box/Scanner prior to the election to meet the functional and operational requirements and descriptions for the Ballot Box/Scanner as defined in this RFP.
- 6.1 Propose a bi-directional data interface between the Ballot Control Station (BCS) (from Element B) and the Ballot Box/Scanner.
- 6.2 The successful proposer for Element C is required to work with the Red Team from Element D. Provide an outline of a plan for working with the Red Team.
- 6.3 Describe the various technologies proposed to be used during any development, including: programming language(s)/software libraries; test frameworks; algorithms (where these aspects are unusual or important to the design, including the selected cryptographic algorithms); and software backend for web-services and any implied hosting requirements.
- 6.4 Describe Proposer's approach to system and software design. Include any development tools and methodologies employed to ensure this project is engineered using best practices and that the resulting system is secure, robust, and scalable. Reference items in Appendix D where appropriate.
- 6.5 Describe the process and any tools used for configuration management for control of source code, methods for continuous integration for automated build and testing and any tools used for defect tracking and reporting. Also address methods use for version control and tracking of documentation.

- 6.6 Propose a data file specification and interface for transferring the Ballot Box/Scanner election data following the close of polls to the Back Up and Archiving module defined in Element B of this RFP.
- 6.7 Ground-up development : If proposing the development of a new Ballot Box/Scanner hardware device (Option 1 from Appendix 10, section 10.9), provide the following:
 - 6.7.1 Rendering of the proposed mechanical design and a description of the mechanical functions;
 - 6.7.2 Describe the electrical and mechanical design, engineering, development and testing process. Testing should include mechanical stress testing and highly accelerated life testing.
 - 6.7.3 Describe an interim solution for processing PVRs including the mechanical configuration and software interface.
 - 6.7.4 Outline of the manufacturing process and cost of goods once in production. An initial production run of 500 units should be used to calculate cost projections.
- 6.8 Describe the process from transitioning from a test environment to a production environment.
- 6.9 Propose a structure for providing on-going support, maintenance, and upgrades to the system. Provide detailed responses to the applicable items in Appendices D, E, F and G..

7.0 DETAILED RESPONSE; ELEMENT D: Red Team Assurance

- 7.0 Propose a skeleton threat model for election operations and outline its application to the STAR-Vote™ system.
- 7.1 Outline the process and content of an end-to-end risk assessment of the STAR-Vote™ system as defined by the requirements in this RFP. Cite any requirement that can be modified to reduce risk or any requirement that cannot be validated within the scope of the contract.
- 7.2 Describe the process used to create a prioritized list of security improvement recommendations, required inputs and expected outputs. Discuss general categories within the recommendations that are expected given the STAR-Vote™ architecture.
- 7.3 Provide a list of recommended assurance-related testing and validation techniques, a description of each, how they are applied to the STAR-Vote™ system and, the value each provides for the overall system security posture.
- 7.4 Outline Proposer's recommended secure design principals, their application to STAR-Vote™ software development requirements and how these principals are integrated into the process used by the successful Proposers of Elements B and C.
- 7.5 Describe how secure development support will be provided to other contract awardees for this RFP.
- 7.6 Given Proposer's knowledge of the product development lifecycle, develop a schedule of Red Team Assurance tasks with dependencies on the availability of the various STAR-Vote™ modules.
- 7.7 The successful Proposer for Element D is required to work with the successful proposers from Elements B and C. Provide an outline of a plan for working with these Element contractors.

- 7.8 The Red Team Assurance contract that may be awarded under this RFP covers the development, testing and release of the STAR-Vote™ system and does not include election support, review or analysis of the system following its deployment and implementation. Propose a program of on-going security support for the STAR-Vote™ system and estimated costs.
- 7.9 Recommend additional security efforts, if any, that are applicable to the Red Team Assurance function.

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8.0 DETAILED RESPONSE; ELEMENT E: Human Factors Evaluation

- 8.0 Given Proposer's knowledge of the product development life cycle, the requirements and structure of this RFP and principles of User Centered Design (UCD), describe the method recommended to embed UCD practices in the development efforts contemplated by this RFP.
- 8.1 Review the RFP requirements and make prioritized list of changes or additions to improve the usability and accessible of the STAR-Vote™ system. For the top five (5) priority items, discuss the process to implement these items and trade-offs for the development timeline.
- 8.2 Provide an outline of a usability study or series of studies to assess the level usability and accessibility with the objective of discovering improvements for the STAR-Vote™ performance and operation relative to these qualities. The outline should include estimates of the number/type of people required to conduct this program, number and profiles of participants and the required equipment and/or systems.
- 8.3 Describe the process required and development impact for a human factors evaluation to incorporate the Performance Protocol and Voting Common Industry reporting cited in Part I, Section E, paragraph 2.8. Responses should demonstrate Proposer's knowledge of the protocol and reporting format. Recommend additional resources to augment the aforementioned resources and assess the added value of any recommendations. The Human Factors Evaluation contract that may be awarded under this RFP covers the development, testing and release of the STAR-Vote™ system and does not include election support, review or analysis of the system following its deployment and implementation. Propose a program of on-going Human Factors evaluation support for the STAR-Vote™ system and estimated costs.

9.0 CONTRACTOR REQUIREMENTS

In this section and in subsequent sections, each successful Proposer (if any) may also be referred to as a "Contractor." Contractor shall:

- 9.0 Warrant that all goods supplied to County are of the latest models and versions, in good working order, free from defects, and in performance to manufacturers specifications. All equipment must conform to the manufacture's official published specifications.
- 9.1 Agree to repair, adjust and/or replace (as determined by the County to be in its best interest) any defective equipment within the warranty period at the successful Vendor's sole expense, including labor to remove defective equipment and install, configure and test replacements.
- 9.2 Follow manufacturer's best practices for installing, configuring and documenting services provided to County.
- 9.3 Provide pricing for all required hardware, software, installation, configuration, accessories, system warranty and post-warranty maintenance support.
- 9.4 Perform in a timely manner, the services and activities described within this RFP, in accordance with the terms and conditions and in compliance and all other statements made by the Contractor in its RFP response.
- 9.5 Indicate if specialist staff members are full-time employees or contracted.
- 9.6 Include any innovative/creative service or approach ideas that may reduce the County's overall costs.

- 9.7 Provide any suggestions with cost estimates, if applicable, beyond the stated services that would provide improved efficiency or beneficial service enhancements.
- 9.8 Coordinate with the County Clerk or designee on all specified work and sequencing of tasks, milestones and testing for project-related efforts that involve two or more contractors.
- 9.9 Consent to cooperating and coordinating with County-provided project management resources and advisors for system-level matters and assistance in managing the operational relationship between contractors provided with awards as a result of this RFP.
- 9.10 Agree to negotiate, in good faith, the format of data interchange requirements between components or modules of the system that exist between the defined Element boundaries. The negotiations will also include designation of specific contractors for on-going maintenance and revision control of the data interchange formats and configuration. Travis County acknowledges the final, agreed-upon data interchange format can impact pricing and Contractors will be allowed submit a justification for any price increase using their proposed format submitted from paragraphs 4.0, 5.0 and 6.0 above.
- 9.11 Provide all services in accordance with applicable federal, state and local laws, rules and regulations, and in a manner consistent with generally accepted professional and technical standards of the election industry, software industry or other similar service industries except as otherwise stated in this RFP.
- 9.12 Assign a qualified Project Manager to the project. County has the right to approve in advance in writing all Contractor staff assigned at any time to this project, which approval shall not be unreasonably withheld or delayed. Contractor's Project Manager must successfully manage the proper performance of Contractor's obligations as stated in this RFP and any executed contract resulting from this RFP. Except in emergency circumstances,. Contractor must not reassign or replace assigned staff without County's prior written consent, which will not be unreasonably withheld or delayed. Contractor must replace any staff member with an equally qualified' person reasonably satisfactory to County. County is not be responsible for any costs associated with changes in Contractor staff.
- 9.13 Each individual software application or software system and custom-designed electromechanical devices must be documented in a Functional Requirements document that consists of testable requirements. The Functional Requirements document includes a definition of any interface with other components of the STAR-Vote™ system.

10.0 CONTRACT REQUIREMENTS

Contract must allow for the following requirements as applicable to specific Elements:

- 10.1 Acquisition of system and application software, software licenses, maintenance and support
- 10.2 Hardware purchases, maintenance, and support
- 10.3 Identification of per hour rate for Contractor's technical resources
- 10.4 Identification of per hour rate for Project Management services
- 10.5 Process for support of changes to system requirements over the term of the contract that includes a method of determining any cost impacts to the contract.

11.0 MAINTENANCE/SERVICE LEVEL REQUIREMENTS: ELEMENTS A, B and C

- 11.1 A service level agreement (SLA) that will include but is not limited to response to and resolution expectation for different levels of problem severity.
- 11.2 Phone support from 8:00am to 5:00pm Central Time for non-election periods, which is defined as 18 days prior to any election day and 3 days following any election day. On-site technician support given five (5) days' notice from the County.
- 11.3 Phone support from 7:00am to 7:00pm Central Time during election periods and one-hour response for technician on-site for first three elections. This includes replacement of any defective hardware under warranty.
- 11.4 All software upgrades and updates shall be provided during maintenance period.
- 11.5 Electronic quarterly and annual reports for all reported problems by: product line, severity, description of problem, resolution and length of time to resolve the issue.

PART III - SPECIAL PROVISIONS

- 1.0 **TERM OF CONTRACT:** The term of the resulting contracts will be specific to each Element and will accommodate the dependencies that exist between the Elements. It is expected that the schedule critical path with the development and testing of Element B (and, therefore, the schedule for the remaining Elements) will be dependent on Element B milestones and completion. The County will perform the systems analysis necessary to coordinate the schedules of the individual Elements. The recommended system-wide schedule will be shared with each successful Proposer during contract negotiation, adjusted as necessary when the final contract terms have been agreed to by the parties to each contract. The resulting contracts will be subject to the approval of Commissioners Court and will be effective upon award.
- 2.0 **OPTION TO EXTEND:** Successful Proposers of each Element will agree to an automatic contract extension of six (6) months that may be exercised at the County's option (individually, an "Option to Extend" and collectively, the "Options to Extend"), and all provisions of the contracts, except for term and price, shall remain unchanged and in full force and effect. County shall exercise an Option to Extend no sooner than ninety (90) days prior to expiration of the then current term. County shall have the right to exercise all or a portion of the Option to Extend in any combination it deems necessary.
- 3.0 **TERM OF WARRANTY:** The successful proposer for Element B shall provide the maximum warranty offered by the COTS manufacturer (not less than one (1) year). Warranty shall begin after installation is complete, the system is fully tested and operational and accepted by County. During the warranty period the Contractor is responsible for labor, materials, and other costs associated with required warranty repair. All successful proposers for each Element will warrant their goods and service in the body of their respective responses and the final, individual Element warranties will be subject to discussion and negotiation during final contract negotiations.
- 4.0 **MAINTENANCE FEES:** For each year after the warranty period, the annual license/maintenance fee may not increase more than 3% annually. Details of maintenance support must be described in the proposal, and must include hours of maintenance support and a statement of what additional charges, if any, will be imposed if an on-site visit is required.
- 5.0 **PURCHASE ORDER:** Contractor will not release any items or perform any services until a purchase order number is assigned by the designated representative of the County Purchasing Office. Contractor will reference contract and purchase order on all invoices submitted to the Travis County Auditor. Upon issuance of a purchase order, the contract administrator will call the contractor with instructions to commence the contracted work.
- 6.0 **CONTRACT ADMINISTRATOR:** For purposes of monitoring performance, establishing requirements, approving and coordinating schedules, users, and equipment, the county department named below shall act as contract administrator on behalf of Travis County:

Travis County Clerk
Ron Morgan (or successor or designee)
5501 Airport Blvd
Austin, Texas 78751
(512) 854-9188

- 7.0 **IMPLIED SERVICES:** If any services, functions or responsibilities not specifically described in the contract are required for the proper performance and provision of the project services, they shall be deemed to be implied by and included within the scope of the required services to the same extent and in the same manner as if specifically described in the contract. Except as otherwise expressly provided in the contract, Contractors shall be responsible for providing the facilities, personnel and other resources as necessary to provide the project services.
- 8.0 **TRAVEL NOT INCLUDED AS PART OF SOLICITATION:** All travel requires prior approval from the County Clerk or designate. All approved travel is subject to compliance with Travis County travel policies. Travis County will not reimburse Contractor for expenses incurred for any unapproved travel or for expenses for approved travel outside the parameters of County policy.

PART IV - GENERAL PROVISIONS

1.0 GENERAL DEFINITIONS:

- 1.1 "Auditor" means the Travis County Auditor or her designee.
- 1.2 "Commissioners Court" means Travis County Commissioners Court.
- 1.3 "County Building" means any County owned buildings and does not include buildings leased by County.
- 1.4 "Was doing business" and "has done business" mean:
 - 1.4.1 Paying or receiving in any calendar year any money or valuable thing which is worth more than \$250 in the aggregate in exchange for personal services or for the purchase of any property or property interest, either real or personal, either legal or equitable; or,
 - 1.4.2 Loaning or receiving a loan of money; or goods or otherwise creating or having in existence any legal obligation or debt with a value of more than \$250 in the aggregate in a calendar year;but does not include
 - 1.4.3 Any retail transaction for goods or services sold to a Key Contracting Person at a posted, published, or marked price available to the public,
 - 1.4.4 Any financial services product sold to a Key Contracting Person for personal, family or household purposes in accordance with pricing guidelines applicable to similarly situated individuals with similar risks as determined by Contractor in the ordinary course of its business; and
 - 1.4.5 A transaction for a financial service or insurance coverage made on behalf of Contractor if Contractor is a national or multinational corporation by an agent, employee or other representative of Contractor who does not know and is not in a position that he or she should have known about the Contract.
- 1.5 "Key Contracting Person" means any person or business listed in Exhibit A to the Ethics Affidavit.
- 1.6 "Purchasing Agent" means the Travis County Purchasing Agent.
- 1.7 "County" means Travis County, Texas, a political subdivision of the State of Texas.
- 1.8 "Historically Underutilized Business" or "HUB" means any entity or association formed to make a profit in which one (1) or more persons who are educationally or economically disadvantaged because of their identification as members of one of the following groups: African Americans, Hispanic Americans, Asian Pacific Americans, Native Americans or Women of any ethnicity have the following rights:

- 1.8.1 Own at least fifty-one percent (51%) of all classes of shares or other equitable securities and have incidents of ownership, including an interest in profit and loss, equivalent to the percentage of capital, equipment or expertise contributed to the business where ownership is measured as though the community property interest of a spouse is the separate property of that spouse, if both spouses certify in writing that the non-participating spouse relinquishes control over his or her spouse, and his or her community property, and not as if it is subject to the community property interest of the other spouse; and
- 1.8.2 have a proportionate interest and demonstrated active participation in the control, operation and management of the business's affairs; where control means having recognized ultimate control over all day-to-day decisions affecting the business, and is be known to, and at least tacitly acknowledged in day-to-day operations by employees of the business and by those with whom business is conducted, and holding a title commensurate with that control.

2.0 GENERAL CONDITIONS:

Contractor represents that he has thoroughly examined the drawings, specifications, schedule, instructions and all other contract documents. Contractor has made all investigations necessary to be thoroughly informed regarding plant and facilities for delivery of material, equipment and/or services as required by the proposal conditions.

3.0 CONTRACTOR CERTIFICATIONS:

- 3.1 Contractor certifies that he is a duly qualified, capable, and otherwise bondable business entity, that he is not in receivership or contemplates same, and has not filed for bankruptcy. He further certifies that the company, corporation or partnership is not currently delinquent with respect to payment of property taxes within County.
- 3.2 Contractor warrants that all applicable copyrights and licenses which may exist on materials used in this contract have been adhered to and further warrants that County shall not be liable for any infringement of those rights and any rights granted to County shall apply for the duration of the contract. Contractor shall indemnify County, its officers, agents and employees from all claims, losses, damages, causes of action and liability of every kind including expenses of litigation, and court costs and attorney fees for damages to any person or property arising in connection with any alleged or actual infringement of existing licenses or copyrights applicable to materials used in this contract.

4.0 DISPUTES AND APPEALS:

The Purchasing Agent acts as the County representative in the issuance and administration of this contract in relation to disputes. Any document, notice, or correspondence not issued by or to the Purchasing Agent or other authorized County person, in relation to disputes is void unless otherwise stated in this contract. If the Contractor does not agree with any document, notice, or correspondence issued by the Purchasing Agent, or other authorized County person, the Contractor must submit a written notice to the Purchasing Agent within ten (10) calendar days after receipt of the document, notice, or correspondence, outlining the exact point of disagreement in detail. If the matter is not resolved to the Contractor's satisfaction, Contractor may submit a written Notice of Appeal to the Commissioners Court, through the Purchasing Agent, if the Notice is submitted within ten (10) calendar days after receipt of the unsatisfactory reply. Contractor then has the right to be heard by Commissioners Court.

5.0 FUNDING:

Funds for payment on this Contract have been provided through the County budget approved by Commissioners Court for this fiscal year only. State of Texas statutes prohibit the obligations and expenditure of public funds beyond the fiscal year for which a budget has been approved. However, the cost of items or services covered by this Contract is considered a recurring requirement and is included as a standard and routine expense of County to be included in each proposed budget within the foreseeable future. County Commissioners expect this to be an integral part of future budgets to be approved during the period of this Contract except for unanticipated needs or events which may prevent such payments against this Contract. However, County cannot guarantee the availability of funds, and enters into this Contract only to the extent such funds are made available. The fiscal year for County extends from October 1st of each calendar year to September 30th of the next calendar year.

6.0 FUNDING OUT:

Despite anything to the contrary in this Contract, if, during budget planning and adoption, Commissioners Court fails to provide funding for this Contract for the following fiscal year of County, County may terminate this Contract after giving Contractor thirty (30) days written notice that this Contract is terminated due to the failure to fund it.

7.0 INVOICING/PAYMENTS:

- 7.1 Contractor shall provide County with an Internal Revenue Form W-9, Request for Taxpayer Identification Number and Certification, that is completed in compliance with the Internal Revenue Code and its rules and regulations before any Contract funds are payable.
- 7.2 Payments will be made by ACH/EFT or check upon satisfactory delivery and acceptance of items and Contractor's submission of a correct and complete invoice to the address below:

Nicki Riley, CPA
Travis County Auditor
and
Emailed to: AP@traviscountytexas.gov (preferred method); or
Mailed to: P.O. Box 1748; Austin, Texas 78748

For assistance on setting up electronic payments (by ACH), which permits County to directly deposit payments into your account, please contact the Travis County Auditor's Office, Disbursements Division at (512) 854-9125.

In addition, a copy of the invoice must be sent to:

Denise Bell (or successor or designee)
Travis County Clerk
5501 Airport Blvd.
Austin, Texas 78751
(512) 854-3997

- 7.3 To be considered correct and complete, invoices will include:

7.3.1 Name, address, and telephone number of Contractor, which will match the W-9 Contractor submits to the Travis County Auditor's Office ("Auditor"); and name and address of where payment is to be sent, if payment is to be by check;

7.3.2 County Contract or Purchase Order number;

7.3.3 Identification of products or services as outlined in the Agreement;

7.3.4 Quantity or quantities, applicable unit prices, total prices, and total amount; and

7.3.5 Any additional payment information called for by the Agreement. County will not pay invoices that are in excess of the amount authorized by the Agreement.

7.3.6 Payment will be deemed to have been made on the date of mailing of the check or warrant. For purposes of payment discounts, time will begin upon satisfactory delivery of products and services or submission of acceptable invoice, whichever is last. Partial payments will not be made unless specifically requested and approved by County prior to Agreement award.

7.4 Accrual and payment of interest on overdue payments is governed by Texas Government Code Chapter 2251.

8.0 RESERVED:

9.0 DISCOUNTS:

Prompt payment discounts will not be considered in determining low proposals and making awards. In connection with any discount offered, time will be computed from the date of receipt of supplies or services or from the date a correct invoice is received, whichever is the later date. Payment is deemed to have been made on the date of mailing of the check, or warrant.

10.0 OFFICIALS NOT TO BENEFIT:

If a member of the Commissioners Court belongs to a cooperative association, the county may purchase equipment or supplies from the association only if no member of the Commissioners Court will receive a pecuniary benefit from the purchase, other than as reflected in an increase in dividends distributed generally to members of the association.

11.0 COVENANT AGAINST CONTINGENT FEES:

The Contractor warrants that no persons or selling agency has been retained to solicit this Contract upon an understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial selling agencies maintained by the Contractor to secure business. For breach or violation of this warranty, County shall have the right to terminate this Contract without liability or in its discretion to, as applicable, add to or deduct from the Contract price for consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

12.0 ASSIGNMENT:

12.1 Assignment. The parties to this Contract shall not assign any of the rights or obligation under this Contract without the prior written consent of the other party. No official, employee,

representative or agent of County has the authority to approve any assignment under this Contract unless that specific authority is expressly granted by Commissioners Court.

12.2 Successors Bound. The terms, provisions, covenants, obligations and conditions of this Contract are binding upon and inure to the benefit of the successors in interest and the assigns of the parties to this Contract if the assignment or transfer is made in compliance with the provisions of this Contract.

12.3 If a change of name is required, the Purchasing Agent shall be notified immediately. No change in the obligation of or to Contractor will be recognized until it is approved by Commissioners Court.

13.0 **FORCE MAJEURE:**

If the performance by the County of any of its obligations hereunder shall be interrupted or delayed by any occurrence not occasioned by its own conduct, whether such occurrence be an act of God or the result of war, riot, civil commotion, sovereign conduct, or the act or conduct of any person or persons not a part hereto, then it shall be excused from such performance for such period of time as is reasonably necessary after such occurrence to remedy the effects thereof.

14.0 **TERMINATION FOR DEFAULT:**

Failure by either County or Contractor in performing any provisions of this Contract shall constitute a breach of Contract. Either party may require corrective action within ten (10) calendar days after date of receipt of written notice citing the exact nature of the other's breach. Failure to take corrective action or failure to provide a satisfactory written reply excusing such failure within the ten (10) calendar days shall constitute a default. The defaulting party shall be given a twenty (20) calendar day period within which to show cause why this Contract should not be terminated for default. Commissioner's Court may take whatever action as its interest may appear, resulting from such notice. All notices for corrective action, breach, default or show cause shall be issued by the Purchasing Agent or County Attorney only and all replies shall be made in writing to the Purchasing Agent at the address provided herein. Notices issued by or to anyone other than the Purchasing Agent or County Attorney shall be null and void, and shall be considered as not having been issued or received. County reserves the right to enforce the performance of this Contract in any manner prescribed by law in case of default and may contract with another party with or without competition or further notification to the Contractor. As a minimum, Contractor shall be required to pay any difference in the cost of securing the products or services covered by this Contract, or compensate for any loss or damage to the County derived hereunder should it become necessary to contract with another source because of his default, plus reasonable administrative costs and attorney's fees. In the event of Termination for Default, County, its agents or representatives, shall not be liable for loss of any profits anticipated to be made hereunder.

15.0 **TERMINATION FOR CONVENIENCE:**

County reserves the right to terminate this Contract upon thirty (30) calendar days written notice for any reason deemed by Commissioners Court to serve the public interest, or resulting from any governmental law, ordinance, regulation, or court order. In the event of such termination the County shall pay the Contractor those costs directly attributable to work done or supplies obtained in preparation for completion or compliance with this Contract prior to termination; provided, however, that no costs shall be paid which are recoverable in the normal course of doing business in which the Contractor is engaged. In addition, no costs which can be mitigated through the sale of supplies or inventories shall be paid. If County pays for the cost of supplies or materials obtained for use under this Contract, said supplies or materials shall become the property of County and shall be delivered to the FOB point

shown herein, or as designated by the Purchasing Agent. County shall not be liable for loss of any profits anticipated to be made hereunder.

16.0 CHANGES:

16.1 Unless specifically provided otherwise in this Contract, any change to the terms of this Contract or any attachments to it shall be made by written change order signed by both parties. The Purchasing Agent may at any time, by written document, make changes within the general scope of this Contract in any one of the following:

16.1.1 Description of services;

16.1.2 Place of delivery; 16.1.3 Any aspect of contract to correct errors of a general administrative a nature or other mistakes, the correction of which does not affect the scope of the contract and does not result in expense to the Contractor.

16.2 It is acknowledged by Contractor that no officer, agent, employee or representative of County has any authority to change the scope of this Contract or any attachments to it unless expressly granted that authority by the Commissioners Court.

16.3 If any change under 16.1 causes an increase or decrease in the cost, or time required for performance of any part of the work under this Contract, the Commissioners Court shall make an equitable adjustment in the contract price, the delivery schedule, or both, and modify this Contract. The Contractor must submit any "proposal for adjustment" within thirty (30) calendar days after the date of receipt of the written order.

16.4 Contractor shall submit all requests for alterations, additions or deletions of the terms of this Contract or any attachment to it to the Purchasing Agent. The Purchasing Agent shall present Contractor's requests to Commissioners Court for consideration.

17.0 COUNTY ACCESS:

Contractor agrees to maintain appropriate accounting records of costs, expenses, and payrolls of employees working on the project, together with documentation of evaluations and study results for a period of five years after final payment for completed services and all other pending matters concerning the Contract have been closed.

18.0 SUBCONTRACTS:

18.1 Contractor shall not enter into any subcontracts for any service or activity relating to the performance of this contract without the prior written approval or the prior written waiver of this right of approval from County. It is acknowledged by Contractor that no officer, agent, employee or representative of County has the authority to grant such approval or waiver unless expressly granted that specific authority by the Commissioners Court.

18.2 If a subcontract is approved, Contractor must make a "good faith effort" to take all necessary and reasonable steps to ensure HUBs maximum opportunity to be subcontractors under this Contract. Contractor must obtain County approval of all proposed HUB subcontractors through the Purchasing Agent. Failure by Contractor to make a good faith effort to employ HUBs as subcontractors constitutes a breach of this Contract and may result in termination of this Contract.

19.0 MONITORING:

County reserves the right to perform periodic on-site monitoring of Contractor's compliance with the terms of this Contract, and of the adequacy and timeliness of Contractor's performance under this Contract. After each monitoring visit, County shall provide Contractor with a written report of the monitor's findings. If the report notes deficiencies in Contractor's performances under the terms of this Contract, it shall include requirements and deadlines for the correction of those deficiencies by Contractor. Contractor shall take action specified in the monitoring report prior to the deadlines specified.

20.0 ASSIGNMENT OF CONTRACT OR MORTGAGE:

Contractor must not transfer or assign any part of or right or interest in this Contract, directly or indirectly, voluntary or involuntary without the express written approval of the Commissioners Court. Contractor must not execute any mortgage, or issue any bonds, shares of stock, or other evidence of interest in County buildings.

21.0 CIVIL RIGHTS AND EQUAL OPPORTUNITY IN EMPLOYMENT:

The Contractor agrees, during the performance of the services under this Agreement, that the Contractor shall provide all services and activities required in a manner that complies with the Civil Rights Act of 1964, as amended, the Rehabilitation Act of 1973, Public Law 93-1122, Section 504, the provisions of the Americans with Disabilities Act of 1990, Public Law 101-336 [S.933], and all other federal and state laws, rules, regulations, and orders pertaining to equal opportunity in employment, as if the Contractor were an entity bound to comply with these laws. The Contractor shall not discriminate against any employee or applicant for employment based on race, religion, color, sex, national origin, age or handicapped condition. In accordance with Title VI of the Civil Rights Act of 1964:

- 21.1 Compliance with Regulations: Contractor shall comply with the requirements relative to nondiscrimination in Federally-Assisted programs, including but not limited to Title VI of the 1964 Civil Rights Act (42 USC Section 2000d, et. seq.), and 49 CFR Part 21, both as explained in Federal Transit Administration (FTA) Circular 4702.1A, as they may be amended (the "Regulations"), which are herein incorporated by reference and made a part of this Agreement.
- 21.2 Nondiscrimination: Regarding the work performed by Contractor under this Agreement, it shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. Seller shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices.
- 21.3 Solicitations for Subcontracts, Including Procurements of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this Agreement and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.
- 21.4 Sanctions for Noncompliance: If Contractor does not comply with the nondiscrimination provisions of this Agreement, County shall impose the sanctions that it determines are appropriate, including, but not limited to, withholding of payments to Contractor under the Agreement until Contractor complies, or until cancellation, termination or suspension of the Agreement, in whole or in part.

21.5 The Contractor further agrees that the County or its duly authorized representatives shall have access to any and all books, documents, papers, reports and records of the Contractor, which the County deems are directly pertinent to the services to be performed under this Agreement for the purposes of making audits, examinations, excerpts, and transcriptions, and to ascertain compliance with federal and state employment discrimination laws. Contractor shall provide all information and reports required by Title VI of the 1964 Civil Rights Act (42 USC Section 2000d, et. seq.) and any regulations or directives issued pursuant to them. Contractor shall permit access to its books, records, accounts, other sources of information and its facilities as County may determine to be pertinent to ascertain compliance with these regulations, orders, and instructions. Where any information required of Contractor is in the exclusive possession of another who fails or refuses to furnish this information, Contractor shall so certify to the County, as appropriate, and shall state what efforts it has made to obtain the information.

21.6 Incorporation of Provisions: Contractor shall include the provisions of sections 21.0 - 21.6 (regarding nondiscrimination) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant to them.

22.0 GRATUITIES:

County may terminate this Contract if it is found that gratuities of any kind including entertainment, or gifts were offered or given by the Contractor or any agent or representative of the Contractor, to any County Official or employee with a view toward securing favorable treatment with respect of this Contract. If this Contract is terminated by the County pursuant to this provision, County shall be entitled, in addition to any other rights and remedies, to recover from the Contractor at least three times the cost incurred by Contractor in providing the gratuities.

23.0 FORFEITURE OF CONTRACT:

23.1 Contractor must forfeit all benefits of the Contract and County must retain all performance by Contractor and recover all consideration or the value of all consideration, paid to Contractor pursuant to this contract if:

23.1.1 Contractor was doing business at the time of submitting its proposal or had done business during the 365 day period immediately prior to the date of which its proposal was due with one or more Key Contracting Persons if Contractor has not disclosed the name of any such Key Contracting Person in its proposal which is expressly incorporated in this Contract; or

23.1.2 Contractor does business with a Key Contracting Person after the date on which the proposal that resulted in this Contract and prior to full performance of the Contract and fails to disclose the name of that Key Contracting Person in writing to each member of the Commissioners Court and to the County Clerk within ten (10) days commencing business with that Key Contracting Person.

24.0 NOTICES:

24.1 Any notice required or permitted to be given under this Contract by one party to the other shall be in writing and shall be given and deemed to have been given immediately if delivered in person to the address set forth in this section for the party to whom the notice is given, or on the third day following mailing if placed in the United States Mail, postage prepaid, by registered or certified mail with return receipt requested, addressed to the party at the address set forth in this Section.

24.2 The address of County for all purposes under this contract shall be:

Cyd Grimes, C.P.M., CPPO
Purchasing Agent
P.O. Box 1748
Austin, Texas 78767-1748

24.3 The address of the Contractor for all purposes under this contract and for all notices hereunder shall be the address shown in the Notice of Award.

24.4 Each party may change the address for notice to it by giving notice of the change in compliance with 24.0.

25.0 CONSTRUCTION OF CONTRACT:

25.1 Law and Venue. This Contract is governed by the laws of the United States of America and Texas and all obligations under this contract are performable in Travis County, Texas. Venue for any dispute arising out of this Contract will lie in the appropriate court of Travis County, Texas.

25.2 Severability. If any portion or portions of this Contract are ruled invalid, illegal, or unenforceable in any respect, by a court of competent jurisdiction, the remainder of it shall remain valid and binding.

25.3 Headings. Headings and titles at the beginning of the various provisions of this Contract have been included only to make it easier to locate the subject matter covered by that part, section or subsection and are not to be used in construing this Contract.

25.4 Computation of Time. When any period of time is stated in this Contract, the time shall be computed to exclude the first day and include the last day of period. If the last day of any period falls on a Saturday, Sunday, or a day that Travis County has declared a holiday for its employees, these days shall be omitted from the computation. All hours stated in this Contract are stated in Central Standard Time from 2:00 o'clock a.m. on the first Sunday October until 2:00 o'clock a.m. on the first Sunday of April and in Central Daylight Saving Time from 2:00 o'clock a.m. on the first Sunday April until 2:00 o'clock a.m. on the first Sunday of October.

25.5 Gender and Number: Words of any gender in this Contract shall be construed to include any other gender and words in either number shall be construed to include the other unless the context in the Contract clearly requires otherwise.

26.0 ENTIRE CONTRACT:

All oral and written agreements between Contractor and County relating to the subject matter of this Contract that were made prior to the execution of this Contract have been reduced to writing and are contained in this Contract.

27.0 CONTRACTOR LIABILITY, INDEMNIFICATION AND CLAIMS NOTIFICATION:

27.1 Contractor shall indemnify County, its officers, agents, and employees, from and against any and all third party claims, losses, damages, causes of action, suits, and liability of every kind whether

meritorious or not and, including all expenses of litigation, court costs, and reasonable attorney's fees, arising in connection with the services provided by Contractor under this Contract. It is the expressed intention of the parties to this contract, both Contractor and County, that the indemnity provided for in this paragraph is indemnity by Contractor to indemnify and protect County from the consequences of Contractor's actions.

- 27.2 Contractor warrants that all applicable copyrights, patents, and licenses which may exist on materials used in this Contract have been adhered to and further warrants that County shall not be liable for any infringement of those rights and any rights granted to County shall apply for the duration of the Contract. CONTRACTOR SHALL INDEMNIFY COUNTY, ITS OFFICERS, AGENTS AND EMPLOYEES FROM ALL CLAIMS, LOSSES, DAMAGES, CAUSES OF ACTION AND LIABILITY OF EVERY KIND, INCLUDING EXPENSES OF LITIGATION, AND COURT COSTS AND ATTORNEY FEES FOR DAMAGES TO ANY PERSON OR PROPERTY ARISING IN CONNECTION WITH ANY ALLEGED OR ACTUAL INFRINGEMENT OF EXISTING LICENSES, PATENTS, OR COPYRIGHTS APPLICABLE TO MATERIALS USED IN THIS CONTRACT. This section shall not be interpreted as a waiver of sovereign immunity and County retains all of its affirmative defenses.

28.0 HUB PROCUREMENT PROGRAM:

- 28.1 Pursuant to the Travis County Historically Underutilized Business (HUB) Procurement Program, the Travis County Commissioners Court adopted goals for Certified HUB Subcontractor participation with an Overall 14.1% Minority-Owned Business Enterprise (MBE) goal and an Overall 15.0% Women-Owned Business Enterprise (WBE) goal (*Sub-goals: 2.5% African-American, 9.9% Hispanic, 1.7% Native/Asian-American*) to be observed by the County in its award of contracts and subcontracts to certified HUBs.
- 28.2 It is the policy of Travis County that HUBs shall have the maximum opportunity to participate in the performance of county contracts and subcontracts. Contractors shall make a "good faith effort" to take all necessary and reasonable steps to ensure HUBs maximum opportunity to participate as subcontractors. Failure by a contractor or subcontractor to carry out the County HUB Procurement Program shall constitute a breach of contract, and after notification of such breach by the Purchasing Agent may result in termination of this contract.
- 28.3 For purposes of HUB participation, Travis County shall count the dollar amount of all firm fixed price/fixed quantity contracts, or the dollar amount of Purchase Orders placed against "Estimated" or "Not to Exceed" contracts.
- 28.4 The following section identifies the specific procedures to be followed with respect to this solicitation for proposals in compliance with the HUB Procurement Program.

28.5 SECTION 1 - HUB PURCHASES

28.5.1 To be eligible under this program, HUB Proposers and subcontractors must:

28.5.1.1 Be certified as HUB, M/WBE or DBE source by:

(A) City of Austin Municipal Government,

(B) Texas Unified Certification Program, or

(C) State of Texas Building and Procurement Commission

28.5.1.2 Have on file in the Travis County Purchasing Office a proper Bidder's Application.

28.5.1.3 Identify the certifying agency and Item/Service for which is certified.

28.5.1.4 Obtain county approval of all proposed HUB subcontractors through the Purchasing Agent.

28.5.1.5 Complete the HUB Declaration form in this RFP package.

28.5.2 Any third party may challenge a firm's HUB status before or after certification. Such action shall be in writing and submitted to the Purchasing Agent, including all relevant information available. If no merit to the challenge is found, the challenging party will be notified by the Purchasing Agent in writing and the matter will be considered closed. If merit is found, the firm in question will be notified by the Purchasing Agent of the challenge, who made it, and a summary of the allegations. The challenged firm shall be required to submit, within a reasonable period of time, information in support of the firm's HUB status. The Purchasing Agent shall make an evaluation and notify the parties of a proposed determination, citing the basis for the decision, and providing an opportunity for an informal hearing to interested parties and affording an opportunity for a written or personal response. The Purchasing Agent shall make a recommendation to the Commissioners Court for a final determination. The Purchasing Agent shall inform all interested parties of the Commissioners Court's determination and its reasons. A firm's HUB status shall remain accurately certified during the challenging procedure and shall not be changed unless or until a successful challenge is finalized. (See also Par. 8.0, "CLARIFICATION OR OBJECTION TO PROPOSAL REQUIREMENTS" in Part I, General Requirements Section of this RFP.).

29.0 ORDER OF PRECEDENCE:

In the event of inconsistency between provisions of this Contract, the inconsistency shall be resolved by giving precedence in the following ascending order:

The Schedule of Items;
Terms and Conditions of Request for Proposal;
General Provisions;
Special Provisions;
Other provisions, whether incorporated by reference or otherwise;
General Requirements; and
The Specifications (Appendices A – G).

30.0 ADDITIONAL GENERAL PROVISIONS:

30.1 County may assign any of its obligations under this Contract.

30.2 Contractor must comply with all Federal and State laws and regulations, City and County ordinances, orders, and regulations, relating in any way to this Contract.

30.3 Contractor must secure all permits and licenses, pay all charges and fees, and give all notices necessary for lawful operations.

30.4 Contractor must pay all taxes and license fees imposed by the Federal and the State Governments and their agencies and political subdivisions upon the property and business of Contractor.

30.5 Despite anything to the contrary in this Contract, if the Contractor is delinquent in payment of property taxes at the time of providing services, Contractor hereby assigns the amount of Gross Receipts equal to the amount Contractor is delinquent in property tax payments to the Travis County Tax Assessor-Collector for the payment of the delinquent taxes.

31.0 **DESIGNATED COUNTY HOLIDAYS:** Travis County will not accept deliveries on days designated as holidays by Travis County, unless specific prior arrangements have been made. Travis County shall provide a list of the holidays designated for each year upon request. Travis County usually designates 11 days each year as holidays and below is a list of the days usually designated:

HOLIDAY	DAY(S) USUALLY CELEBRATED
New Year's Day.....	January 1 st or Monday after if it falls on a weekend
Martin Luther King, Jr. Day	3 rd Monday in January
President's Day.....	3 rd Monday in February
Memorial Day	4 th Monday in May
Independence Day	July 4 th or Monday after if it falls on a weekend
Labor Day	1 st Monday in September
Veteran's Day	November 11 th or Monday after, if it falls on a weekend
Thanksgiving Day	4 th Thursday AND Friday in November
Christmas Season.....	December 25 th AND either day before or day after whichever allows a four day weekend, if possible

32.0 **MEDIATION:**

When mediation is acceptable to both parties in resolving a dispute arising under this Agreement, the parties agree to use a mutually agreed upon mediator, or a person appointed by a court of competent jurisdiction, for mediation as described in Section 154.023 of the Texas Civil Practice and Remedies Code. Unless both parties are satisfied with the result of the mediation, the mediation will not constitute a final and binding resolution of the dispute. All communications within the scope of the mediation shall remain confidential as described in §154.073 of the Texas Civil Practice and Remedies Code, unless both parties agree, in writing, to waive the confidentiality.

33.0 **TIN REQUIRED:**

Contractor shall provide County with an Internal Revenue Form W-9, Request For Taxpayer Identification Number and Certification, that is completed in compliance with the Internal Revenue Code, its rule and regulations, and a statement of entity status in a form satisfactory to the County Auditor before any contract funds are payable.

34.0 **NON-WAIVER OF DEFAULT:**

34.1 The waiver of a breach of any term or condition of this Contract is not a waiver of a subsequent breach of that term or condition, or a breach or subsequent breach of any other term of condition. No official, agent, employee, or representative of County may waive any breach of any term of

condition of this Contract unless expressly granted that specific authority by Commissioner Court.

- 34.2 All rights of County under this Contract are specifically reserved and any payment, act or omission shall not impair or prejudice any remedy or right to County under it. Any right or remedy in this Contract shall not preclude the exercise of any other right or remedy under this Contract or under any law, nor shall any action taken in the exercise of any right or remedy be deemed a waiver of any other rights or remedies.

35.0 CERTIFICATION OF ELIGIBILITY:

This provision applies if the anticipated contract exceeds \$25,000. By submitting a bid or proposal in response to this solicitation, the bidder/proposer certifies that at the time of submission, he/she is not on the Federal Government's list of suspended, ineligible, or debarred contractors. In the event of placement on the list between the time of bid/proposal submission and time of award, the bidder/proposer will notify the Travis County Purchasing Agent. Failure to do so may result in terminating this Contract for default.

36.0 INSURANCE:

Contractor shall have, Standard Insurance sufficient to cover the needs of Contractor and/or Subcontractor pursuant to applicable generally accepted business standards. Depending on services provided by Contractor and/or Subcontractor, Supplemental Insurance Requirements or alternate insurance options as set forth in **Attachment 10**, "Insurance Requirements," may be imposed.

CONTRACTOR:

By: _____

Printed Name:

Its Duly Authorized Agent

Date: _____

TRAVIS COUNTY:

By: _____

Sarah Eckhardt

Travis County Judge

Date: _____

APPROVED AS TO FORM:

County Attorney

AVAILABILITY OF FUNDS CONFIRMED:

Nicki Riley, Travis County Auditor

Date: _____

APPROVED AS TO PURCHASING POLICIES AND PROCEDURES:

Cyd V. Grimes, C.P.M., CPPO
Travis County Purchasing Agent

Date: _____

ATTACHMENT 1 TERMINOLOGY

1.0 TERMINOLOGY

1.1 TERMS AND ACRONYMS

The term “Administrator” refers to a county election official responsible for conducting elections and implementing and using STAR-Vote™.

Any requirements and specifications indicated by the word “must” or “shall,” will be fully implemented by any successful proposal. Those constraints or limitations indicated by “must not,” or “may not” will not be included in a successful proposal. Those requirements and specifications indicated by “should,” “preferred,” or “ideally” represent preferred elements or guidelines for how the designers of this specification envision its realization, but are intended to leave flexibility in its ultimate form.

A Glossary is provided at the end of this document to assist in clarifying terms used in this RFP.

Frequently used acronyms include:

Acc-VS	Accessible Voting Station
BCS	Ballot Control Station
BBM	Ballot-By-Mail
CSS	Cascading Sheet Style
COTS	Commercial Off-the-Shelf
ED	Election Day
EDF	Election Definition File
EML	Election Markup Language
ENR	Election Night Return Internet System
EVBB	Early Voting Ballot Board
EV	Early Voting
EVR	Electronic Vote Record
FBR	Failed Beyond Repair
FPCA	Federal Post Card Application
JSON	JavaScript Object Notation
L & A	Logic and Accuracy Testing
MID	Machine Identifier
NIZK	Non-Interactive Zero-Knowledge
PCID	Page Casting Identifier
PID	Page Identifier
PVR	Printed Vote Record
RAND	Reasonable and Non-Discriminatory
SOR	Statement of Residency
SOS	Texas Secretary of State
TEC	Texas Election Code

UOCAVA	Uniformed and Overseas Citizens Absentee Voting Act
UUID	Universally Unique Identifier
VR	Voter Registration
VEBD	Voter Editable Ballot Device
VEBD-A	Voter Editable Ballot Device (Audio)
VVSG	Voluntary Voting System Guidelines
XML	Extensible Markup Language

1.2 GLOSSARY

- 1.2.1 **AIR-GAPPED SYSTEM (AGS):** Encompasses all elements of STAR-Vote™ that are used in polling locations or for tabulation, and any systems that at any point have a network connection to other AGS devices. These systems are considered “Air-gapped” as they should never have a direct physical connection to any system outside of the AGS. Due to their sensitive nature, electronic information flow into the system is carefully controlled.
- 1.2.2 **AUDIT HASH CHAIN SEED:** A value used as the ‘previous element’s hash’ when calculating the first element’s hash in a hash chain. See Hash Chain.
- 1.2.3 **AUDIT LOG:** A subset of the Message Log containing sufficient information to generate encrypted tallies, verify hash chains involving ballot data (including the generation of Launch Codes) and verify that there were no anomalies during the election process. Ballot Definition File
- 1.2.4 **CASCADING STYLE SHEET (CSS):** Cascading Style Sheets (CSS) is a style sheet language used for describing the look and formatting of a document written in a markup language. While most often used to style web pages and interfaces written in HTML and XHTML, the language can be applied to any type of XML/JSON/Human Readable document, including plain XML/JSON, SVG and XUL. CSS is a cornerstone specification of the web and almost all web pages use CSS style sheets to describe their presentation. See http://en.wikipedia.org/wiki/Cascading_Style_Sheets.
- 1.2.5 **COMMITMENT-CONSISTENT ENCRYPTION:** An encryption algorithm that is commitment-consistent and enables the Entity that can decrypt the data (the private key holder) to prove to a third party that what it claims is a valid decryption of a given ciphertext is actually the decryption of that ciphertext without enabling the third party to decrypt any data itself.
- 1.2.6 **COMPONENTIZED SOFTWARE ELEMENT:** A software component designed to implement an externally-defined interface such that the component may be “swapped” with a comparable software component without modification of any code in any other element of the software.

- 1.2.7 **CRYPTOGRAPHIC MIXNET:** Cryptographic mixnets (short for “mix networks”) are routing protocols that seek to prevent any one person or Entity from knowing which encrypted output corresponds to which encrypted input. This is accomplished by using a chain of servers each of which re-encrypts and randomizes the order of the data. A mixnet is considered verifiable if it is able to prove (or provide significant evidence) that there is a 1-to-1 correspondence between its inputs and its outputs without revealing the correspondence.
- 1.2.8 **CRYPTOGRAPHICALLY RANDOM:** A random value (typically a number) that is generated in such a way as to make it highly mathematically improbable that knowing any arbitrarily long sequence of prior random numbers would allow someone to predict the next random value. Strictly speaking, cryptographically random numbers are generated such that they have high entropy.
- 1.2.9 **DEVICE ROLE:** The prescribed role a given device has been authorized to fill during an Election while connected to a Polling Location Network. Current expected Device Roles are: Voting Station, Ballot Control Station, Ballot Scanner, Device Initialization, Tabulator, Trustee.
- 1.2.10 **DIGITAL CERTIFICATE:** An electronic document used to verify the identity of the entity in possession of a private key associated with a public key named in the Digital Certificate. Digital Certificates are created by the entity whose identity is to be verified, and are then digitally signed by a trusted Certification Authority, which is implicitly attesting that it has verified the identity of the certificate provider prior to signing.
- 1.2.11 **ELECTION CERTIFICATION AUTHORITY:** A Digital Certificate which is entrusted with the sole authority to sign Digital Certificates from election devices, stating that those devices are permitted to participate in the election for which that Election Certification Authority was created.
- 1.2.12 **ELECTION DEFINITION:** A digitally signed file (or collection of files) which contains the complete set of electronic data required by STAR-Vote™ to run an election. This includes (but is not limited to) ballot styles, the Election Public Key, and the Election Certification Authority public certificate.
- 1.2.13 **ELECTION PUBLIC KEY:** Public key used to encrypt all votes, and any data which must be recoverable by an audit or later investigation during the election. Data encrypted with this key can be decrypted only when a threshold number of Election Trustees coordinate to decrypt it.
- 1.2.14 **ELECTRONIC VOTE RECORD (EVR):** An electronic record containing one voter’s encrypted selections, as well as proofs about good structuring of the data and various metadata required by STAR-Vote™.

- 1.2.15 **END-TO-END ENCRYPTION (E2E):** An encryption system that allows for any manipulations of the data required during normal operations to happen without first decrypting the data. In the context of a voting system, an end-to-end encryption system enables tallying and verification of the tally without ever decrypting individual ballots.
- 1.2.16 **EXTENSIBLE MARKUP LANGUAGE (XML):** A markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. It is defined in the XML 1.0 Specification produced by the World Wide Web Consortium (W3C), and several other related specifications, all free open standards.
- 1.2.17 **FEDERAL POSTCARD APPLICATION (FPCA):** A ballot by-mail application for U.S. citizens residing outside the United States, and for U.S. citizens who are active members of the Uniformed Services, the Merchant Marines, the commissioned corps of the Public Health Service and National Oceanic and Atmospheric Administration, and their eligible family members. This application registers the applicant to vote (if not already registered) and allows the applicant to receive a ballot-by-mail.
- 1.2.18 **GOOD ORDERING:** Good ordering implies the order in which items are created / sent / intended to be received is the order in which those items are received and (if applicable) stored.
- 1.2.19 **HARDWARE SECURITY MODULE (HSM):** A specialized device used to securely generate and store cryptographic keys, and to encrypt, decrypt, and/or digitally sign data with these keys. HSMs generally include tamper-resistant features which significantly impede any attempts at raw key extraction but offer capabilities to back-up keys to other HSMs.
- 1.2.20 **HASH CHAIN:** A hash chain is a technique for providing tamper-evidence to sequential data. For each element in the chain, a cryptographic hash is calculated of the data in that element combined with the hash of the previous element. If at any point in the chain data is altered, inserted, or deleted, none of the hashes from that point on would match, thus providing evidence that the data has been tampered with. This can be further strengthened by creating independent records of the elements' hashes as STAR-Vote™ accomplishes with its Paper Receipt.
- 1.2.21 **HOMOMORPHIC ENCRYPTION ALGORITHM:** Generally, an additively Homomorphic encryption algorithm is an encryption algorithm that allows a user to take two encrypted numbers and combine them into an encryption of the sum of the two numbers.

- 1.2.22 **LAUNCH CODE:** A code that is inserted into the audit hash chain at the beginning of each Election Day, and that is not capable of being known in advance.
- 1.2.23 **MESSAGE LOG:** A complete log of every network message received or sent by a device while connected to a polling location network.
- 1.2.24 **MACHINE IDENTIFIER (MID):** Assigned number that uniquely identifies a specific machine in an election.
- 1.2.25 **NON-INTERACTIVE ZERO-KNOWLEDGE (NIZK) PROOF:** (From Wikipedia): In cryptography, a zero-knowledge proof or zero-knowledge protocol is a method by which one party (the prover) can prove to another party (the verifier) that a given statement is true, without conveying any additional information apart from the fact that the statement is indeed true. A non-interactive zero-knowledge proof is a variant of the zero-knowledge proof in which no interaction is necessary between prover and verifier.
- In the context of STAR-Vote™, NIZK proofs consist of a small number of calculated values that cannot be calculated if a value is not able to be decrypted, and that enable the verifier to prove that the value in an encryption matches what the STAR-Vote™ operator claims it matches. For specific examples, see Attachment 8.
- 1.2.26 **NONCE:** A cryptographically random number that is inserted into a process or structure to add an additional layer of security.
- 1.2.27 **NON-VOLATILE MEMORY:** Any data storage element that retains its data when the device loses power. Examples include Hard Disk Drives, USB thumb drives, flash memory, DVDs, etc.
- 1.2.28 **PAGE CASTING IDENTIFIER (PCID):** Number (possibly sequential) that is assigned to a specific page of a specific Printed Vote Record (PVR) and is guaranteed to be unique within the polling location in which the PVR is produced. Used for inventory tracking within the polling location, and identifying PVR Pages during the Risk Limiting Audit.
- 1.2.29 **PAGE IDENTIFIER (PID):** Cryptographically random number uniquely identifying a specific page of a specific Printed Vote Record (PVR) and that is not stored in plaintext at any point during the election except physically on the sheet of paper to which it refers.
- 1.2.30 **PRINTED VOTE RECORD (PVR):** The physical printed paper record of a voter's selections that he or she reviews and places into a ballot box to cast a vote.
- 1.2.31 **PUBLIC ELECTRONIC VOTE RECORD (PEVR):** An excerpt of an Electronic Vote Record (EVR) that contains sufficient information to verify the

election tallies but minimizes the amount of information that would be disclosed in the event that the encryption technologies used are broken.

- 1.2.32 **PUBLIC KEY:** In asymmetric key cryptography, a Public Key is one-half of a public-private key pair. Values encrypted using the public encryption key can be decrypted by someone with the private key. In such a scheme, an entity publishes, or “makes public” the Public Key, and then can enable secure communication from others to the entity (via encryption with the Public Key). A public signature verification key enables public verification of digital signatures created using a corresponding private signature key.
- 1.2.33 **SINGLE RACE SELECTION VECTOR (SRSV):** A SRSV is the basic unit of storage for a voter’s selections for a single race.
- 1.2.34 **SYSTEM IMAGE:** A data element that includes the entire operating system, application, drivers, election-specific information, security components and any other data required for a specific device to perform its function within the STAR-Vote™ system for an election.
- 1.2.35 **THRESHOLD ENCRYPTION:** A threshold encryption system is one in which a group of private keyholders coordinate to perform decryption. Each participant creates its own public / private key pair. A threshold, k , is chosen, and a threshold public key calculated such that no data encrypted with that key can be decrypted unless at least k keyholders participate. So long as k is less than the total number of keyholders, n , then the system is robust to $n - k$ keys being lost without losing the ability to decrypt data.
- 1.2.36 **TRANSPORT LAYER SECURITY (TLS):** Industry-standard technology for providing secure point-to-point communication over a public network (such as the internet). TLS is an Internet Engineering Task Force standard.
- 1.2.37 **TRUSTED PLATFORM MODULE (TPM):** An international standard for a secure cryptoprocessor that is a dedicated microprocessor designed to secure hardware by integrating cryptographic keys into devices. TPMs offer facilities for the secure generation and storage of cryptographic keys, in addition to random number generation.
- 1.2.38 **TUPLE:** An ordered set of items of potentially different types. Typically written comma-delimited between parentheses (e.g. “(1, ‘frog’, 0xA2B4C6D8)”). Contrast with a vector.
- 1.2.39 **UNIFORMED AND OVERSEAS CITIZENS ABSENTEE VOTING ACT (UOCAVA):** Provides the legal basis for absentee voting requirements for federal offices to U.S. citizens residing outside the United States, and to U.S. citizens who are active members of the Uniformed Services, the Merchant Marines, the

commissioned corps of the Public Health Service and National Oceanic and Atmospheric Administration, and their eligible family members.

- 1.2.40 **UNIVERSALLY UNIQUE IDENTIFIER (UUID):** A UUID is a 16-octet (128-bit) number. In its canonical form, a UUID is represented by 32 lowercase hexadecimal digits, displayed in five groups separated by hyphens, in the form 8-4-4-4-12. Proper UUID generation ensures that the probability of two independently generated UUIDs having the same value is exceptionally small.
- 1.2.41 **USER INTERFACE (UI):** Any piece of a software or hardware system with which any person is expected to interact once the system is deployed.
- 1.2.42 **VECTOR:** An ordered set of items, all of the same type. Typically written comma delimited between angle brackets (e.g. "<1, 4, 3, 7>"). Technically, a special case of a tuple.
- 1.2.43 **VOLATILE MEMORY:** Any data storage element that does not retain its data when the device loses power. The most common example is a computer's RAM memory, or various internal caches.
- 1.2.44 **VOTER EDITABLE BALLOT DEVICE – AUDIO (VEBD-A):** Used within the VVSG to refer to recommendations around the presentation and interaction of a voting system when an audio interface is used by a voter.
- 1.2.45 **VOTER EDITABLE BALLOT DEVICE – VISUAL (VEBD-V):** Used within the VVSG to refer to recommendations around the presentation and interaction of a voting system when a visual interface is used by a voter.
- 1.2.46 **WELL-FORMED:** Conforming to all rules of the relevant language, schema, or specification. In this context, the term should be interpreted with two more subtle meanings: (1) With regard to encrypted ballots, it requires that votes encrypted within those ballots are valid – i.e. that each vote counter contains a number which is non-negative and no larger than the maximum number of votes that a voter may cast for that candidate (typically 1), and that the ballot does not contain more votes in any race than are permitted for that race. (2) With regard to data structures generally, it requires that data that is intended to conform to a standard can be correctly read by any software that correctly implements that standard.
- 1.2.47 **XML:** See Extensible Markup Language.

ATTACHMENT 2
VVSG Gap Analysis

Due to the size of the VVSG Gap Analysis, this document will be made available upon request only. Please send your request via email to lori.clyde@traviscountytexas.gov.

ATTACHMENT 3
Texas Election Code Gap Analysis

Due to the size of the Texas Election Code Gap Analysis, this document will be made available upon request only. Please send your request via email to lori.clyde@traviscountytx.gov.

ATTACHMENT 4
Ballot Style Tokens

Primary Ballot Style Token

1130976557 X, MISTER
498 UNNAMED ST.
AUSTIN 213A

REPUBLICAN



R213A 
REPUBLICAN

1130976557
X, MISTER

Primary Provisional Ballot Style Token

P1130976557 X, MISTER
498 UNNAMED ST.
AUSTIN 213A

DEMOCRAT



PD213A 
DEMOCRAT

P1130976557
X, MISTER

Regular Ballot Style Token

1130976561 X, MADAME
498 UNNAMED ST.
AUSTIN 213A



213A 

1130976561
X, MADAME

Attachment 5 SAMPLE PVR

Official Ballot November 4, 2012
Joint General and Special Elections
Travis County, Texas Precinct 101A



11042012 Pct 101A BID11042012 BCID3457894 Pg 1 of 2

Travis County General Election continued

Travis County General Election

Straight Party

PURP Purple ☒

District 210, United States Representative

PURP Anna Alpha ☒

Governor

PURP Betty Beta ☒

Lieutenant Governor

PURP Gertrude Gamma ☒

Attorney General

PURP Daniel Delta ☒

State Senator

PURP Eric Epsilon ☒

Comptroller of Public Accounts

GLD Zitta Zeta ☒

Attorney General

PURP Derick Delta ☒

State Senator

PURP Edith Epsilon ☒

Comptroller of Public Accounts

GLD Zorro Zeta ☒

Commissioner of the General Land Office

PURP Etta Eta ☒

Commissioner of Agriculture

PURP Theodore Theta ☒

Railroad Commissioner

PURP Onne Iota ☒

District 257, State Senator

NO SELECTION ☐

Place 456, Justice, 33rd Court of Appeals District

PURP Larry Lambda ☒

Place 334, Justice, Supreme Court

NO SELECTION ☐

Place 667, Judge, Court of Criminal Appeals

NO SELECTION ☐

District 589, Member State Board of Education

PURP Karla Kappa ☒

District 257, State Senator

NO SELECTION ☐

Place 456, Justice, 33rd Court of Appeals District

PURP Leticia Lambda ☒

Precinct 145, Justice of the Peace

PURP Nancy Nu ☒

District 147, State Representative

PURP Xena Xi ☒

County Judge

PURP Oscar Omicron ☒

County Court at Law 677, Judge

PURP Peggy Pi ☒

County Probate Court Judge

PURP Rhoda Rho ☒

District Clerk

PURP Samuel Sigma ☒

County Clerk

GLD Teresa Tau ☒

County Treasurer

PURP Uma Upsilon ☒

District Clerk

PURP Selena Sigma ☒

County Clerk

GLD Thomas Tau ☒

County Treasurer

PURP Ulysses Upsilon ☒

County Commissioner

PURP Phillip Phi ☒

Railroad Commissioner

PURP Charles Chi ☒

Place 332, Justice, Supreme Court

NO SELECTION ☐

Central Health Tax Ratification Election

Proposition 1

For ☒

Proposition 2

Against ☒

Proposition 3

For ☒

Austin Community College Board of Trustees Election

Place 7, ACC Trustee

Umberto Upsigma ☒



11042012 Pct 101A BID11042012 BCID3457894 Pg 1 of 2

Attachment 6
SAMPLE VOTER RECEIPT

YOUR VOTE COUNTS



Thank you for voting!

Take this confirmation of voting with you

Verify your ballot at:

www.star-vote.org/ballot/

Enter this unique code:

HV1235Z7568RK84

Find your code on the STAR-Vote website to ensure that your vote was recorded correctly.

Look for Election results and other tools for confirming the election at:

www.traviscountyelections.org

Voting Date: October 30, 2012

Location: Randall's South Mopac

Voting Terminal: UI12345

Time: 18:45:56

Attachment 7 COMPREHENSIVE SAMPLE BALLOTS

Comprehensive Ballot – County General and Constitutional Amendment Elections

Travis County Clerk Elections Division November 4, 2014 Joint General and Special Elections División de Elecciones de la Secretaría del Condado de Travis el 4 de noviembre de 2014 Elecciones Generales y Especiales Conjuntas

If you do not know your election precinct or need other election information, call the
Travis County Clerk Elections Division at (512) 238-VOTE (8683). www.traviscountyelections.org
Si usted no sabe su precinto de elección o para más información sobre la elección, llame a la División de Elecciones
de la Oficina de la Secretaría del Condado de Travis (512) 238-VOTE (8683). www.traviscountyelections.org

**Straight Party
(Partido Completo)**
All precincts / Precintos enteros:

☐ Republican / Republicano
☐ Democratic / Democrático
☐ Libertarian / Libertariano
☐ Green / Verde

**United States Senator
(Senador de los Estados Unidos)**
All precincts / Precintos enteros:

☐ John Cornyn - REP
☐ David M. Alameel - DEM
☐ Rebecca Paddock - LIB
☐ Emily "Spicybrown" Sanchez - GRN
☐ Write-in / Voto Escrito

**District 10, United States Representative
(Distrito Núm. 10, Representante de los Estados Unidos)**
Precincts / Precintos: 103, 104, 105, 106, 108, 114, 116, 123, 125, 127, 131, 136, 138, 140, 141, 142, 146, 149, 150, 153, 154, 156, 200, 203, 211, 212, 217, 218, 222, 227, 228, 235, 236, 237, 239, 240, 241, 242, 243, 245, 246, 248, 249, 252, 253, 256, 260, 262, 266, 268, 273, 321, 323, 326, 327, 331, 333, 334, 335, 336, 337, 343, 374, 375

☐ Michael McCaul - REP
☐ Tawana Walter-Caden - DEM
☐ Bill Kelsey - LIB

**District 17, United States Representative
(Distrito Núm. 17, Representante de los Estados Unidos)**
Precincts / Precintos: 102, 107, 109, 110, 111, 112, 113, 137, 145, 146, 160, 161, 163, 205, 207, 215, 216, 219, 225, 226, 229, 254, 259, 263, 287, 305, 328, 345

☐ Bill Flores - REP
☐ Nick Haynes - DEM
☐ Shawn Michael Hamilton - LIB

**District 21, United States Representative
(Distrito Núm. 21, Representante de los Estados Unidos)**
Precincts / Precintos: 250, 277, 301, 309, 310, 311, 314, 315, 329, 330, 332, 339, 340, 341, 342, 344, 349, 350, 351, 352, 354, 356, 357, 363, 365, 368, 406, 408, 409, 412, 416, 418, 419, 420, 421, 422, 424, 428, 430, 431, 433, 435, 437, 446, 454, 456, 460, 461

☐ Lamar Smith - REP
☐ Ryan Shields - LIB
☐ Antonio Diaz - GRN

**District 25, United States Representative
(Distrito Núm. 25, Representante de los Estados Unidos)**
Precincts / Precintos: 122, 124, 126, 129, 130, 132, 133, 135, 151, 152, 202, 206, 208, 210, 213, 214, 220, 221, 231, 232, 233, 234, 238, 244, 247, 251, 256, 274, 275, 302, 303, 304, 306, 307, 308, 312, 313, 316, 317, 318, 319, 320, 324, 325, 338, 346, 347, 358, 359, 360, 361, 362, 364, 366, 367, 369, 370, 371, 372, 373, 432, 434

☐ Roger Williams - REP
☐ Marco Montoya - DEM
☐ John Betz - LIB

**District 35, United States Representative
(Distrito Núm. 35, Representante de los Estados Unidos)**
Precincts / Precintos: 101, 115, 116, 117, 119, 120, 121, 126, 134, 139, 164, 209, 223, 224, 401, 402, 403, 404, 405, 407, 410, 411, 413, 414, 415, 417, 423, 425, 426, 427, 429, 436, 438, 439, 440, 441, 442, 443, 444, 447, 448, 450, 451, 452, 463

☐ Susan Narvaiz - REP
☐ Lloyd Doggett - DEM
☐ Cory W. Bruner - LIB
☐ kat swift - GRN

**Governor
(Gobernador)**
All precincts / Precintos enteros:

☐ Greg Abbott - REP
☐ Wendy R. Davis - DEM
☐ Kathie Glass - LIB
☐ Brandon Parmer - GRN
☐ Write-in / Voto Escrito

**Lieutenant Governor
(Gobernador Teniente)**
All precincts / Precintos enteros:

☐ Dan Patrick - REP
☐ Leticia Van de Putte - DEM
☐ Robert D. Butler - LIB
☐ Chandrakantha Courtney - GRN

**Attorney General
(Procurador General)**
All precincts / Precintos enteros:

☐ Ken Paxton - REP
☐ Sam Houston - DEM
☐ Jamie Balagis - LIB
☐ Jamar Osborne - GRN

**Comptroller of Public Accounts
(Contralor de Cuentas Públicas)**
All precincts / Precintos enteros:

☐ Glenn Hegar - REP
☐ Mike Collier - DEM
☐ Ben Sanders - LIB
☐ Deb Shafro - GRN

**Commissioner of the General Land Office
(Comisionado de la Oficina General de Tierras)**
All precincts / Precintos enteros:

☐ George P. Bush - REP
☐ John Cook - DEM
☐ Justin Knight - LIB
☐ Valerie Alessi - GRN

**Commissioner of Agriculture
(Comisionado de Agricultura)**
All precincts / Precintos enteros:

☐ Sid Miller - REP
☐ Jim Hogan - DEM
☐ David (Rocky) Palmquist - LIB
☐ Kenneth Kendrick - GRN

**Railroad Commissioner
(Comisionado de Ferrocarriles)**
All precincts / Precintos enteros:

☐ Ryan Sitton - REP
☐ Steve Brown - DEM
☐ Mark A. Miller - LIB
☐ Martina Salinas - GRN

**Chief Justice, Supreme Court
(Jefe Presidente, Corte Suprema)**
All precincts / Precintos enteros:

☐ Nathan Hecht - REP
☐ William Moody - DEM
☐ Tom Oxford - LIB

**Place 6, Justice, Supreme Court, Unexpired Term
(Lugar Núm. 6, Juez, Corte Suprema, Duración Restante del Cargo)**
All precincts / Precintos enteros:

☐ Jeff Brown - REP
☐ Lawrence Edward Meyers - DEM
☐ Mark Ash - LIB

**Place 7, Justice, Supreme Court
(Lugar Núm. 7, Juez, Corte Suprema)**
All precincts / Precintos enteros:

☐ Jeff Boyd - REP
☐ Gina Benavides - DEM
☐ Don Fulton - LIB
☐ Charles E. Waterbury - GRN

**Place 8, Justice, Supreme Court
(Lugar Núm. 8, Juez, Corte Suprema)**
All precincts / Precintos enteros:

☐ Phil Johnson - REP
☐ RS Roberto Koelsch - LIB
☐ Jim Chisolm - GRN

**Place 3, Judge, Court of Criminal Appeals
(Lugar Núm. 3, Juez, Corte de Apelaciones Criminales)**
All precincts / Precintos enteros:

☐ Bert Richardson - REP
☐ John Granberg - DEM
☐ Mark W. Bennett - LIB

**Place 4, Judge, Court of Criminal Appeals
(Lugar Núm. 4, Juez, Corte de Apelaciones Criminales)**
All precincts / Precintos enteros:

☐ Kevin Patrick Yeary - REP
☐ Quannah Parker - LIB
☐ Judith Sanders-Castro - GRN

**Place 9, Judge, Court of Criminal Appeals
(Lugar Núm. 9, Juez, Corte de Apelaciones Criminales)**
All precincts / Precintos enteros:

☐ David Newell - REP
☐ William Bryan Strange, III - LIB
☐ George Joseph Altgelt - GRN

**District 14, State Senator
(Distrito Núm. 14, Senador Estatal)**
Precincts / Precintos: 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 139, 140, 141, 142, 145, 146, 148, 149, 150, 151, 152, 153, 154, 156, 160, 161, 163, 164, 200, 202, 203, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 256, 258, 259, 260, 262, 263, 266, 267, 268, 273, 274, 275, 277, 301, 305, 307, 309, 311, 313, 317, 318, 321, 323, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 347, 350, 351, 352, 354, 356, 357, 358, 360, 364, 369, 370, 371, 372, 373, 374, 375, 407, 409, 412, 415, 421, 422, 424, 426, 427, 428, 430, 432, 433, 434, 435, 436, 437, 438, 439, 442, 444, 454, 456, 460, 461

☐ Kirk Watson - DEM
☐ James Arthur Strohm - LIB

**District 25, State Senator
(Distrito Núm. 25, Senador Estatal)**
Precincts / Precintos: 302, 303, 304, 310, 315, 349, 352, 363, 366, 367, 406, 408, 411, 414, 416, 417

☐ Donna Campbell - REP
☐ Daniel Boone - DEM
☐ Brandin P. Lea - LIB

**District 46, State Representative
(Distrito Núm. 46, Representante Estatal)**
Precincts / Precintos: 105, 113, 116, 117, 118, 120, 121, 122, 124, 125, 126, 127, 129, 130, 131, 132, 133, 134, 135, 136, 139, 141, 142, 145, 146, 148, 151, 152, 156, 160, 203, 217, 223, 224, 436, 444

☐ Dawnna Dukes - DEM
☐ Kevin Ludlow - LIB

**District 47, State Representative
(Distrito Núm. 47, Representante Estatal)**
Precincts / Precintos: 232, 233, 234, 244, 245, 302, 303, 304, 306, 308, 310, 312, 314, 315, 316, 318, 319, 320, 324, 330, 333, 334, 336, 338, 346, 349, 359, 360, 361, 365, 367, 368, 369, 370, 371, 372, 373, 374, 375, 406, 417

☐ Paul D. Workman - REP
☐ Scott G. McKinlay - LIB

District 48, State Representative
(*Distrito Núm. 48, Representante Estatal*)

Precincts / Precintos: 210, 212, 213, 220, 221, 231, 237, 238, 246, 247, 249, 251, 253, 256, 262, 266, 301, 307, 309, 317, 337, 339, 343, 344, 347, 350, 351, 352, 354, 356, 357, 358, 362, 363, 364, 366, 408, 411, 412, 413, 414, 415, 416, 418, 419, 435, 447, 451, 455, 463

- ☐ Donna Howard - DEM
☐ Ben Easton - LIB

District 49, State Representative
(*Distrito Núm. 49, Representante Estatal*)

Precincts / Precintos: 149, 200, 202, 206, 208, 209, 214, 218, 222, 228, 235, 236, 239, 240, 241, 242, 243, 248, 250, 252, 254, 260, 267, 268, 273, 274, 275, 277, 305, 311, 313, 323, 325, 329, 332, 340, 342, 345, 409, 425, 430, 446, 454, 460, 461

- ☐ Elliott Naishtat - DEM
☐ Daniel Krawisz - LIB

District 50, State Representative
(*Distrito Núm. 50, Representante Estatal*)

Precincts / Precintos: 102, 103, 104, 106, 107, 108, 109, 110, 111, 112, 123, 128, 137, 140, 150, 153, 154, 161, 163, 164, 205, 207, 211, 215, 216, 219, 225, 226, 227, 229, 254, 258, 263, 321, 326, 327, 328, 331, 335

- ☐ Mike VanDeWalle - REP
☐ Celia Israel - DEM
☐ David Dreesen - LIB

District 51, State Representative
(*Distrito Núm. 51, Representante Estatal*)

Precincts / Precintos: 101, 114, 115, 119, 138, 341, 401, 402, 403, 404, 405, 407, 410, 420, 421, 422, 423, 424, 426, 427, 428, 429, 431, 432, 433, 434, 437, 438, 439, 440, 441, 442, 443, 446, 450, 452

- ☐ Eddie Rodriguez - DEM
☐ Arthur DiBianca - LIB

Chief Justice, 3rd Court of Appeals District
(*Jefe Presidente, Corte de Apelaciones, Distrito Núm. 3*)

All precincts / Precintos enteros:

- ☐ Jeff Rose - REP
☐ Diane Henson - DEM

District Judge, 147th Judicial District
(*Juez del Distrito, Distrito Judicial Núm. 147*)

All precincts / Precintos enteros:

- ☐ Cliff Brown - DEM

District Judge, 201st Judicial District
(*Juez del Distrito, Distrito Judicial Núm. 201*)

All precincts / Precintos enteros:

- ☐ Amy Clark Meachum - DEM

District Judge, 250th Judicial District
(*Juez del Distrito, Distrito Judicial Núm. 250*)

All precincts / Precintos enteros:

- ☐ Karin Crump - DEM

District Judge, 261st Judicial District
(*Juez del Distrito, Distrito Judicial Núm. 261*)

All precincts / Precintos enteros:

- ☐ Lora Livingston - DEM

District Judge, 299th Judicial District
(*Juez del Distrito, Distrito Judicial Núm. 299*)

All precincts / Precintos enteros:

- ☐ Karen Sage - DEM

District Judge, 331st Judicial District
(*Juez del Distrito, Distrito Judicial Núm. 331*)

All precincts / Precintos enteros:

- ☐ David Crain - DEM

District Judge, 403rd Judicial District
(*Juez del Distrito, Distrito Judicial Núm. 403*)

All precincts / Precintos enteros:

- ☐ Brenda P. Kennedy - DEM

District Judge, 419th Judicial District
(*Juez del Distrito, Distrito Judicial Núm. 419*)

All precincts / Precintos enteros:

- ☐ Orlinda Naranjo - DEM

County Judge
(*Juez del Condado*)

All precincts / Precintos enteros:

- ☐ Mike McNamara - REP
☐ Sarah Eckhardt - DEM
☐ Richard Perkins - LIB

County Court at Law 1, Judge
(*Corte de Ley del Condado 1, Juez*)

All precincts / Precintos enteros:

- ☐ Todd Wong - DEM

County Court at Law 2, Judge
(*Corte de Ley del Condado 2, Juez*)

All precincts / Precintos enteros:

- ☐ Eric Montgomery Shepherd - DEM

County Court at Law 3, Judge
(*Corte de Ley del Condado 3, Juez*)

All precincts / Precintos enteros:

- ☐ John Lipscombe - DEM

County Court at Law 4, Judge
(*Corte de Ley del Condado 4, Juez*)

All precincts / Precintos enteros:

- ☐ Mike Denton - DEM

County Court at Law 5, Judge
(*Corte de Ley del Condado 5, Juez*)

All precincts / Precintos enteros:

- ☐ Nancy Hohengarten - DEM

County Court at Law 6, Judge
(*Corte de Ley del Condado 6, Juez*)

All precincts / Precintos enteros:

- ☐ Brandy Mueller - DEM

County Court at Law 7, Judge
(*Corte de Ley del Condado 7, Juez*)

All precincts / Precintos enteros:

- ☐ Elisabeth Earle - DEM

Judge, County Probate Court
(*Juez, Corte Testamentaria del Condado*)

All precincts / Precintos enteros:

- ☐ Guy Herman - DEM

District Clerk
(*Secretario del Distrito*)

All precincts / Precintos enteros:

- ☐ Velda L. Price - DEM
☐ Kevin Pick - LIB

County Clerk
(*Secretario del Condado*)

All precincts / Precintos enteros:

- ☐ Dana DeBeauvoir - DEM
☐ Michael M. Holt - LIB
☐ William E. Stout, Jr. - GRN

County Treasurer
(*Tesorero del Condado*)

All precincts / Precintos enteros:

- ☐ Dolores Ortega Carter - DEM
☐ Mike Burris - LIB

Precinct 2, County Commissioner
(*Precinto Núm. 2, Comisionado del Condado*)

Precincts / Precintos: 200, 202, 203, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 256, 258, 259, 260, 262, 263, 266, 267, 268, 273, 274, 275, 277

- ☐ Raymond Frank - REP
☐ Brigid Shea - DEM
☐ Steven Haskett - LIB

Precinct 4, County Commissioner
(*Precinto Núm. 4, Comisionado del Condado*)

Precincts / Precintos: 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 446, 447, 448, 450, 451, 452, 454, 458, 460, 461, 463

- ☐ Margaret J. Gomez - DEM
☐ Joseph Morse - LIB

Precinct 1, Justice of the Peace
(*Precinto Núm. 1, Juez de Paz*)

Precincts / Precintos: 101, 102, 103, 105, 106, 107, 108, 112, 113, 114, 116, 117, 118, 119, 120, 121, 122, 124, 125, 126, 127, 128, 129, 130, 131, 132, 134, 139, 140, 141, 149, 151, 152, 153, 154, 156, 164, 226, 227

- ☐ Yvonne M. Williams - DEM

Precinct 2, Justice of the Peace
(*Precinto Núm. 2, Juez de Paz*)

Precincts / Precintos: 104, 109, 110, 111, 123, 136, 137, 145, 146, 148, 150, 160, 161, 163, 203, 205, 207, 209, 211, 215, 216, 218, 219, 222, 225, 228, 229, 232, 244, 245, 246, 247, 248, 253, 254, 258, 259, 260, 262, 263, 267, 268, 305, 306, 312, 319, 320, 321, 323, 326, 327, 328, 331, 333, 334, 335, 336, 337, 343, 345, 359, 369, 370, 371, 372, 373, 374, 375

- ☐ Glenn Bass - REP
☐ Randall Slagle - DEM
☐ Daniel Martin Ruble - LIB

Precinct 3, Justice of the Peace
(*Precinto Núm. 3, Juez de Paz*)

Precincts / Precintos: 212, 221, 301, 302, 303, 304, 307, 308, 309, 310, 314, 315, 316, 317, 318, 324, 330, 332, 336, 339, 340, 342, 344, 346, 347, 349, 350, 351, 352, 354, 356, 357, 358, 360, 361, 362, 363, 364, 365, 366, 367, 368, 408, 410, 411, 412, 414, 415, 416, 419, 425, 430, 435, 441, 446, 447, 451, 454, 458, 460, 461, 463

- ☐ Susan Steeg - DEM
☐ Nathan Kieffman - LIB

Precinct 4, Justice of the Peace
(*Precinto Núm. 4, Juez de Paz*)

Precincts / Precintos: 115, 138, 341, 401, 402, 403, 404, 405, 406, 407, 409, 413, 417, 418, 420, 421, 422, 423, 424, 426, 427, 428, 429, 431, 432, 433, 434, 436, 437, 438, 439, 440, 442, 443, 444, 446, 450, 452

- ☐ Raul Arturo Gonzalez - DEM
☐ Zach Warren - LIB

Precinct 5, Justice of the Peace
(*Precinto Núm. 5, Juez de Paz*)

Precincts / Precintos: 133, 135, 142, 200, 202, 206, 208, 210, 213, 214, 217, 220, 223, 224, 231, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 246, 250, 251, 252, 256, 266, 273, 274, 275, 277, 311, 313, 325, 329

- ☐ Herb Evans - DEM

Proposed Constitutional Amendment
(*Enmienda Propuesta a La Constitución*)

All precincts / Precintos enteros:

"The constitutional amendment providing for the use and dedication of certain money transferred to the state highway fund to assist in the completion of transportation construction, maintenance, and rehabilitation projects, not to include toll roads."

"La enmienda constitucional que establece el uso y dedicación de ciertos fondos transferidos al Fondo Estatal de Carreteras para ayudar a finalizar la construcción, mantenimiento y rehabilitación en relación con el transporte, no incluye caminos de peaje."

- ☐ For / A Favor
☐ Against / En Contra

Comprehensive Ballot – City Elections

Travis County Clerk Elections Division

November 4, 2014 Joint General and Special Elections

Austin, Creedmoor, Jonestown, Pflugerville, Rollingwood, Village of Point Venture and Village of Volente.

If you do not know your election precinct or need other election information, call the Travis County Clerk

Elections Division at (512) 238-VOTE (8683). www.traviscountyelections.org

División de Elecciones de la Secretaría del Condado de Travis el 4 de noviembre de 2014 Elecciones Generales y Especiales Conjuntas

Austin, Creedmoor, Jonestown, Pflugerville, Rollingwood, Aldea de Point Venture y Village of Volente.

Si usted no sabe su precinto de elección o para más información sobre la elección, llame a la División de Elecciones de la Oficina de la Secretaría del Condado de Travis (512) 238-VOTE (8683). www.traviscountyelections.org

CITY OF AUSTIN SPECIAL AND GENERAL MUNICIPAL ELECTION (ELECCIÓN MUNICIPAL ESPECIAL Y GENERAL CIUDAD DE AUSTIN)

MAYOR, CITY OF AUSTIN

(ALCALDE, CIUDAD DE AUSTIN)

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 101, 102, 103, 104, 105, 106, 108, 109, 111, 112, 113, 116, 117, 118, 120, 121, 122, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 139, 140, 141, 142, 148, 149, 151, 152, 153, 154, 156, 160, 164, 200, 202, 203, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 256, 258, 259, 260, 262, 263, 266, 267, 268, 273, 274, 275, 277, 301, 302, 303, 304, 305, 307, 309, 310, 311, 312, 313, 314, 315, 317, 318, 321, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 347, 349, 350, 351, 352, 354, 356, 358, 359, 360, 362, 363, 364, 365, 366, 367, 368, 374, 375, 401, 402, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 446, 447, 448, 450, 451, 452, 454, 458, 460, 461, 463

- ☐ Mary Catherine Krenke
- ☐ Todd Phelps
- ☐ Ronald Culver
- ☐ Mike Martinez
- ☐ Randall Stephens
- ☐ Sheryl Cole
- ☐ David Orshalick
- ☐ Steve Adler

DISTRICT 1, AUSTIN CITY COUNCIL, CITY OF AUSTIN (DISTRITO 1, CIUDAD DE AUSTIN CONSEJO, CIUDAD DE AUSTIN)

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 101, 102, 103, 104, 105, 106, 108, 117, 118, 120, 121, 122, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 139, 141, 151, 153, 154, 156, 203, 206, 227, 325, 444

- ☐ George Hindman
- ☐ Sam Osemene
- ☐ Christopher Hutchins
- ☐ DeWayne Lofton
- ☐ Valerie Menard
- ☐ Norman A. Jacobson
- ☐ Michael Cargill
- ☐ Ora Houston
- ☐ Andrew Bucknall

DISTRICT 2, AUSTIN CITY COUNCIL, CITY OF AUSTIN (DISTRITO 2, CIUDAD DE AUSTIN CONSEJO, CIUDAD DE AUSTIN)

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 116, 401, 402, 404, 405, 407, 410, 411, 413, 423, 425, 443, 447, 448, 450, 451, 452, 463

- ☐ Edward "Wally" Reyes
- ☐ John C. Sheppard
- ☐ Delia Garza
- ☐ Mike Owen

DISTRICT 3, AUSTIN CITY COUNCIL, CITY OF AUSTIN (DISTRITO 3, CIUDAD DE AUSTIN CONSEJO, CIUDAD DE AUSTIN)

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 407, 409, 420, 423, 424, 426, 427, 429, 430, 431, 432, 433, 434, 436, 438, 439, 440, 441, 442, 446

- ☐ Ricardo Turullols-Bonilla
- ☐ Kent Phillips
- ☐ Christopher Hoerster
- ☐ Shaun Ireland
- ☐ Mario Cantu
- ☐ Jose Quintero Sr.
- ☐ Fred L. McGhee
- ☐ Jose Valera
- ☐ Eric J. Rangel
- ☐ Susana R. Almanza
- ☐ Sabino "Pio" Renteria
- ☐ Julian Limon Fernandez

DISTRICT 4, AUSTIN CITY COUNCIL, CITY OF AUSTIN (DISTRITO 4, CIUDAD DE AUSTIN CONSEJO, CIUDAD DE AUSTIN)

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 133, 135, 139, 140, 142, 149, 156, 164, 209, 211, 217, 218, 222, 223, 224, 258, 260, 268

- ☐ Roberto Perez, Jr.
- ☐ Louis C. Herrin, III
- ☐ Sharon E. Mays
- ☐ Monica A. Guzman
- ☐ Marco Mancillas
- ☐ Gregorio "Greg" Casar
- ☐ Katrina Daniel
- ☐ Laura Pressley

DISTRICT 5, AUSTIN CITY COUNCIL, CITY OF AUSTIN (DISTRITO 5, CIUDAD DE AUSTIN CONSEJO, CIUDAD DE AUSTIN)

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 309, 310, 332, 340, 342, 344, 350, 352, 406, 408, 411, 412, 414, 415, 416, 417, 419, 430, 435, 447, 454, 458, 460, 461, 463

- ☐ Jason Denny
- ☐ Dave Floyd
- ☐ Mike Rodriguez
- ☐ Ann Kitchen
- ☐ CarolAnneRose Kennedy
- ☐ Dave Senecal
- ☐ Dan Buda

DISTRICT 6, AUSTIN CITY COUNCIL, CITY OF AUSTIN (DISTRITO 6, CIUDAD DE AUSTIN CONSEJO, CIUDAD DE AUSTIN)

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 207, 232, 234, 244, 245, 254, 267, 312, 318, 324, 333, 334, 335, 336, 343, 359, 374, 375

- ☐ James "Jimmy" Flannigan
- ☐ Lloyd "Pete" Phillips
- ☐ Don Zimmerman
- ☐ Jay Wiley
- ☐ Matt Stilwell
- ☐ Mackenzie Kelly

DISTRICT 7, AUSTIN CITY COUNCIL, CITY OF AUSTIN (DISTRITO 7, CIUDAD DE AUSTIN CONSEJO, CIUDAD DE AUSTIN)

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 109, 111, 112, 113, 148, 160, 205, 207, 211, 215, 216, 218, 219, 225, 226, 228, 235, 236, 239, 241, 242, 243, 248, 252, 258, 259, 260, 263, 268

- ☐ J.E. "Jeb" Boyt
- ☐ Zack Ingraham
- ☐ Melissa Zone
- ☐ Ed English
- ☐ Darryl R. Wittie
- ☐ Jimmy Paver
- ☐ Leslie Pool
- ☐ Pete A. Salazar, Jr.

DISTRICT 8, AUSTIN CITY COUNCIL, CITY OF AUSTIN (DISTRITO 8, CIUDAD DE AUSTIN CONSEJO, CIUDAD DE AUSTIN)

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 301, 302, 303, 304, 307, 314, 315, 317, 330, 338, 339, 347, 349, 351, 354, 356, 358, 360, 362, 363, 364, 365, 366, 367, 368

- ☐ Ellen Troxclair
- ☐ Ed Scruggs
- ☐ Becky Bray
- ☐ Darrell Pierce
- ☐ Eliza May

DISTRICT 9, AUSTIN CITY COUNCIL, CITY OF AUSTIN (DISTRITO 9, CIUDAD DE AUSTIN CONSEJO, CIUDAD DE AUSTIN)

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 133, 135, 152, 200, 202, 206, 208, 214, 250, 274, 275, 277, 311, 313, 329, 341, 420, 421, 422, 424, 428, 429, 433, 437

- ☐ Erin McGann
- ☐ Kathie Tovo
- ☐ Chris Riley

DISTRICT 10, AUSTIN CITY COUNCIL, CITY OF AUSTIN (DISTRITO 10, CIUDAD DE AUSTIN CONSEJO, CIUDAD DE AUSTIN)

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 210, 212, 213, 214, 220, 221, 231, 233, 237, 238, 240, 246, 247, 249, 251, 253, 256, 262, 266, 273, 274, 305, 321, 323, 326, 327, 328, 331, 337, 338, 345, 364

- ☐ Matt Lamon
- ☐ Bill Worsham
- ☐ Tina Cannon
- ☐ Margie Burciaga
- ☐ Robert Thomas
- ☐ Shen Gallo
- ☐ Mandy Dealey
- ☐ Jason Meeker

**CITY OF AUSTIN, BOND ELECTION
(ELECCIÓN DE BONOS
CIUDAD DE AUSTIN)**

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 101, 102, 103, 104, 105, 108, 109, 111, 112, 113, 116, 117, 118, 120, 121, 122, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 139, 140, 141, 142, 148, 151, 152, 153, 154, 156, 160, 164, 200, 202, 203, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 220, 221, 222, 223, 224, 226, 227, 228, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 256, 258, 259, 260, 262, 263, 266, 267, 268, 273, 274, 275, 277, 301, 302, 303, 304, 305, 307, 309, 310, 311, 312, 313, 314, 315, 317, 318, 321, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 347, 349, 350, 351, 352, 354, 356, 358, 359, 360, 362, 363, 364, 365, 366, 367, 374, 375, 401, 402, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 446, 447, 448, 450, 451, 452, 454, 456, 460, 461, 463

PROPOSITION, CITY OF AUSTIN

The issuance of \$600,000,000 bonds and notes for rail systems, facilities and infrastructure, including a fixed rail transit system to be operated by Capital Metropolitan Transportation Authority (which may spend its funds to build, operate and maintain such system) servicing the East Riverside Corridor, downtown Austin, the State Capitol complex, the Medical School complex, the University of Texas, Hancock Center, Austin Community College Highland campus, and surrounding neighborhoods, and roadway improvements related to such rail systems, facilities and infrastructure; provided that the City may not issue bonds or notes to pay costs of the fixed rail transit system (other than expenditures for planning, designing and engineering necessary to obtain grant and/or match funding) unless (i) the City obtains grant or match funding for the cost of the fixed rail transit system from the Federal Transit Administration or one or more other federal or state sources and (ii) the City provides funding in an amount not less than \$400,000,000 to pay costs of roadway improvement projects of regional significance that are designed to relieve congestion, enhance mobility and manage traffic in the I-35, US 183, SH 71, RM 620, RM 1826, RM 2222, FM 734 (Parmer), Lamar Boulevard, and Loop 360 corridors, and the levy of a tax sufficient to pay for the bonds and notes.

(PROPOSICIÓN, CIUDAD DE AUSTIN)

La emisión de \$600,000,000 en bonos y pagares para sistemas ferroviarios, facilidades, e infraestructura, incluyendo un sistema de tránsito sobre rieles fijos operado por Capital Metropolitan Transportation Authority (quien podrá gastar sus fondos para construir, operar y mantener dicho sistema) para servicio al corredor East Riverside Corridor, a la Zona Centro de Austin, al Complejo Estatal del Capitolio, al Complejo de la Escuela de Medicina, a la Universidad de Texas, a Hancock Center, al campus Highland de Austin Community College, y a los vecindarios circunvecinos y para mejoras de calles y carreteras relacionadas con dichos sistemas ferroviarios, facilidades e infraestructura; siempre y cuando la Ciudad no podrá emitir bonos ni pagares para pagar costos del sistema de tránsito sobre rieles fijos (que no sean gastos para planificación, diseño e ingeniería necesarios para obtener financiamiento de concesiones y/o de contrapartida/matching) a no ser que (i) la Ciudad obtenga fondos de concesiones o contrapartida/matching para el costo del sistema de tránsito sobre rieles fijos de la Administración Federal de Tránsito (Federal Transit Administration) o de uno o más recursos federales o estatales y (ii) la Ciudad proporcione financiamiento en una cantidad que no sea menos de \$400,000,000 para pagar el costo de proyectos de mejoras de calles y carreteras de transportación de significancia regional, que se hayan diseñado para aliviar congestionamientos, realzar la movilidad y manejar el tráfico en los corredores de I-35, US 183, SH 71, RM 620, RM 1826, RM 2222, FM 734 (Parmer), Lamar Boulevard, y Loop 360; y la imposición de un impuesto suficiente para pagar los bonos y pagará.

- ☐ For / A Favor
☐ Against / En Contra

**CITY OF CREEDMOOR
GENERAL ELECTION
(CIUDAD DE CREEDMOOR
ELECCIÓN GENERAL)**

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 403, 404
**BOARD OF ALDERMEN, CITY OF CREEDMOOR
(JUNTA DE CONCEJALES, CIUDAD DE CREEDMOOR)**
Vote for none, one, two or three (Vote por ninguno, uno, dos o tres)

- ☐ Richard E. Harrison
☐ Connie Meador Horn
☐ Jeff Jakobait
☐ Milissa Berry
☐ James Stinson
☐ Jesse Solis

**CITY OF JONESTOWN
GENERAL ELECTION
(ELECCIÓN GENERAL
DE CIUDAD DE JONESTOWN)**

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 369, 371, 372, 373, 375

**PLACE 3, ALDERMAN, CITY OF JONESTOWN
(LUGAR 3, CONCEJAL,
CIUDAD DE JONESTOWN)**

- ☐ Joseph D. Aaron
☐ Sarah Heihn

**PLACE 4, ALDERMAN, CITY OF JONESTOWN
(LUGAR 4 CONCEJAL,
CIUDAD DE JONESTOWN)**

- ☐ Dave Neisen

**PLACE 5, ALDERMAN, CITY OF JONESTOWN
(LUGAR 5, CONCEJAL,
CIUDAD DE JONESTOWN)**

- ☐ Paul Johnson

**CITY OF PFLUGERVILLE
GENERAL ELECTION
(ELECCIÓN GENERAL
CIUDAD DE PFLUGERVILLE)**

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 105, 107, 110, 113, 123, 136, 137, 145, 146, 148, 150, 160, 161, 163, 203, 219

**PLACE 2, COUNCIL MEMBER,
CITY OF PFLUGERVILLE
(LUGAR 2, MIEMBRO DEL CONCILIO,
CIUDAD DE PFLUGERVILLE)**

- ☐ Brad Marshall
☐ Rudy Metayer

**PLACE 4, COUNCIL MEMBER,
CITY OF PFLUGERVILLE
(LUGAR 4, MIEMBRO DEL CONCILIO,
CIUDAD DE PFLUGERVILLE)**

- ☐ Starlet D. Sattler

**CITY OF PFLUGERVILLE
BOND ELECTION
(ELECCIÓN DE BONOS
CIUDAD DE PFLUGERVILLE)**

PROP. 1, CITY OF PFLUGERVILLE

The issuance of \$28,000,000 tax bonds for City street improvements, including for E. Pecan Street, Pflugerville Parkway, Heatherwilde Boulevard, Weiss Lane, Rowe Lane, Pfennig Lane, Cactus Blossom Drive, Columbine Street, Ardisia Drive, Simsbrook Drive, Dashwood Creek Drive, Blackhorn Drive, Thackeray Lane, Gravesbend Road, Isle of Man Road, Isle of Man Court, Gower Street and Langland Road.

(PROP. 1, CIUDAD DE PFLUGERVILLE)

La emisión de bonos de impuestos por \$28,000,000 para mejoras de las calles de la ciudad, que incluyen para E. Pecan Street, Pflugerville Parkway, Heatherwilde Boulevard, Weiss Lane, Rowe Lane, Pfennig Lane, Cactus Blossom Drive, Columbine Street, Ardisia Drive, Simsbrook Drive, Dashwood Creek Drive, Blackhorn Drive, Thackeray Lane, Gravesbend Road, Isle of Man Road, Isle of Man Court, Gower Street y Langland Road.

- ☐ For / A Favor
☐ Against / En Contra

PROP. 2, CITY OF PFLUGERVILLE

The issuance of \$25,000,000 tax bonds for City park and recreational purposes, including development of parks and hike and bike trails, a City Sports Complex and parks and recreational improvements at Lake Pflugerville.

(PROP. 2, CIUDAD DE PFLUGERVILLE)

La emisión de bonos de impuestos por \$25,000,000 para parques y fines recreativos de la Ciudad, que incluyen el desarrollo de parques y sendas para caminar y para bicicletas, un Complejo Deportivo para la Ciudad y mejoras a parques e instalaciones recreativas en Lake Pflugerville.

- ☐ For / A Favor
☐ Against / En Contra

**CITY OF ROLLINGWOOD
GENERAL ELECTION
(ELECCIÓN GENERAL
CIUDAD DE ROLLINGWOOD)**

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 307, 347

**THE FOLLOWING UNOPPOSED
CANDIDATES ARE
DECLARED ELECTED:
(CANDIDATOS SIN OPOSICIÓN SON
DECLARADOS ELECTOS):**

**MAYOR, CITY OF ROLLINGWOOD
(ALCALDE, CIUDAD DE ROLLINGWOOD)**

Thom Farrell

**ALDERMAN, CITY OF ROLLINGWOOD
(CONCEJAL, CIUDAD DE ROLLINGWOOD)**

Roxanne McKee

**ALDERMAN, CITY OF ROLLINGWOOD
(CONCEJAL, CIUDAD DE ROLLINGWOOD)**

Sara Hutson

**CITY OF ROLLINGWOOD
SPECIAL ELECTION
(ELECCIÓN ESPECIAL
CIUDAD DE ROLLINGWOOD)**

**ALDERMAN, CITY OF ROLLINGWOOD
(CONCEJAL, CIUDAD DE ROLLINGWOOD)**

Vote for none, one or two (Vote por ninguno, uno o dos)

- ☐ Jordan Scott
☐ Amy Pattillo
☐ Colin MacDougall

**THE VILLAGE OF POINT VENTURE
COUNCIL ELECTION
(ELECCIÓN CONSEJO DE LA
ALDEA DE POINT VENTURE)**

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 373

**COUNCIL, VILLAGE OF POINT VENTURE
(CONSEJO, LA ALDEA DE POINT VENTURE)**

Vote for none, one, two or three (Vote para ninguno, uno, dos, o tres)

- ☐ Dan Devezze
☐ Bill Roney
☐ Lisa Guest
☐ Michael Sutton

**VILLAGE OF VOLENTE
GENERAL ELECTION
(ELECCIÓN GENERAL
VILLAGE DE VOLENTE)**

All or portions of these precincts / (Precintos enteros o partes de estos precintos): 375

**MAYOR, VILLAGE OF VOLENTE
(ALCALDE, VILLAGE DE VOLENTE)**

☐ Ken Beck

**COUNCIL MEMBER, VILLAGE OF VOLENTE
(CONCEJO MUNICIPAL, VILLAGE DE VOLENTE)**

Vote for none, one or two (Vote por ninguno, uno o dos)

- ☐ David Springer
☐ Kristi Belote
☐ Bill Connors

Attachment 8
STAR-VOTE™ CRYPTOGRAPHIC ASPECTS PAPER

Star-Vote™ Cryptographic Aspects

Josh Benaloh, Microsoft Research
and Olivier Pereira, Université Catholique de Louvain

Modified by Bryce Eakin for consistency with Travis County requirements

1. ELECTION PROCESS

1.1. Entities

This paper presumes 3 parties assuming 3 different roles:

Voters submit votes and want to be able to perform various audit operations.

Trustees compute the election outcome and are responsible for the privacy of the votes.

Internal Auditors are responsible for doing internal audit operations. This role in particular includes running a risk-limiting audit.

This paper also presumes 4 devices assuming 4 different roles:

Voting Stations interact with the voters in order to produce ballots, under electronic and paper format.

Ballot Box/Scanners receive the paper ballots and notify Ballot Control Station of this reception.

Auditing Station can be used by the voter to challenge ballot-marking devices.

Ballot Control Stations (BCS) orchestrate the various devices in a voting office.

1.2. Setup

The following values are created and published before the election starts.

- (1) Trustees produce an election public key k_T for a threshold commitment consistent encryption scheme [6].
- (2) Each BCS produces a public key k_{C_i} for an encryption scheme.
- (3) Two unique hash chain seeds z_{p0} and z_{i0} , one for the public audit part and one for the internal audit part. These seeds are computed as cryptographic hashes of a string representing in a unique, unambiguous and unpredictable way the description of the election, to which is concatenated a special string indicating the chain in which that seed must be used.

The unpredictability may be produced by a variety of methods that generate a random outcome on election morning in each polling station; pollworkers then enter the outcome into the controller..

All voting stations are initialized with $k_T, k_{C_{1...n}}, zp_0, zi_0$. The ballot boxes are initialized with $k_{C_{1...n}}, zp_0$ and zi_0 .

1.3. Voter identification

When signing-in, a voter receives a token t associated to his ballot style bst . This token is made in such a way that it can be used only once. Recovery procedures are decided in the case a voter claims that his token was consumed by a Voting Station that did not return a paper ballot.

1.4. At the Ballot Marking Device

When entering the booth, the voter enters his token and the Voting Station displays an empty ballot of style bst , so that the voter can make his selection v .

The Voting Station processes these choices as follows:

- It broadcasts the information that the token introduced by the user is consumed.
- It selects an unpredictable ballot identifier pid_p (e.g., as a UUID) for each page which will ultimately be printed as part of the paper voting record. These pid_p must be kept secret and will be part of the risk limiting audit trail.
- It selects a unique page casting identifier $pcid_p$ (possibly as the concatenation of the mid and a counter) for each page of the paper voting record. This $pcid_p$ will be used to track whether the ballot page made its way to a ballot box.
- It computes $c_{pcid}^{C_i} = \text{Enc}_{k_{C_i}}(pcid_0 \parallel \dots \parallel pcid_n)$, for each BCS, i , which will be used by BCS i to link the paper pages and electronic record. For simplicity, c_{pcid}^C will refer to the vector of these $c_{pcid}^{C_i}$'s: $(c_{pcid}^{C_0} \parallel \dots \parallel c_{pcid}^{C_n})$.
- For each page p of the final PVR, it computes $c_{v_p} = \text{CCEnc}_{k_T}(v_p, zp_0)$ where v_p is the subset of the voter's selections which will appear in the PVR on that page. For convenience, c_v will refer to the vector of these c_{v_p} 's.
- It computes a vector c_{pcid} of ciphertexts that encrypt $\mathcal{H}(bcid_p \parallel r_i)$ with k_T for each race r_i , using the $pcid_p$ for the page of the PVR on which that race will ultimately be printed.
- It broadcasts a message that contains the identifier of the voting station, mid , the time t , bst , c_{pcid}^C , c_{pcid} , c_v and a hash $zi_i := \mathcal{H}(zi_{i-1}, mid, t, bst, c_{pcid}^C, c_{pcid}, c_v)$ for inclusion in the internal audit trail.
- It prints a paper voting record, potentially consisting of more than one page, as well as a receipt. Each page of the paper voting record contains a human readable summary of v and a machine readable version (as a 1D barcode) of pid_p , $pcid_p$, and the ballot style bst (if the ballot is made of multiple pages, then the page number is concatenated to the bst). The second part is a take home receipt that contains a human readable version of the election description, the time t and $zp_i := \mathcal{H}(zp_{i-1}, mid, t, \text{CCExt}(c_v))$. In order to simplify the audit process, the first 5 symbols of zp_i are printed in bold and a bit separated from the other symbols. At verification time, the voter will then be invited to search for his receipt based on these 5 characters and to check whether the reply contains the rest of the hash.

When receiving this, each BCS decrypts $c_{pcid}^{C_i}$ and appends the pair $(pcid_p, zp_i)$ into a local table, until a ballot with that $pcid_p$ is scanned at the ballot box. Note that this table should not appear in any log, as being able to link a $pcid_p$ to a specific time and that time to the time at which a voter submitted a specific ballot could violate the vote privacy during the internal audit process. In case of problems, the encrypted version of the $pcid_p$ still appears in all logs, which should provide the information needed if an investigation is required.

1.5. Challenging the Ballot Marking Device

If the voter wants to challenge the BMD, he brings the PVR to a poll worker. The poll worker now proceeds as follows:

- He physically stamps the PVR to mark it as spoiled, and ideally links its different pages (including the receipt) together in such a way that no one will be able to rebuild a full ballot from parts of different ballots in an unnoticeable way (possibly by stamping a unique serial number on all parts of the ballot). This makes that ballot usable as evidence in case of a cheating Voting Station. Using specially designed paper would be desirable as well, in order to make forgeries harder.
- He scans the $pcid_p$ for each page, so that the ballot is recorded to be spoiled. This recording process happens in the same way as a normal casting process, except that a “spoiled” flag appears in all messages included in the hash chain. (This scanning step is optional. Its goal is to facilitate, as a human factor verification, the counting of the number of spoiled ballots against the number of voters who leave the voting office without casting their ballot.) — He gives the PVR back to the voter. Any PVR (or pages of a PVR) not placed in a ballot box are presumed to have been implicitly spoiled.

Later, at tallying time, the spoiled vote records will all be decrypted and posted on a bulletin board for voter verification. If only a subset of a voter’s PVR pages were placed in a ballot box, the remaining pages are considered spoiled and their associated races decrypted and posted on the bulletin board for voter verification. Any voter who sees either that his ballot does not appear decrypted on the board, or that the published decryption does not match the human readable choices on his PVR, is invited to complain.

1.6. Casting a Ballot

If the voter is happy with the selections printed by the Voting Station, he brings the PVR to a ballot box. There, each page of the PVR is placed into the ballot box, while the take-home receipt is kept by the voter.

The ballot box computes a vector $c_{pcid_p}^{C_i} = (\text{Enc}_{k_{C_0}}(pcid_p) \parallel \dots \parallel \text{Enc}_{k_{C_n}}(pcid_p))$ for each page and sends it to the BCSs, together with $zi_i = \mathcal{H}(zi_{i-1}, t, uid, c_{pcid_p}^{C_i})$. Each BCS decrypts $c_{pcid_p}^{C_i}$ and searches for $pcid_p$ in its local ballot table. If $pcid_p$ is not in the table, it triggers an alert. Otherwise, if it finds a $(pcid_p, zp_i)$ pair in its table, removes it from the table, and broadcasts z, p , and $zi_i = \mathcal{H}(zi_{i-1}, t, cid, z, p)$ which indicates that page p of the vote record that is associated to z in the hash chain has been cast and must be included in the tally.

1.7. Tallying Process

At the end of the day, all c_{v_p} that have been marked as to be included for the tally are checked for validity and aggregated into an encryption c_v of the tally. This tally is then

jointly decrypted by the Trustees and published. (This is done as needed for the different races, ballot styles, ...)

Then, $\text{CCExt}()$ is applied to all c_{vp} ciphertexts and the result is published with all the information needed to check the zp hash chain, and the trustees publish the information that is needed to prove that the tally is consistent with the $\text{CCExt}(c_{vp})$'s.

In addition, the Trustees also jointly verifiably decrypt and publish the content of all c_{vp} corresponding to spoiled pages of PVRs.

1.8. Audit of the Electronic Process

Anyone can perform a number of verifications from the published information:

- (1) check the validity of the published $\text{CCExt}(c_{vp})$'s;
- (2) check that the tally is consistent with the published $\text{CCExt}(c_{vp})$'s;
- (3) check the validity of the zp hash chain;
- (4) check the number of ballots against the number of voters if the information is public.

Furthermore, voters are invited to check whether the zpi value printed on their receipt appears in the list of ballots included in the tally.

All published information is available through an easy to access web API in order to ease the design of independent auditing tools, but also as a big signed document that commits the election organizers on the posted values.

If any of these verification procedures fails, a voter may complain.

1.9. Audit of the Paper Ballots

After having checked the validity of all the ballots, but before decrypting the election outcome, the Trustees supervise (or perform), contest by contest, a shuffle of all (c_{pid}, c_{vp}) pairs corresponding to valid ballots, yielding a list of (c_{pid}, c'_{vp}) pairs. This shuffle is performed in an optimistic way and does not need to be verifiable. As a result, it can be performed extremely efficiently: all reencryption ciphertexts can be precomputed as $\text{Enc}_{k_T}(0)$, leaving only a bunch of multiplications to be performed at tallying time.

After completion of this shuffle, the Trustees decrypt all c'_{vp} and c_{pid} tuples, at the same time as they decrypt the election outcome. This decryption yields, for each race r_i , a list that contains $\mathcal{H}(pcid_p \parallel r_i)$ and the cleartext choices that should be those on the paper vote record page $pcid_p$ for race r_i . This table is made available to all people and observers who take part to the risk-limiting audit. Note that, thanks to the use of the hash function, no one is able to decide which race results belong to the same ballot: this can only be recovered by someone who knows the $pcid_p$, which can be learned from the paper vote records. But, in that case, the full ballot is exposed anyway.

From this table, a risk limiting audit can take place. One way of doing this audit is as follows. Make sure that all hashes are unique and that the table contains as many races as are on the paper ballots, then repeat as long as decided for the audit:

- (1) verifiably select a random paper ballot in the urn;

- (2) read its $pcid_p$ and search for $\mathcal{H}(pcid_p \parallel r_i)$ values in the table for all races r_i present on the ballot;
- (3) compare the corresponding plaintexts to the paper ballot.

Proper care should also be taken to make sure that it is not feasible to inspect all paper ballots in search of a specific pattern.

2. CRYPTOGRAPHIC ALGORITHMS

For practical use, targets are established using:

- Encryption schemes that come with a simple distributed/threshold key generation procedure, in order to simplify and limit the risks of error. In this context, encryption schemes that allow computing in prime order groups are of special interest.
- A security level equivalent to at least 256-bits. This applies for the output size of hash functions (e.g., SHA256 or Keccak) and the order of the groups in which the system operator would compute (see [9] for instance.)

Some concrete proposals are discussed below.

2.1. Key generation

Groups with a public generator of prime order q are used. In all the schemes, the public key is a sequence of elements of the form g^x and the private key is a sequence of corresponding x , possibly shared between a set of key holders.

This can be done in a very simple way in the case of distributed (non-threshold) key generation. Let U_1, \dots, U_n be the set of key holders and l be a unique election identifier. U_i proceeds as follows:

- (1) select $(x_i, r_i) \leftarrow \mathbb{Z}_q^2$;
- (2) publish g^{x_i} , and the Schnorr proof made of $c_i = \mathcal{H}(l, g^{x_i}, g^{r_i})$ and $f_i = r_i + c_i x_i$.

Everyone can now verify that $c_i = \mathcal{H}(l, g^{x_i}, g^{f_i} / (g^{x_i})^{c_i})$ and compute the public key element as $g^x = \prod_i g^{x_i}$.

The key benefit of this approach is that it requires a single round by the key holders and does not require any private communication between key holders. A single key loss is however sufficient to make it infeasible to decrypt any ciphertext. Various threshold key generation procedures exist but are much more demanding [8].

The goal is to have a commitment-consistent encryption scheme for the Trustees, that makes it simple to have verifiable encryption and decryption procedures.

2.2. Encryption of 0/1 values

The scheme must also be additively homomorphic and it should be feasible to decrypt the sum of all votes efficiently.

The most effective way to do this seems to encrypt all choices independently and, for validity, to prove that each ciphertext encrypts a 0 or a 1 (assuming approval voting). All unregistered write-ins can be aggregated in a single candidate, which prevents having a full count for them individually. Ideally, the number of votes write-ins will get will be small enough to not require decrypting write-in ciphertexts in the end.

There are (at least) two ways to verifiably encrypt and decrypt a 0 or a 1. The first involves simpler algebraic operations (basic modular arithmetic is sufficient) but is less robust from a confidentiality point of view. The second offers stronger resilience to mistakes by Trustees, hacking and advances in computational power and cryptanalysis, but involves more sophisticated algebraic operations (elliptic curve point operations for voting and pairing evaluation for auditing.)

2.2.1. ElGamal encryption

The simplest choice for encryption is to use exponential ElGamal.

- The public key is a single group element $h = g^x$ generated as suggested above, in a distributed or threshold way.
- A choice m is encrypted as follows: choose $r \leftarrow \mathbb{Z}_q$ and compute $(\alpha, \beta) = (g^r, g^m h^r)$.
- The fact that a ciphertext encrypts 0 or 1 is proven by adding the following disjunctive Chaum-Pedersen proof: select $c_{1-m} \leftarrow \mathbb{Z}_{2^{256}}$ and $f_{1-m} \leftarrow \mathbb{Z}_q$, compute $A_{1-m} = g^{f_{1-m}} / (\alpha)^{c_{1-m}}$ and $B_{1-m} = h^{f_{1-m}} / (\beta / g^{1-m})^{c_{1-m}}$, select $s \leftarrow \mathbb{Z}_q$, compute $A_m = g^s$ and $B_m = h^s$, then $c = \mathcal{H}(zp_0, \alpha, \beta, A_0, B_0, A_1, B_1)$. Eventually, compute $c_m = c - c_{1-m}$ and $f_m = s + c_m r$. The proof is made of c_0, c_1, f_0, f_1 .
- Decryption proceeds by computing a decryption factor $\delta = \alpha^x$. Then, m can be computed as the discrete logarithm of β/δ in basis g .
- The correctness of the decryption can be proven by adding the following proof. Select $s \leftarrow \mathbb{Z}_q$, compute and publish $c = \mathcal{H}(zp_0, \alpha, \delta, g^s, h^s)$ and $f = s + cx$.

Several observations here:

Group choice. The group used here can either be a 256 bits prime order subgroup of \mathbb{Z}_p^* where $|p| = 2048$ (or even 3248 for general long-term protection) or a 256 bits prime order group on an elliptic curve. Actual choices for these groups are proposed in various places (e.g., [10; 13]). Explicit formula for elliptic curve operations are widely available as well [4]. Elliptic curves require more sophisticated algebra but offer ciphertexts that are typically ≈ 8 –10 times smaller for the same security level.

Discrete log extraction. Exponential ElGamal is used in order to have an additively homomorphic encryption scheme. As a result, the decryption procedure involves extracting a discrete logarithm (DL) in a fixed base. As the number of voters is an upper bound on this DL, an exhaustive search is easy. The full list of values can also be stored in a table in advance if desired. A middle ground consists in using Shanks' baby-step giant-step algorithm.

Distributed decryption. Distributed decryption can be done as follows: each key holder computes $\delta_i = \alpha^{x_i}$ and now m is the DL of $\beta / \prod_i \delta_i$ in base g . Each key holder also needs to provide a Chaum-Pedersen proof of correct decryption.

CCExt. The CCExt function is defined here as the identity function. As a result, when using ElGamal, the full ciphertexts are included as part of the public audit trail zp . This may result in a full loss of the privacy of the votes if the trustees somehow lose their keys, if a cryptanalytic breakthrough happens, or if people look at the records a

few dozen years from now when computational power will have increased enough to break the encryption easily.

2.2.2. PPATS encryption

The PPATS scheme [6] makes it possible to have public audit trail perfectly hiding the votes, at the potential cost of more sophisticated algebraic operations. By using this scheme, the public audit trail does not risk violating the privacy of the votes if keys are revealed or encryption broken.

This scheme uses 3 groups of the same prime order q : \mathbb{G}_1 , \mathbb{G}_2 and \mathbb{G}_T , in a setting where there is an asymmetric bilinear map $e: \mathbb{G}_1 \times \mathbb{G}_2 \rightarrow \mathbb{G}_T$. We use so-called Type-3 groups [7], so that the DDH problem on which the security of ElGamal relies is expected to be hard in these groups. We suppose that g_1 , g_2 and g_T generate \mathbb{G}_1 , \mathbb{G}_2 and \mathbb{G}_T respectively. We furthermore assume that h_2 is a second generator of \mathbb{G}_2 chosen randomly and independent of g_2 (in practice, this can be done by computing h_2 deterministically as a cryptographic hash of g_2 for instance).

- The public key is a single group element $h_1 = g_1^x$ generated as suggested above, in a distributed or threshold way.
- A choice m is encrypted as follows: choose $r, s \leftarrow \mathbb{Z}_q^2$ and compute $(\alpha, \beta, \gamma) = (g_1^s, g_1^r h_1^s, h_2^m g_2^r)$.
- The fact that a ciphertext encrypts 0 or 1 is proven by adding the following proofs:
- Choose $m_c, r_c, s_c \leftarrow \mathbb{Z}_q^3$ and compute $(A_c, B_c, C_c) = (g_1^{s_c}, g_1^{r_c} h_1^{s_c}, h_2^{m_c} g_2^{r_c})$. The proof is made of $c_c = \mathcal{H}(zp_0, \alpha, \beta, \gamma, A_c, B_c, C_c)$ and $f_c = (m_c + c_c m, r_c + c_c r, s_c + c_c s)$;
- select $c_{1-m} \leftarrow \mathbb{Z}_{2^{256}}$ and $f_{1-m} \leftarrow \mathbb{Z}_q$, compute $C_{1-m} = g_2^{f_{1-m}} / (\gamma / h_2^{1-m})^{c_{1-m}}$ select $r_0 \leftarrow \mathbb{Z}_q$, compute $C_m = g_2^{r_0}$, then $c = \mathcal{H}(zp_0, \gamma, C_0, C_1)$. Eventually, compute $c_m = c - c_{1-m}$ and $f_m = r_0 + c_m r$. The proof is made of c_0, c_1, f_0, f_1 .
- $\text{CCExt}(\alpha, \beta, \gamma, c_c, f_c, c_0, c_1, f_0, f_1) = (\gamma, c_0, c_1, f_0, f_1)$
- Decryption proceeds by computing a decryption factor $\delta = \alpha^x$. Then, m can be computed as the discrete logarithm of $e(\delta/\beta, g_2) \cdot e(g_1, \gamma)$ in basis $e(g_1, h_2)$.
- The correctness of the decryption can be proven by publishing $a = \alpha^x$. (It can then be checked that $e(\beta/a, g_2) = e(g_1, \gamma/h_2^m)$.)

Several observations:

Group choice. The most common curve choices offering the properties needed are the BLS curves [1; 5] or the BN curves [2; 14]. Various free implementations of the BN curve arithmetic are available [12; 11; 3].

CCExt. The CCExt function now extracts a single group element from the ciphertext, which perfectly hides the vote, as well as the 0-1 validity proof, which is perfectly hiding as well. So, whatever cryptography breakthrough or hacking of the trustees happens, the output of CCExt will not leak anything about the votes.

2.3. Encryption of the *pid*

It is necessary to encrypt larger values in various places and, most importantly, the *pid* which is a high entropy value, and needs to be homomorphically encrypted. The high

entropy prevents using a scheme in exponential mode: it would not be possible to extract the final DL at decryption time.

There are two ways to solve this:

- (1) Use ElGamal on elliptic curves (not in \mathbb{Z}_p^*): it is then easy to encode and decode integers as group elements.
- (2) Generate a second ElGamal key in a different group \mathbb{Z}_p^* with $p = 2q + 1$ where q is a 2047 bits prime and p is equal to 3 mod 4. Then, squaring messages mod p is an easily decodable encoding of messages. Note that this group should not be used everywhere, as encryption becomes 8 times more expensive.

This suggests that elliptic curve cryptography might be more convenient by limiting the number of keys.

2.4. Encryption for the controller

The encryption scheme used to send the $pcid_p$ to the BCS does not need any homomorphic property but needs to support efficient decryption.

The solutions above can be used again here, as well as more traditional solutions if that eases the implementation (e.g., RSA encryption, or hashed ElGamal).

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ATTACHMENT 9 HUMAN FACTORS EVALUATION TEST BALLOT

Test Ballot, Page 1 Test Ballot, Page 2

GENERAL ELECTION BALLOT HARRIS COUNTY, TEXAS NOVEMBER 4, 2008		
<p>• TO VOTE, COMPLETELY FILL IN THE OVAL NEXT TO YOUR CHOICE.</p> <p>• Use only the marking device provided or a number 2 pencil.</p> <p>• If you make a mistake, don't hesitate to ask for a new ballot. If you erase or make other marks, your vote may not count.</p>		
PRESIDENT AND VICE PRESIDENT	STATE	COUNTY
PRESIDENT AND VICE PRESIDENT (Vote for One)	COMMISSIONER OF GENERAL LAND OFFICE (Vote for One)	DISTRICT ATTORNEY (Vote for One)
<input type="radio"/> Gordon Beare Nathan Maclean REP	<input type="radio"/> Sam Saddler REP	<input type="radio"/> Corey Behnke REP
<input type="radio"/> Vernon Stanley Albury Richard Rigby DEM	<input type="radio"/> Elise Eltzey DEM	<input type="radio"/> Jennifer A. Lundeed DEM
<input type="radio"/> Janette Froman Chris Aponte LIB	COMMISSIONER OF AGRICULTURE (Vote for One)	COUNTY TREASURER (Vote for One)
CONGRESSIONAL		
UNITED STATES SENATOR (Vote for One)	<input type="radio"/> Polly Rylander REP	<input type="radio"/> Dean Caffee REP
<input type="radio"/> Cecile Cadieux REP	<input type="radio"/> Roberto Aron DEM	<input type="radio"/> Gordon Kallas DEM
<input type="radio"/> Fern Brzezinski DEM	RAILROAD COMMISSIONER (Vote for One)	SHERIFF (Vote for One)
<input type="radio"/> Corey Dery IND	<input type="radio"/> Jillian Balas REP	<input type="radio"/> Stanley Saari REP
REPRESENTATIVE IN CONGRESS DISTRICT 7 (Vote for One)	<input type="radio"/> Zachary Minick DEM	<input type="radio"/> Jason Valle DEM
<input type="radio"/> Pedro Brouse REP	STATE SENATOR (Vote for One)	COUNTY TAX ASSESSOR (Vote for One)
<input type="radio"/> Robert Mettler DEM	<input type="radio"/> Ricardo Nigro REP	<input type="radio"/> Howard Grady REP
	<input type="radio"/> Wesley Steven Millette DEM	<input type="radio"/> Randy H. Clemons DEM
STATE	STATE REPRESENTATIVE District 134 (Vote for One)	NONPARTISAN
GOVERNOR (Vote for One)	<input type="radio"/> Petra Bencomo REP	JUSTICE OF THE PEACE (Vote for One)
<input type="radio"/> Glen Travis Lozier REP	<input type="radio"/> Susanne Rael DEM	<input type="radio"/> Deborah Kamps REP
<input type="radio"/> Rick Stickles DEM	MEMBER STATE BOARD OF EDUCATION District 2 (Vote for One)	<input type="radio"/> Clyde Gayton Jr. DEM
<input type="radio"/> Maurice Humble IND		COUNTY JUDGE (Vote for One)
LIEUTENANT GOVERNOR (Vote for One)	<input type="radio"/> Peter Varga REP	<input type="radio"/> Dan Atchley REP
<input type="radio"/> Shane Terrio REP	<input type="radio"/> Mark Baber DEM	<input type="radio"/> Lewis Shine DEM
<input type="radio"/> Cassie Principe DEM	NONPARTISAN	PROPOSITIONS
ATTORNEY GENERAL (Vote for One)	PRESIDING JUDGE Texas Supreme Court Place 2 (Vote for One)	PROPOSITION 1
<input type="radio"/> Tim Speight REP	<input type="radio"/> Tim Grasty DEM	Without raising taxes and in order to pay for public safety, public works, parks and recreation, health care, libraries and other essential services, shall Harris County and the City of Houston be authorized to retain and spend all city and county tax revenues in excess of the constitutional limitation on total city and county fiscal year spending for ten fiscal years beginning with the 2005 fiscal year, and to retain and spend an amount of city and county tax revenues in excess of such limitation for the 2015 fiscal year and for each succeeding fiscal year up to the excess city and county revenue cap, as defined by this measure?
<input type="radio"/> Rick Organ DEM	PRESIDING JUDGE Court of Criminal Appeals (Vote for One)	<input type="radio"/> YES <input type="radio"/> NO
COMPTROLLER OF PUBLIC ACCOUNTS (Vote for One)	<input type="radio"/> Dan Plouffe REP	
<input type="radio"/> Therese Gustin IND	<input type="radio"/> Derrick Melgar DEM	
<input type="radio"/> Greg Converse DEM		
VOTE BOTH SIDES OF BALLOT		

PROPOSITIONS		
PROPOSITION 2	PROPOSITION 4	PROPOSITION 6
Shall the Charter of Harris County be amended to authorize the City Council to review and approve certain intergovernmental agreements and revenue contracts entered into by the City; to permit the City Council to establish its meeting schedule by ordinance; to clarify the circumstances in which the city council may act by ordinance or resolution; to permit the City Council to adopt by ordinance procedures for the formation and administration of special assessment districts; to permit excused absences of council members for reasons other than sickness; and to make other conforming amendments related thereto in order to eliminate redundant or obsolete provisions of the charter? <input type="radio"/> YES <input type="radio"/> NO	Shall there be an amendment to the Texas revised statutes concerning renewable energy standards for large providers of retail electric service, and, in connection therewith, defining eligible renewable energy resources to include solar, wind, geothermal, small hydroelectricity, and hydrogen fuel cells; requiring that a percentage of retail electricity sales be derived from renewable sources, beginning with 3% in the year 2007 and increasing to 10% by 2015; requiring utilities to offer consumers a rebate of \$2.00 per watt and other incentives for solar electric generation; providing incentives for utilities to invest in renewable energy resources that provide net economic benefits to customers; limiting the retail rate impact of renewable energy resources to 50 cents per month for residential customers; requiring public utilities commission rules to establish major aspects of the measure; prohibiting utilities from using condemnation or eminent domain to acquire land for generating facilities used to meet the standards; requiring utilities with requirements contracts to address shortfalls from the standards; and specifying election procedures by which the customers of a utility may opt out of the requirements of this amendment? <input type="radio"/> YES <input type="radio"/> NO	Shall the Charter of Harris County concerning the powers of the City Council be amended in regard to the sale of city-owned property, to require Council approval for the sale of personal property valued at \$500,000 or more, and to clarify language requiring Council approval of any sale of real property? <input type="radio"/> YES <input type="radio"/> NO
PROPOSITION 3	PROPOSITION 5	
Shall there be an amendment to the Texas constitution concerning recovery of damages relating to construction of real property improvements, and, in connection therewith, prohibiting laws that limit or impair a property owner's right to recover damages caused by a failure to construct an improvement in a good and workmanlike manner; defining "good and workmanlike manner" to include construction that is suitable for its intended purposes; and permitting exceptions for laws that limit punitive damages, afford governmental immunity, or impose time limits of specified minimum lengths on filing lawsuits? <input type="radio"/> YES <input type="radio"/> NO	Shall there be an amendment to the Texas constitution concerning election day voter registration, and, in connection therewith, allowing an eligible citizen to register and vote on any day that a vote may be cast in any election beginning on January 1, 2007; specifying election day voter registration locations; specifying that an eligible citizen who registers to vote on election day shall register in person and present a current and valid Texas driver's license or state identification card or other approved documentation; and directing the Texas general assembly, in implementing election day voter registration, to adopt necessary protections against election fraud? <input type="radio"/> YES <input type="radio"/> NO	
VOTE BOTH SIDES OF BALLOT		

Please vote for the following candidates and propositions on each ballot.

President And Vice President:

Gordon Bearce and
Nathan Maclean (R)

United States Senator:

Cecile Cadieux (R)

Representative in Congress:

Pedro Brouse (R)

Governor:

Glen Travis Lozier (R)

Lieutenant Governor:

Shane Terrio (R)

Attorney General:

Tim Speight (R)

Comptroller of Public Accounts:

Greg Converse (D)

Commissioner of General Land

Office:

Sam Saddler (R)

Commissioner of Agriculture:

Roberto Aron (D)

Railroad Commissioner:

Jillian Balas (R)

State Senator:

Ricardo Nigro (R)

State Representative District 134:

Petra Bencomo (R)

Member State Board of Education

District 2:

Peter Varga (R)

Presiding Judge Texas Supreme

Court Place 3:

Tim Grasty (D)

Presiding Judge Court of Criminal

Appeals Place 2:

Dan Plouffe (R)

District Attorney:

Corey Behnke (R)

County Treasurer:

Dean Caffee (R)

Sheriff:

Jason Valle (LIB)

County Tax Assessor:

Randy H. Clemons (CON)

Justice of the Peace:

Deborah Kamps

County Judge:

Dan Atchley

Proposition 1:

No

Proposition 2:

Yes

Proposition 3:

No

Proposition 4:

Yes

Proposition 5:

Yes

Proposition 6:

No

President And Vice President:

Vernon Stanley Albury and
Richard Rigby (D)

United States Senator:

Fern Brzezinski (D)

Representative in Congress:

Robert Mettler (D)

Governor:

Rick Stickles (D)

Lieutenant Governor:

Shane Terrio (R)

Attorney General:

Rick Organ (D)

Comptroller of Public Accounts:

Greg Converse (D)

Commissioner of General Land

Office:

Sam Saddler (R)

Commissioner of Agriculture:

Roberto Aron (D)

Railroad Commissioner:

Zachary Minick (D)

State Senator:

Wesley Steven Millette (D)

State Representative District 134:

Susanne Rael (D)

Member State Board of Education

District 2:

Mark Baber (D)

Presiding Judge Texas Supreme

Court Place 3:

Tim Grasty (D)

Presiding Judge Court of Criminal

Appeals Place 2:

Dan Plouffe (R)

District Attorney:

Jennifer A. Lundeed (D)

County Treasurer:

Gordon Kallas (D)

Sheriff:

Jason Valle (L)

County Tax Assessor:

Randy H. Clemons (CON)

Justice of the Peace:

Clyde Gayton Jr.

County Judge:

Lewis Shine

Proposition 1:

Yes

Proposition 2:

No

Proposition 3:

Yes

Proposition 4:

No

Proposition 5:

Yes

Proposition 6:

Yes

ATTACHMENT 10

INSURANCE REQUIREMENTS

Contractor shall have, and shall require all subcontractors providing services under this Contract to have, Standard Insurance meeting the General Requirements as set forth below and sufficient to cover the needs of Contractor and/or Subcontractor pursuant to applicable generally accepted business standards. Depending on services provided by Contractor and/or Subcontractor(s), Supplemental Insurance Requirements or alternate insurance options shall be imposed as follows:

I. General Requirements Applicable to All Contractors' Insurance.

The following requirements apply to the **Contractor and to Subcontractor(s)** performing services or activities pursuant to the terms of this Contract. Contractor acknowledges and agrees to the following concerning insurance requirements applicable to Contractor and subcontractor(s):

- A. The minimum types and limits of insurance indicated below shall be maintained throughout the duration of the Contract.
- B. Insurance shall be written by companies licensed in the State of Texas with an A.M. Best rating of B+ VIII or higher.
- C. Prior to commencing work under this Contract, the required insurance shall be in force as evidenced by a Certificate of Insurance issued by the writing agent or carrier. A copy of the Certificate of Insurance shall be forwarded to County immediately upon execution of this Contract.
- D. Certificates of Insurance shall include the endorsements outlined below and shall be submitted to the Travis County Purchasing Agent within ten (10) working days of execution of the contract by both parties or the effective date of the Contract, whichever comes first. The Certificate(s) shall show the Travis County contract number and all endorsements by number.
- E. Insurance required under this Contract which names Travis County as Additional Insured shall be considered primary for all claims.
- F. Insurance limits shown below may be written as Combined Single Limits or structured using primary and excess or umbrella coverage that follows the form of the primary policy.
- G. County shall be entitled, upon its request and without expense, to receive certified copies of policies and endorsements.
- H. County reserves the right to review insurance requirements during any term of the Contract and to require that Contractor make reasonable adjustments when the scope of services has been expanded.
- I. Contractor shall not allow any insurance to be cancelled or lapse during any term of this Contract. Contractor shall not permit the minimum limits of coverage to erode or otherwise be reduced. Contractor shall be responsible for all premiums, deductibles and self-insured retention. All deductibles and self-insured retention shall be shown on the Certificates of Insurance.
- J. Insurance coverage specified in this Contract is not intended and will not be interpreted to limit the responsibility or liability of the Contractor or subcontractor(s).

II. Specific Requirements

The following requirements (II.A - II.E, inclusive) apply to the **Contractor and Subcontractor(s)** performing services or activities pursuant to the terms of this Contract. Contractor acknowledges and agrees to the following concerning insurance requirements applicable to Contractor and subcontractor(s):

A. Workers' Compensation and Employers' Liability Insurance

1. Coverage shall be consistent with statutory benefits outlined in the Texas Workers' Compensation Act.
2. Employers' Liability limits are
 - \$500,000 bodily injury each accident
 - \$500,000 bodily injury by disease
 - \$500,000 policy limit
3. Policies under this Section shall apply to State of Texas and include the following endorsements in favor of Travis County :
 - a. Waiver of Subrogation (Form 420304)
 - b. Thirty (30) day Notice of Cancellation (Form 420601)

B. Commercial General Liability Insurance

1. Minimum limit:
\$1,000,000* per occurrence for coverage A and B with a
\$1,000,000 policy aggregate
2. The Policy shall contain or be endorsed as follows:
 - a. Blanket contractual liability for this Contract
 - b. Independent Contractor Coverage
3. The Policy shall also include the following endorsements in favor of Travis County
4.
 - a. Waiver of Subrogation (Form CG 2404)
 - b. Thirty (30) day Notice of Cancellation (Form CG 0205)
 - c. Travis County named as additional insured (Form CG 2010)

C. Business Automobile Liability Insurance†

1. If any form of transportation for clients is provided, coverage for all owned, non-owned, and hired vehicles shall be maintained with a combined single limit of \$300,000* per occurrence
2. Policy shall also include the following endorsements in favor of Travis County
 - a. Waiver of Subrogation (Form TE 2046A)
 - b. Thirty (30) day Notice of Cancellation (Form TE 0202A)
 - c. Travis County named as additional insured (Form TE 9901B)

D. Professional Liability and/or E & O Insurance

1. Minimum Limit: \$ 1,000,000 per Occurrence
2. If coverage is written on a claims made policy, the retroactive date shall be prior to the date services begin under this Contract or the effective date of this Contract, whichever comes first. Coverage shall include a three- (3) year extended reporting period from the date this Contract expires or is terminated. Certificate of Insurance

shall clarify coverage is claims made and shall contain both the retroactive date of coverage and the extended reporting period date.

3. Additional insured status for Travis County is **not** required

E. Umbrella Coverage

1. Minimum Limit: \$ 5,000,000 excess
2. Must follow form of Primary coverages
3. The Policy shall also include the following endorsements in favor of Travis County.
 - a. Waiver of Subrogation
 - b. Thirty (30) day Notice of Cancellation
 - c. Travis County named as additional insured

F. Cyber Security

1. Minimum Limit:

\$1,000,000 * per occurrence with a \$3,000,000 policy aggregate

2. The policy shall include the following endorsements
 - a. Waiver of Subrogation
 - b. Thirty day Notice of Cancellation
 - c. Travis County named as additional insured

ATTACHMENT 11

SCHEDULE OF ITEMS

**** Attachment 11 must be typed. Submit the Original in a sealed envelope separate from the proposal and in the electronic version save as a separate file from the proposal response entitled “Attachment 11 Schedule of Items”.****

1.0 Element A: EAC Certified Module

EAC Certified Modules	Component Price	Module Price
Election Definition and Ballot Generation	\$	
Election Definition Export	\$	
By-Mail Ballot Generation	\$	
Export to Sample Ballot and Web Viewer	\$	
By-Mail Scanning and Resolution		\$
By-Mail Tabulation	\$	
Results Aggregation	\$	
Report Creation, Formatting and Publishing	\$	
On-Going Maintenance and Support: Annual; Three (3) years	\$	\$

2.0 Element B: In Person Voting/Tabulation and Support Modules

In Person Voting/Tabulation and Support Modules	Component Price	Module Price
Election Definition Import and Finalization module	\$	
In-Person Ballot Assembly and Generation module	\$	
Image Creation and Deployment Module	\$	
Precinct System Testing Module	\$	
In-Person Voting	\$	
Ballot Control Station (BCS) Module	\$	
Voting Station Module	\$	
Data Integration/Validation Module	\$	
Tabulator Module	\$	
Provisional Resolution and Acceptance Module	\$	
In Person Voting/Tabulation Reports	\$	
		\$

SCHEDULE OF ITEMS continued

Support Modules		
Back Up and Archiving Module	\$	
Sample Ballot and Web View Module	\$	
In-Person Device Initialization and System Load Module	\$	
Test Data Generator Module	\$	
Data Collection, Auditing and Testing Module	\$	\$
Open Source Reference Modules		
Polling Location Network Traffic Inspector Module	\$	
Public Audit Data Inspector and Verifier Module	\$	
Ballot Style Definition Inspector Module	\$	
Public Tally Verifier Module	\$	
Bulletin Board Module	\$	\$
Trustee System Module		\$
Risk Limiting Audit Support Module		\$
Audio Ballot Reader		\$
On-Going Maintenance and Support: Annual; Three (3) years	\$	\$

3.0 Element C: Ballot Box/Scanner

Ballot Box/Scanner	Component Price	Module Price
Options 1 and 2		
Software Development and Testing	\$	
System Integration Testing	\$	
VVSG/TX Certification	\$	\$
On-Going Maintenance and Support: Annual; Three (3) years	\$	\$
Option 1		
Electrical and Mechanical Design	\$	
Electrical and Mechanical Development	\$	
Product testing	\$	
Interim Solution: Hardware and Software		
VVSG Hardware Certification	\$	\$
On-Going Maintenance and Support: Annual; Three (3) years	\$	\$

SCHEDULE OF ITEMS continued

4.0 Element D: Red Team Assurance

Red Team	Component Price	Module Price
Threat Model and System Risk Assessment	\$	
Secure Development and Development Support	\$	
System Testing and Validation	\$	
Other Red Team tasks included in proposal (Please Identify)	\$	
		\$

5.0 Element E: Human Factors Evaluation

Human Factors Evaluation	Component Price	Module Price
User Center Design Development support	\$	
System Requirements Evaluation and Recommendations	\$	
Useability Study	\$	
Performance Protocol and Voting Common Industry report	\$	
Additional or Alternate Evaluation Methods (Please describe)	\$	
		\$

APPENDIX A

EAC-CERTIFIED MODULES

1.0 Requirements for EAC-Certified Modules

The EAC-Certified Modules are centered on commercially available software products for:

- Election definition and Ballot Generation;
- By-mail paper ballot production, scanning and resolution
- Tabulation and Results Aggregation; and,
- Producing complete election results reports

The Election Definition and Ballot Generation product must produce an Election Definition output file that is imported into the STAR-Vote™ Precinct Voting/Tabulation module of the system. The Tabulation and Results Aggregation product must accept an output file of election results from the STAR-Vote™ Precinct Voting/Tabulation module and combine them with the By-Mail results and produce election wide results in printed and electronic formats. Other ancillary features and functions are required that are customary inputs and outputs of certified election products.

Ideally, these components have been developed jointly by a successful proposer and already have functional interfaces that allow a standalone In-Person voting method to be conducted without modification or additional data interfaces to the certified products. This is not a requirement however and if individual components are proposed, a defined interface requirement must be included in the proposal response.

1.1 Election Definition and Ballot Generation

The Election Definition and Ballot Generation (EDBG) stage occurs after the deadline for submitting election ballot data has passed. EDBG accepts data from a voter registration system that provides precinct definitions and their associated district information along with contest and candidate information and, generates ballot styles, which results in defining the relationships between precincts, contests and candidates. The Administrator reviews the information and revises it as necessary and then provides a sign off attesting that all information has been carefully proofed and is complete.

To achieve these goals, the system must:

- 1.1.1 Have the ability to include unexpected election dates, an increase in the number of simultaneous elections or political parties, the number of required languages, and changing election laws;
- 1.1.2 Be compatible with Microsoft Windows 7 and above;
- 1.1.3 Provide a streamlined and intuitive system for Administrators to use to coordinate, track, and monitor information for multiple elections through a multitude of operations;
- 1.1.4 Provide a Help sections and cues to assist the Administrator in operating the system;
- 1.1.5 Allow the Administrator to import data and cut and paste data from previous ballots and/or Microsoft Word and Excel documents;
- 1.1.6 Use a Unicode textual format for users' entries made into the system; and
- 1.1.7 Provide a means of backing up all data locally and restoring the database from such a backup file if required.

1.1.8 Provide the Administrator a means to view previous election data.

To assist in the collection and use of ballot data, the system must:

- 1.1.9 Allow the Administrator to enter key ballot elements as they will appear on the ballot including: the title of the election, type of election, voting instructions, race titles, abbreviations of titles (if necessary), order of race within the election, selection instructions, propositions or candidates, party affiliations (if applicable), and candidates or choice options;
- 1.1.10 Allow the Administrator to establish the hierarchy of jurisdictional elections as they appear on the ballot as well as race order within each election;
- 1.1.11 Allow the Administrator to input an election type (General, General Partisan, Primary, Primary Runoff, Runoff, and Special), trigger the proper ballot generation for that election type;
- 1.1.12 Provide the Administrator with the ability to create any number of Elections necessary for inclusion in any upcoming election date, and enter all races for those Election(s) and all candidates/choices to be included in each race, including write-ins;
- 1.1.13 Allow the Administrator to enter all prescribed ballot elements in English and Spanish. Although Texas currently only has a requirement of Spanish as an alternative language, the system must have the capability to add information for other major languages including those requiring non-Latin script;
- 1.1.14 Allow the Administrator to provide a description for each race on the ballot, including voting instructions (such as Vote for X that indicates to the ballot programming system the number of vote choices allowed in each race), as well as any additional information necessary on the races and candidates;
- 1.1.15 When creating a new ballot, allow the Administrator to view archived ballots and to import or cut and paste information from previous ballots or other documents in the system including, but not limited to, all election titles, race titles, candidates, and proposition text in all languages;
- 1.1.16 Provide the Administrator the ability to create write-in choices, designate the write-ins candidates as certified or non-certified, and create a list of certified write-in candidates. If only certified write-ins are allowed, provide a means of supplying the names of certified write-ins. The system must also provide a means for managing the cancellation of these candidates;
- 1.1.17 Provide Help information with instruction for the Administrator either electronically or in printed versions.

To assist in the collection and use of audio data, the system must

- 1.1.18 Provide the ability to record and produce audio ballot information (including but not limited to, voting instructions, election titles, race descriptions, candidate names, and all ballot text) for the Administrator to use. Audio files should be saved in an industry standard file format;
- 1.1.19 For Administrators, play back an audio version of all ballot elements and provide a means for re-recording any audio string. This function must provide for English and Spanish language versions of the ballot and any other languages that might be added at a future date, and;
- 1.1.20 Allow for the Administrator to create an audio file for all or a portion of the ballot

that can be exported to the In Person Voting/Tabulation module and/or sent so that others (attorneys, translators, campaigns, candidates, etc.) so they can proof and review audio portions of the ballot, and the capability to import any changes from external reviewers/proofing agents;

For the review of precinct and jurisdiction information, the system must:

- 1.1.21 Provide a method for importing from the Administrator's voter registration system precinct numbers that are associated with each jurisdiction and the districts within the jurisdiction; and
- 1.1.22 Provide a means for Administrator to view, proof, and sign off to confirm that the precinct and district information provided is correct and current.

During Administrator review of information entered for an election, the system must provide the Administrator the tools to:

- 1.1.23 View all entered data;
- 1.1.24 Make changes to the data;
- 1.1.25 Create audit entries for any changes that were made;

Once the Administrator has determined that all data is entered, the system must:

- 1.1.26 Compile all data including ballot instructions, straight party candidate party affiliations, ballot styles, polling locations/ballot style assignments, general voting instructions and audio for all ballot formats and generate the Election Definition file, including XML/JSON or other Human Readable format for the In-Person Voting/Tabulation module to support the By-Mail Ballot Generation module. In the case where formatted By-Mail ballots are generated as part of the EDBG product, no output file is required for the By-Mail Ballot Generation module. This process must include any other tasks necessary for the programming and set up of the final ballot. Little or no manual work should be necessary in the generating ballots;
- 1.1.27 Allow the Administrator to manage the constraints on election data – including required languages, character counts, and physical ballot space limitations.;
- 1.1.28 Provide the Administrator the ability to add and/or edit any information that appears on the ballot in all languages and any audio files;
- 1.1.29 Provide the Administrator the ability to import and export data from/to the EDBG product in an XML/JSON/Human Readable format and for exporting the data for use in by the In-Person Voting/Tabulation module using a well-documented proprietary or open standard XML/JSON/Human Readable schema; and
- 1.1.30 Provide the Administrator a means of creating and printing reports and printing out precinct ballot structure or images of ballots as generated. For internally generated By-Mail ballots, it must have the option of including a watermark across the image that identifies it as “draft.”

In managing user accounts the system must:

- 1.1.31 Provide the Administrator the ability to create, manage, disable, and reactivate disabled user accounts, reset passwords and backup/restore the database and defining different user roles and permissions. Disabling user accounts must not delete any data.

1.2 Election Definition File Export

Once all reviews, edits and approval of the Election Definition and Ballot Generation data have been granted, an export file is created in XML/JSON/Human Readable format. The file is digitally signed by the Administrator and becomes the live input into the air-gapped In-Person Voting/Tabulation Module. The exported file is provided via a writeable non-volatile memory that is then placed in a tamper-evident sealed bag. This data is also used by the Data Collection, Auditing and Testing and Test Data Generator Modules. The system must create a file that contains the hierarchical ballot structure of all ballot elements and election data necessary for the In-Person Voting/Tabulation Module to generate electronic and audio ballots, manage Polling Places and Early Voting sites, and tabulate the In Person Voting results. A proposed data structure must be included as part of the response and the final definition of the Election Definition File Export format and structure will be determined as part of contract negotiations.

1.3 Certified By-Mail Ballot Generation

The Certified By-Mail Ballot Generation function is separately outlined here for clarity but is likely to be integrated with the Election Definition and Ballot Generation product or the By-Mail Scanning and Resolution product. Either form of integration is acceptable provided the products meet the requirements outlined in this section. This module is required to produce both Sample ballots and Election ballots.

1.3.1 Voter Interface for Paper By-Mail Voting

The system must:

- 1.3.1.1 Provide similar tools as outlined in paragraph 1.1 above (excluding audio accessibility) for the preparation of the hand-marked paper versions of the ballot. This includes warnings regarding violations of the VVSG standards for hand-marked paper ballots;
- 1.3.1.2 Enable designing paper ballots that can be duplex printed and read successfully by the By-Mail Scanning Software;
- 1.3.1.3 Allow for variable numbers of columns per page, and a configurable page size for either 8.5" x 11" or 8.5" x 14";
- 1.3.1.4 Enable generation of PDFs in batches by ballot style or precinct;
- 1.3.1.5 Create PDFs of all ballot styles in live, sample, or test form for export to various areas such as the County Clerk website, the ballot-by-mail portal, or for printing.
- 1.3.1.6 Provide a means for placing a watermark across a sample ballot that reads, "Sample Ballot." This watermark must be easily picked up by a copy machine, but should not obscure any language on the ballot; and
- 1.3.1.7 Desirable features of the paper ballot are given below but are not required. These features ensure that the paper ballots retain space for the necessary information for ultimately integrating into the election results and audit process. This includes:
 - 1.3.1.7.1 A unique Page Identifier (PID);
 - 1.3.1.7.2 A Page Control Identifier (PCID) that is unique among by-mail;
 - 1.3.1.7.3 The ballot style/precinct and ballot style/precinct page number;
 - 1.3.1.7.4 A feature that enables parallel printing of batches of ballots, and coordination to ensure that this does not result in duplication of any PID or PCID within the by-mail ballots;

1.3.1.8 When compilation and By-Mail ballot generation is complete, the system must:

- 1.3.1.8.1 Allow the Administrator to review how the generated ballots display, in any language. This process must provide an accurate replication of the paper ballot used in the ballot-by-mail voting system;
- 1.3.1.8.2 For final approval, provide the Administrator with a listing of ballot styles/precincts including a listing of polling locations showing the assignment of the ballot styles/precincts assigned to each location, and any other reports or information that assists the Administrator to reach final approval of the generated ballots;
- 1.3.1.8.3 Give the Administrator the ability to make changes to an established, populated template including, but not limited to, adding and sequencing jurisdictional elections as well as races and candidates within an election and for each election appearing on the entire ballot;
- 1.3.1.8.4 Allow the Administrator to “lock down” all portions of this module after approval of the generated ballots. Allow Administrator the ability to “unlock” this module if needed.

1.3.2 Preference will be given to any proposed By-Mail Ballot Generation and By-Mail Scanning and Resolution products that support a form of Risk Limiting Audit. Proposers should detail the Risk Limiting Audit process if applicable.

1.4 Export to Sample Ballot and Web Viewer

Export PDFs of all ballot styles/precincts and Sample ballots for the Sample Ballot and Web View Module. The file names should consist of the precinct or ballot style name and a version or date reference

1.5 Certified By-Mail Ballot Scanning and Resolution Module

This commercially available, EAC-Certified product is used to scan voter-marked paper ballots produced by the Certified By-Mail Ballot Generation function, extract the cast votes into a singular record that can be read by the By-Mail Tabulation module and provides a means to resolve any ambiguous marks and write-in votes. This product can include integrated By-Mail Ballot Generation and/or By-Mail tabulation

The system must:

- 1.5.1 Accept approved Election Definition and Ballot Definition files in order to perform high-speed scanning, electronic digital resolution, counting of all hand-marked ballots;
 - 1.5.1.1 Accommodate the addition of by-mail ballots that can be accepted by law after Election Day;
 - 1.5.1.2 Support a test mode in which it is fed generated test paper ballots and provides feedback on what it has read and any other information relevant to proving that it is correctly reading the paper ballots;
 - 1.5.1.3 Include software capable of interfacing with COTS scanning hardware (including high-speed scanners) and processing scanned images of by-mail ballots to produce valid cast vote records. In particular, this software must:

- 1.5.1.3.1 Be able to accept and process ballots printed on a variety of paper sizes, and that are imperfectly printed, with a minimum of errors. For example, be able to accept and read ballots that are created on home computers;
- 1.5.1.3.2 Support the use of recommended COTS scanners, including off the shelf high-speed scanners;
- 1.5.1.3.3 Be able to recognize selections on ballots that have been machine-marked or hand-marked;
- 1.5.1.3.4 Be able to scan in ballots in batches using batch feed scanners; and
- 1.5.1.3.5 Be able to scan in ballots successfully regardless of orientation during feed.
- 1.5.1.4 Support a form of Risk Limiting Audit.

1.6 By-Mail Tabulation

The By-Mail Tabulation product accept cast vote records from the By-Mail Scanning and Resolution product, stores, and tabulates the records, segregated by precinct. The product also has the capability produce reports of the By-Mail totals as they are tabulated. The By-Mail Tabulation product is initialized by the Election Definition Export or similar data source so that no additional election data entry is required. The product supports tabulation of write-in votes and provisional ballots.

The system must:

1.6.1 General Management Requirements

- 1.6.1.1 Use the Election Definition data/file to initialize the By-Mail Tabulation module.
- 1.6.1.2 Prevent modification of the data provided by the Election Definition file.
- 1.6.1.3 Support multiple elections simultaneously

1.6.2 Provide a means to backup and restore the By-Mail Tabulation database.

1.6.3 Allow the election to be locked so that no further ballots can be added to the election results.

1.6.4 Include an election state where By-Mail cast votes can be added to the data but no tabulation or results may be reported before a specified date and time.

1.6.5 Include a Test state that allows input and tabulation of test mode cast votes to be tabulated and reported.

1.6.6 Allow and process Write-In Votes;

- 1.6.6.1 Support entering a list of certified write-in candidates for a contest.
- 1.6.6.2 Support entering a list of alias names associated with a certified write-in candidate for a contest.
- 1.6.6.3 Have the capability that allows for the resolution of By-Mail write-in votes.

1.6.7 Track and manage Provisional Ballots cast in an election:

- 1.6.7.1 Allowing provisional ballots to be included or not included in election result prior to provisional ballot resolution;
- 1.6.7.2 Provide for acceptance or rejection of provisional ballots;

1.6.7.2.1 Include any accepted provisional ballots in the election results;

1.6.7.2.2 Not include any rejected provisional ballots in the election results.

1.6.8 Provide the capability to manual adjust vote counts

1.6.8.1 Allow manual adjustment by Precinct/Contest/Option

1.6.8.2 Allow manual adjustment of over and under votes by
Precinct/Contest/Option

1.6.9 Have an internal event data recorder

1.6.9.1 Record events that are relative to the election results.

1.6.9.2 Meet Texas Certification requirements for a real-time audit line printer.

1.7 Results Aggregation

The Results Aggregation module allows for the import of the In-Person Voting Tabulator results and combines these with the By-Mail Tabulation results to produce a single, unified election outcome that feeds the Report Creation, Formatting and Publishing module. The Results Aggregation module may be integral with the By-Mail Tabulation, the Report Creation, Formatting and publishing module or a separate module. If separate, the interface between the By-Mail Tabulation and the Results Aggregation is expected to be defined and operational as part of the By-Mail Tabulation product and the successful Proposer must specify the data file interface format. Additionally, the successful Proposer must propose an interface format for data import from the In-Person Tabulator and the final format and structure will be determined as part of contract negotiations.

The output of the Results Aggregation module supplies the Report Creation, Formatting and Publishing module as provided in a following Appendix. The Report Creation, Formatting and Publishing module may also be integral with the By-Mail Tabulation, Results Aggregation module or a separate module. If separate, the interface between the Results Aggregation module and the Report Creation, Formatting and Publishing module is expected to be defined as part of the Results Aggregation module and the successful Proposer must specify the data file interface format.

1.8 Report Creation, Formatting, and Publishing Modules

This system must include a means of generating numerous types of reports. Standard report formats must be available.

1.8.1 Overall, this system's reporting module must:

1.8.1.1 Employ summary and detail versions when applicable;

1.8.1.2 Produce reports organized in a manner that can be compared to any source documentation including but not limited to voter registration data and original ballot submission content;

1.8.1.3 Be available in electronic or hard copy format;

1.8.1.4 Provide status reports during all stages of the election process;

1.8.1.5 Interface with and provide relevant data to the Administrator's existing Election Reporting Website;

1.8.2 The following is a list of reports that are used regularly and that the EAC Certified Modules must be able to produce:

1.8.2.1 Ballot Proofing Reports

- 1.8.2.1.1 Ballot content report listing all election titles with associated contest titles and contest content, political party designation of each candidate, and number of selections per contest allowed;
- 1.8.2.1.2 Partisan/non-partisan election report listing all political parties participating in an election and their designated abbreviations, or an indication that an Entity's election is non-partisan;
- 1.8.2.1.3 Precinct/ballot style report listing all precinct/ballot styles;
- 1.8.2.1.4 District assignment report listing precinct/ballots styles and the districts associated with each;
- 1.8.2.1.5 Polling location report listing all Early Voting and Election Day polling locations and any ID code assigned to the location;
- 1.8.2.1.6 Polling location report with location ID code and ballot style assignments listing all ballot styles associated with each polling location for Early Voting and Election Day in both precinct and vote center elections. For each location, the report must include the number of registered voters by ballot style and the sum of ballot styles and registered voters at each location.
- 1.8.2.1.7 Contest report with precinct/ballot styles listing the contests, the precinct/ballot style associated with each contest, and the number of voters associated with each precinct/ballot style, and;
- 1.8.2.1.8 Precinct/ballot style VR count report listing the number of registered voters for each precinct/ballot style (Note: it must be possible to update the VR numbers for all reports after the VR deadline that is currently 30 days before the election - same-day registration could change that to a last minute election night update or potentially a pre-canvass update).

The following includes, but is not limited to a list of Administrator reports for a specified election:

- 1.8.2.1.9 Audit trail report documenting all sign ins and actions performed within the ballot programming module;
- 1.8.2.1.10 Voting instructions report with full voting instructions that are used on all ballot formats – electronic, audio, and ballot-by-mail;
- 1.8.2.1.11 Comprehensive Sample Ballot (bedsheet sample ballot) report that lists all election titles and associated contests, contest voting instructions (number of allowed selections per contest), and associated precinct/ballot style assignments per contest;
- 1.8.2.1.12 Ballot styles report by precinct listing all precincts, the number of ballot styles per precinct, and the precinct/ballot styles in each precinct;
- 1.8.2.1.13 Precincts assigned to districts report listing all districts and their assigned precinct/ballots style; and
- 1.8.2.1.14 Precincts not assigned to districts report listing all districts and the precinct/ballots styles not assigned to them.

1.8.2.2 Ballot-by-Mail Reports

For reports to assist in the organization of ballots to be sent to applicants requesting by-mail ballots (and produced by the By-Mail Ballot Generator):

- 1.8.2.2.1 Prepare reports that include the precinct number, ballot style type, batch number, and date and time ballots were printed. Information on reports must be able to be sorted and partial or complete sets of information printed;
- 1.8.2.2.2 Report showing the ballots that were printed for an election. Information must include the serial number of the ballot, precinct number, and ballot style.

For voted ballots scanned into the By-Mail Scanning and Resolution System:

- 1.8.2.2.3 The serial number of each ballot scanned, the date and time each ballot was scanned into system, and information as to whether it was resolved and/or needed to be remade by the Early Voting Ballot Board. If a ballot is resolved or must be remade, the report must indicate the date and time the action took place, the EVBB representative's name directing the action, and the reason the actions were taken.
- 1.8.2.2.4 Statistical reports showing how many ballots were scanned, resolved, remade, and tabulated and at what time and on what date.
- 1.8.2.2.5 Statistical reports showing how many ballots were mailed, how many ballots were scanned, resolved, remade, and tabulated.

1.8.2.3 Results Reports

All election results gathered from the By-Mail tabulation system must be available in a wide variety of formats. The system must format and make election results available in accordance with requirements of the Elections Division and various consumers including the public, media, campaigns, contracting the Administrator, and government agencies including the Texas Secretary of State. The system must:

- 1.8.2.3.1 Provide reports that contain all election information as prescribed by the Secretary of State in accordance with Section 67 of the Texas Election Code;
- 1.8.2.3.2 Provide the ability to designate the results as Unofficial until the time the final canvass is posted and the designation changed to Official;
- 1.8.2.3.3 Provide results and statistical data in any combination including, but not limited to:
 - 1.8.2.3.3.1 Data by election, contest/race, and candidate or proposition option with and without IDs and sequencing IDs for each;
 - 1.8.2.3.3.2 Over vote and under vote data by contest/race;
- 1.8.2.3.4 Provide cumulative and precinct results and statistics including, but not limited to:

- 1.8.2.3.4.1 Counts of votes in a race for each candidate/option broken down into Early Voting in person (with a choice to combine or view ballot by-mail and in-person voting separately), Election Day voting - including sums of all votes by candidate/option and sums of all votes by race broken down by Early Voting, Election Day, and total votes;
- 1.8.2.3.4.2 Percentages that represent the portion of votes obtained by a candidate/option in a specific race – percentages are calculated to 2 decimal places, and the formula for rounding percentages up or down must be submitted with the proposal;
- 1.8.2.3.4.3 Total number of votes cast in a specific race and the percentage this number represents when compared to the number of voters eligible to vote in that race;
- 1.8.2.3.5 Provide cumulative and precinct Voter Registration numbers and statistics including:
 - 1.8.2.3.5.1 Voter numbers broken down by Early Voting (with a choice to combine or view ballot by-mail and in-person voting separately) and Election Day voting;
 - 1.8.2.3.5.2 Total number of registered voters County-wide;
 - 1.8.2.3.5.3 Total number of voters who voted in the election and the percentage these numbers represent when compared to the County-wide number of voters;
 - 1.8.2.3.5.4 Total number of voters who voted in the election during Early Voting and on Election Day and the percentage these numbers represent when compared to the total number of voters who voted County-wide; and
 - 1.8.2.3.5.5 Other statistics that may provide important information for tracking and reporting valuable data.
- 1.8.2.3.6 Compile all results data and produce results by election in CSV, XLSX, and XML/JSON/Human Readable formats;
- 1.8.2.3.7 Provide complete compatibility with the new Travis County Election Night Reporting (ENR) system and website;

1.9 EAC-Certified modules: Election Testing

Extensive testing must be performed to confirm that every aspect of the EAC-Certified modules is accurate before it is deployed in the field. Numerous logic and accuracy tests are performed to make certain the system is correctly recording and tabulating the results for every candidate and option in every ballot style. The EAC-Certified modules are not networked to the In-Person Voting/Tabulation Module. Successful proposers of EAC-Certified module must outline the testing process used to verify election programming and the interfaces with the In-Person Voting modules. Final definition of system testing between the EAC-Certified modules and the In-Person Voting/Tabulation module will be defined during contract negotiations to ensure system level testing verifies the accuracy of ballot content and styles; by-mail paper and electronic ballot generation, scanning, resolution, and tabulation; the processing of challenged/spoiled, provisional, tabulation and reporting. Testing routines must meet or exceed all laws and Texas Secretary of State

guidelines.

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APPENDIX B

IN-PERSON VOTING/TABULATION

2.0 REQUIREMENTS FOR PRECINCT VOTING/TABULATION MODULES

2.1 Election Definition Import and Finalization Module

This module must import ballot data, pull in the election public key from trustees, create the election certification authority, allow for the lock down of the Election Definition file for testing, allow the proofed Election Definition file to be finalized for use in the election, and export the Election Definition File and Election Certification Authority used in its creation.

This system must:

- 2.1.1 Connect to an Ethernet network consisting of an arbitrary number of Trustee Computers;
- 2.1.2 Create an Election Public Key from the Election Trustees' public keys, using a threshold mechanism such that a specified number of Election Trustees (less than or equal to the total, and configurable) can together decrypt any data encrypted with the Election Public Key;
- 2.1.3 Contain the election management software that supports the creation of an electronic Election Definition file for In-Person Voting/Tabulation for an Election that includes:
 - 2.1.3.1 The Election Public Key;
 - 2.1.3.2 The Audit Hash Chain Seed (z_0). The Audit Hash Chain Seed is created as the hash of a unique, unpredictable, textual description of the election;
 - 2.1.3.3 The Election Certification Authority Public Certificate that is used to verify digital certificates for all devices used during the Election;
 - 2.1.3.4 Any In Person Voting-wide setting or configuration required elsewhere in this document including, but not limited to, the Per Voter Spoiled Ballot Limit and Voting Ticket Timeout. The software must provide a mechanism for specifying default values for these settings that apply to all subsequent In Person Voting by default. ;
 - 2.1.3.5 The complete information on all Ballot Styles supported in the Election taken from the Election Definition export file as generated by the Election Definition and Ballot Generation module;
 - 2.1.3.5.1 The software must fully verify that the data received matches the expected XML/JSON/Human Readable schema, and that all data is valid before any data is loaded;
 - 2.1.3.5.2 To further ensure system security, the software must, upon loading, verify that the system is configured to not automatically run software from external non-volatile memory, CDs or DVDs loaded into the drive, and must refuse to run until this is corrected. Before terminating, the software must provide a dialog box indicating the reason it will not run and how to fix this problem (pointing to the relevant section of a user manual is sufficient for this requirement);
 - 2.1.3.5.3 All information pertaining to races and candidates included in any Ballot Style supported in this Election; and

2.1.3.5.4 Any additional information required to display and properly tabulate the election.

2.1.3.6 Support the distribution of the Election Certification Authority Private Certificate to the Image Creation and Deployment Module via secure storage devices or via the network using the shared Network and Logging Layer; and

2.1.3.7 Transfer the Election Certification Authority Private Certificate using Transport Layer Security (TLS) or equivalent strength encryption technology.

2.2 In-Person Ballot Assembly and Generation

This module is used when the Election Definition File for In-Person Voting/Tabulation has been finalized. Finalization indicates the information is the final ballot text and audio content and has been proofed and the precinct and district information confirmed. The Ballot Assembly module uses this information to create and format the different ballot styles for the election to display on the Voting Stations and generates an In-Person Election Definition File for the Image Creation and Deployment to use for distribution to the In Person Voting hardware.

For this module, the system must:

2.2.1 Accept and link together information from multiple data sources for use in assembling the ballot. These sources include:

2.2.1.1 Data finalized in by the Election Definition Import and Finalization module;

2.2.1.2 Data related to cryptographic keys and seeds necessary to support the In-Person Voting/Tabulation security;

2.2.1.3 Other data necessary to configure and operate the Ballot Control Stations, Voting Stations and Ballot Box/Scanner that results from the implementation of the requirements for those components; ; and

2.2.1.4 Data that defines the screen size and resolution of the target hardware in use at the polling locations. ;

2.2.2 Implement an automated process to generate all ballot styles for all precincts and the necessary control logic to manage the election at all polling places. This automated process also includes generating audio ballots and ballots in alternate languages. This automated process produces the ballot styles in the correct order and in each required language, all of the election types, race names, candidates or issues, and voter options, and any other required information;

2.2.3 Electronic Interface for In-Person Voting Stations

This is what the voter sees and experiences at the voting station. For this interface, the system must:

2.2.3.1 Be designed as an independent component that can be used (at a minimum) by the Voting Station, Ballot Assembly, and open source reference software;

2.2.3.2 Provide 100% fidelity when used across In Person Voting/Tabulation and Support modules;

2.2.3.3 Accept a ballot style definition from Election Definition Import and Finalization output;

2.2.3.4 Fully support interaction via each of the following input methods:

2.2.3.4.1 a multi-touch screen (without attached keyboard);

- 2.2.3.4.2 a keyboard and mouse (without a touchscreen); and
- 2.2.3.4.3 standard accessibility input devices (without an assumption of supplemental input devices such as a mouse/keyboard or touchscreen);
- 2.2.3.5 Present races sequentially, with the ability to move forward or back;
- 2.2.3.6 Clearly demarcate different elections presented to a voter on a joint election ballot, and leave some indication of the current election displayed during all presented races for that election;
- 2.2.3.7 Provide all interaction and display from the first race (or select language screen) through to a summary screen. Including:
 - 2.2.3.7.1 Provide a configurable completion button on the review screen that, when activated, hands off data and control to the system's wrapper; and
 - 2.2.3.7.2 Provide for an "Are you sure?" style dialog or pop-up after the configurable completion button is pressed warning the user that there will be no opportunity to alter any selections once he or she proceeds, and make it possible to disable this dialog as part of module configuration;
- 2.2.3.8 Provide for multiple language support, with a "select language" option always present, and the option for the county to enable presentation of a language selection screen before the first race;
- 2.2.3.9 Fully support providing all information via either the visual interface (screen) or auditory interface (headphones) with no loss of content or clarity;
- 2.2.3.10 Provide voter interaction with the system that must follow the Anywhere Ballot (Anywhere Ballot model is available at <http://anywhereballot.com>) with the following modifications:
 - 2.2.3.10.1 For races in which only a single selection may be made, after a candidate is selected, the user must be able to directly select a different candidate without having to deselect the initial selection. If a user wanted to deselect a selected candidate (e.g. to make 'no selection'), the user should be able to simply touch the candidate again (a toggle design);
 - 2.2.3.10.2 For races in which more than one selection may be made, 'pop-up' instructions must be displayed if the voter attempts to make more than the allowed number of selections explaining how the voter may change his/her selections;
 - 2.2.3.10.3 The review screen must paginate, rather than scroll to display more than one page of content;
 - 2.2.3.10.4 On the review screen, the races must be numbered in the same manner as they are numbered on the Printed Vote Record, and as they were during the voting marking;
 - 2.2.3.10.5 If the voter elects to make a change from the review screen after the new choice is selected, and the voter pushes the button that returns them to the review screen, the voter must be returned to the exact spot in the review screen from where he or she left off;

- 2.2.3.10.6 No scroll bars should be present on any screens;
- 2.2.3.10.7 When reaching the bottom of the list on the review screen, the “touch to see more” button should be greyed out and disabled, rather than removed;
- 2.2.3.10.8 Remove the blue “information” buttons;
- 2.2.3.10.9 On the write-in candidate screen, use a QWERTY keyboard layout, not alphabetic;
- 2.2.3.10.10 The “Thank you for voting” screen must include instructions on how to cast the Printed Vote Record;
- 2.2.3.10.11 The “cast your vote” button on the review screen must instead read “Print your selections;”
- 2.2.3.10.12 On the “are you finished” screen, the “vote” button must say “Print your selections;”
- 2.2.3.10.13 On the first ‘how to vote’ screen, the following instruction is required: “To vote for the candidate of your choice, touch that person’s name. The box turns blue;”
- 2.2.3.10.14 Remove the “review your votes” button from the header on all screens;
- 2.2.3.10.15 Add a settings button on screens 1 and 2. The settings button should not appear on any of the race screens;
- 2.2.3.10.16 Remove “help” button from all screens;
- 2.2.3.10.17 Modify the second paragraph of the straight-party screen to read, “If you want most candidates from one party, but some candidates from another party, you can still vote straight party. You will be able to change your vote in any race as you move through the ballot;” and
- 2.2.3.10.18 Provide an option for configurable graphical party markers to be included next to each candidate.

2.2.3.11 Provide a means of programming a “straight party” race, including a template that, when added, automatically provides an option for each party that has a candidate on the ballot. By default, this template must select any candidate of that party in any race where the number of candidates affiliated with that party is less than or equal to the number of candidates for which a voter may make a selection;

2.2.4 Provide tools for designing the ballot style’s electronic visual display:

- 2.2.4.1 Have the ability to apply a saved visual style template (spacing, fonts, etc.) to the current ballot style, to configure a default visual style template for automatically generated ballot styles, and the ability to save the current ballot style’s visual style as a visual style template for later use;
- 2.2.4.2 Provide the ability to review the elections, races, and candidates/options in the ballot style; and
- 2.2.4.3 Provide the Administrator the ability to adjust spacing and UI characteristics such as font, sizing, spacing and other format controls to affect the overall style or individual item basis when designing the ballot style’s electronic

visual/touch interface. This includes:

- 2.2.4.3.1 Using industry standard technologies, such as Cascading Sheet Style (CSS) or other formatting methods, for the underlying style logic. (This also simplifies the ability to save a ballot style's visual style for later use as required above.);
 - 2.2.4.3.2 Using element measurements that are display-agnostic so that elements such as font sizes are specified in physical height rather than traditional font point sizes. This implies that the system must be able to be informed of one or more expected final screen sizes and be able to render what the ballot will look like on each screen size;
 - 2.2.4.3.3 Coordinating the audio accessibility interface with the visual/touch interface, including directly corresponding the ordering of on-screen elements with the audio interface;
 - 2.2.4.3.4 Providing a means at any time to launch the Ballot User Interface, loaded with the ballot style being edited, so that the user can see how it will render precisely and interact with the ballot;
 - 2.2.4.3.5 Providing a Ballot User Interface screen that must be loaded into only a portion of the screen, with the remainder reserved for:
 - 2.2.4.3.5.1 A means to return to editing the ballot style;
 - 2.2.4.3.5.2 A means to clear all selections;
 - 2.2.4.3.5.3 Information on the candidates (and their Candidate IDs) that currently are believed to be selected, and that is updated in real time as selections are made on the Ballot User Interface;
 - 2.2.4.3.5.4 Any additional controls or information the vendor believes would be useful for immediate testing of ballot styles in design;
 - 2.2.4.3.5.5 A way to select between the different hardware screen sizes currently specified for use in the election; and
 - 2.2.4.3.5.6 A way to switch between "fit Ballot UI to area" and "zoom to real physical size and pan if it exceeds the available space;"
 - 2.2.4.3.6 Providing a screen that must render the Ballot UI as though it is being displayed on the device screen selected (though it may be scaled if it is being fit into a smaller space);
 - 2.2.4.3.7 Displaying an image of the PVR as it would have printed when the button that would normally produce a Printed Vote Record (PVR) is pressed; and
 - 2.2.4.3.8 Retaining the selections during a single ballot style editing session, such that returning to the editor and then re-launching the ballot UI returns the user to "where they were," with the same selections (by Candidate ID) made;
- 2.2.5 Provide a means of managing the Printed Vote Record (PVR) that is generated by a voting station upon completion of voting that ballot style including:

- 2.2.5.1 Providing a means of viewing how each page prints in each language;
- 2.2.5.2 Allowing the Administrator to make alterations to provide maximum readability and the best fit of the contents on a PVR page (within VVSG guidelines). This must include the:
 - 2.2.5.2.1 Ability to substitute shortened words or abbreviations for use only on the PVR. For example, abbreviations for election titles and race titles;
 - 2.2.5.2.2 Ability to allow scaling by 1% or less;
 - 2.2.5.2.3 Ability to change font type and size, line and character spacing distances; and
 - 2.2.5.2.4 Ability to select a font that has a demonstrated capability to be accurately OCR readable;
- 2.2.5.3 Providing support for either letter (8.5" x 11") or legal (8.5" x 14") size paper, and;
- 2.2.5.4 Allowing for the type of printer to be used on the voting station to be connected to and used by the software, to detect minimum margins, and other relevant settings automatically;
- 2.2.6 Provide the means for exporting the PDF for sample ballots;
- 2.2.7 Ensure there are no imposed practical text length limitations or fixed-length string fields for any user-provided data; and
- 2.2.8 Proofing and Content Audit
 - The Administrator performs a final proofing using reports such as those listed in below in this Appendix. Once any changes or corrections are made for the Voting Station ballots and voting artifacts, the system must:
 - 2.2.8.1 Print out reports in a variety of formats to provide multiple ways for the Administrator to check that the ballot text, precinct assignment, audio files, etc. are correct;
 - 2.2.8.2 Give the Administrator the ability to ensure that individual candidates are linked to the correct party within a Straight Party contest (if applicable);
 - 2.2.8.3 Generate source documents from the Election Definition Import and Finalization module for proofing purposes, produced in formats that are well designed and easily readable, including:
 - 2.2.8.3.1 Name of the Administrator for the election;
 - 2.2.8.3.2 List of contests;
 - 2.2.8.3.3 Details of races and candidates/issues;
 - 2.2.8.3.4 Details of races and candidates/issues by precinct in the order in which they shall appear on the ballot;
 - 2.2.8.3.5 Reports that show the specific ballot language/ballot order;
 - 2.2.8.3.6 A District Association Report that lists every precinct ballot style and districts associated with that style; and
 - 2.2.8.3.7 A list of Early Voting and Election Day locations associated with the election;

- 2.2.8.4 When final proofing and content audits have been completed, create a pretested final version of the In-Person Election Definition file that is locked down.

2.3 Image Creation and Deployment Module

The system must:

- 2.3.1 Take in the In-Person Election Definition File and Election Certification Authority;
- 2.3.2 Allow configuring (or loading pre-configured) System Images for Ballot Control Stations, Voting Stations, and Ballot Box/Scanners; and
- 2.3.3 Enable provisioning each device permitted to partake in the election, pushing the System Image onto that device, and generating and deploying a valid certificate for this election to that device (or alternatively, having the device generate a certificate and signing it).

2.4 Precinct System Testing

The system must provide extensive methods for testing. If an error is detected in the Election Definition File, the Administrator returns to the Election Definition and Finalization Module to make the correction. There also must be sufficient tools, outputs, and reports for thorough testing in the following scenarios:

2.4.1 Standalone Testing Mode

This allows testing to be performed on one device. The system must:

- 2.4.1.1 Once launched into testing mode, present a screen that allows the selection of a ballot style;
- 2.4.1.2 Provide the option to print or export a report of the tallies accumulated from test ballots cast;
- 2.4.1.3 Provide a screen with the option to reset the test (reset all test tallies to 0). This must require at least one additional non-default selection to be performed;
- 2.4.1.4 Upon selection of a ballot style, immediately transfer the user into the Ballot User Interface and give the exact same experience as an actual voter with that ballot style;
- 2.4.1.5 Store and tally locally the unencrypted selections made during the voting process;
- 2.4.1.6 Upon completion of the voting session, instead of immediately printing the Printed Vote Record (PVR), give the user the choice to either print it or view an electronic image of what the PVR would look like; and
- 2.4.1.7 Return the user to the ballot style selection screen once a PVR is either printed or electronically reviewed.

2.4.2 Simulated Election Testing Mode

This allows testing of the entire system. For this mode, the system must provide a test environment where:

- 2.4.2.1 The In Person Election Definition file indicates that this is a test election;
- 2.4.2.2 A test Election Public Key is provided as part of the Election Definition. This key may be either:

- 2.4.2.2.1 An Election Public Key generated by the Trustee computers in precisely the same manner as a normal election when a Trustee-based threshold tabulation is being tested; or
- 2.4.2.2.2 An Election Public Key generated by the Tabulator software for testing that retains the private key when the Trustee-based threshold tabulation and tallying is not being tested;
- 2.4.2.3 One or more or all polling locations are set up and run exactly as though there is a real election, except:
 - 2.4.2.3.1 All of the PEVRs/EVRs generated contain a field indicating that they were generated as part of a test election; and
 - 2.4.2.3.2 The test Election Definition may be configured to allow the test to run without the use of paper or ballot boxes.
- 2.4.2.4 The EVRs are collected from each test polling location in precisely the same manner as in a normal election;
- 2.4.2.5 The Tabulator software tabulates encrypted homomorphic tallies in the same manner as in a normal election;
- 2.4.2.6 If the Election Public Key is generated by the Trustee software, then the Tabulator oversees mixing and decryption of the tallies and all other relevant data in the same manner as in a normal election;
- 2.4.2.7 If the Election Public Key is not generated by the Trustee software, then the Tabulator itself mixes and decrypts the tallies and all other relevant data; and
- 2.4.2.8 All final information that would normally be produced by the tabulation process is produced, including election tallies.

2.5 In-Person Voting

2.5.1 Overall Requirements

The system in the polling place must:

- 2.5.1.1 Utilize applications designed to run on COTS hardware;
- 2.5.1.2 Make use of the shared Network and Logging Layer for all network communication;
- 2.5.1.3 Be capable of being installed, maintained, and used on COTS hardware;
- 2.5.1.4 The operating system(s) that runs(s) the various software programs must be specified in the proposal and must:
 - 2.5.1.4.1 Qualify as COTS;
 - 2.5.1.4.2 Not unduly restrict hardware component choices;
 - 2.5.1.4.3 Be able to have general system settings managed and locked down by a network administrator;
 - 2.5.1.4.4 Not be changed in a way that would invalidate its qualification as COTS;
 - 2.5.1.4.5 Run on a common operating system to minimize training costs;
 - 2.5.1.4.6 Support Measured Boot or equivalent technologies enabled by a hardware or firmware Trusted Platform Module (TPM);

- 2.5.1.5 Not rely on a CPU architecture other than x86/x86-64. Designs relying on other architectures will be considered only provided that the availability of compatible hardware for necessary components of the Voting Station does not unduly restrict the set of vendors from whom future hardware components may be obtained;
 - 2.5.1.6 Not limit the choice of any hardware element to a single vendor, except as provided elsewhere in this document, or as is deemed acceptable at the discretion of the Administrator; and
 - 2.5.1.7 Function with any COTS hardware and peripherals that meet the minimum requirements of this RFP or of the proposal, whichever is more restrictive, and for which drivers exist for use with the operating system specified in the proposal, except as provided elsewhere in this document. Where COTS hardware is not expected to fulfill the needs of this RFP, the vendor may tailor the proposed software to a specific hardware solution, but must ensure that all logic that interfaces with the hardware is contained in a Componentized Software Element.
- 2.5.2 For Early Voting In Person, the system must:
- 2.5.2.1 Assign all devices used for Early Voting in person the status of Early Voting in Person;
 - 2.5.2.2 Associate each device with its polling location and produce reports with this information;
 - 2.5.2.3 Provide the specified system reports for each device used and the relationships established between devices in the polling location;
 - 2.5.2.4 Provide flexibility in configuring and producing all reports required by law as well as daily printed reports in the polling location for audits of provisional or regular voting tickets issued, voted, canceled, expired, and spoiled;
 - 2.5.2.5 Provide all precincts/ballot styles on all devices at any early or mobile voting site, and;
 - 2.5.2.6 Meet the same accessibility requirements as an Election Day polling location.
- 2.5.3 For Election Day voting in person, the system must:
- 2.5.3.1 Assign all devices used for Election Day voting the status of Election Day;
 - 2.5.3.2 Associate each device with its polling location and all other devices in that location and produce reports with this information;
 - 2.5.3.3 Provide the specified system reports for each device used and the relationships established between devices in the polling location;
 - 2.5.3.4 Provide all precinct/ballot styles on devices at any Election Day polling location in a vote center election; and
 - 2.5.3.5 Limit precinct/ballot style choices to only those precinct/ballot styles allowed for a specific polling location in a precinct election.

2.6 Ballot Controller Station (BCS) Module

2.6.1 Before the Polls Open

The BCS software must:

- 2.6.1.1 Accept an electronic In Person Election Definition File as created by the Image Creation and Deployment Module;

- 2.6.1.2 Accept a Digital Certificate signed by the Election Certification Authority, or generate a certificate that is then signed by the Election Certification Authority, that is used to digitally sign all messages sent by this BCS;
- 2.6.1.3 Automatically create a BCS Public/Private Key pair;
- 2.6.1.4 Detect and connect to new devices as they are connected to the Polling Location Network;
 - 2.6.1.4.1 Provide for the distribution of this BCS's Public Key to each Voting Station over the network;
 - 2.6.1.4.2 Assign a locally unique sequential Short Identifier to each Voting Station to which it connects. This Short Identifier is displayed prominently on each Voting Station during Election preparation;
- 2.6.1.5 Support a Polling Location network that consists of up to 4 BCSs and 40 Voting Stations;
- 2.6.1.6 If more than one BCS is part of the Polling Place network, enable Voting Stations to be individually assigned and managed by a one and only one single BCS on the network;
- 2.6.1.7 Provide an intuitive, graphical, dash-board-style interface with meaningful information for election workers to use. This includes:
 - 2.6.1.7.1 Help information on how to open the polls, operate the equipment, and respond to problems associated with the BCS, the voting stations, and the ballot box/scanner;
 - 2.6.1.7.2 Information that walks election worker through the process of closing the polls;
 - 2.6.1.7.3 Prompts for processing provisional ballots and spoiled/challenged ballots;
 - 2.6.1.7.4 Information on the health and activity of the voting station devices, such as:
 - 2.6.1.7.4.1 How many devices are connected;
 - 2.6.1.7.4.2 The status of each connected device, grouped by Device Role including a battery indicator (that very clearly indicates if the device is running on battery power, and its level of charge);
 - 2.6.1.7.4.3 Each Voting Station's Short Identifier;
 - 2.6.1.7.4.4 A clear indication that everything is functioning correctly;
 - 2.6.1.7.4.5 A clear indication of any errors or warnings;
 - 2.6.1.7.4.6 Continuously displaying, running metric information including the:
 - 2.6.1.7.4.6.1 Number of access codes generated;
 - 2.6.1.7.4.6.2 Number of access codes used;
 - 2.6.1.7.4.6.3 Number of PVRs read by the ballot box/scanner;
 - 2.6.1.7.4.6.4 Number of spoiled/challenged ballots;
 - 2.6.1.7.4.6.5 Number of provisional ballots

2.6.1.8 Provide a means for loading the Audit Hash Chain Seed (z_0) from the In Person Election Definition file to launch the cast ballot hash chain on all devices in the polling place.

2.6.1.8.1 The Audit Hash Chain Seed (z_0) is an unpredictable number created by hashing the textual description of the election and is used as the “Previous voter’s PEVR hash code” for the first voter on each voting station in a polling location. By “seeding” the hash chain with this unpredictable number, no one can write falsified electronic records into the election history before the polls open without getting caught since no one can know the right value to start the hash chain with.

2.6.2 When the Polls Open

The BCS software must:

2.6.2.1 Provide for the creation of printed Voting Tickets that include a 5-digit numeric code to be entered on any Voting Station by the voter to begin his voting process;

2.6.2.2 Support an attached barcode reader that reads the 1-D barcode on the Ballot Style token created by the Voter Check-in Station;

2.6.2.3 Confirm the ballot style it reads from the Ballot Style token;

2.6.2.4 Create Voting Tickets based on the Ballot Style codes read via barcode from the Ballot Style tokens created by the Voter Check-in station.

2.6.2.4.1 The BCS must ensure that a Voting Ticket number is retired after it is used in the polling location ;

2.6.2.4.2 Voting Ticket numbers are unique to an individual polling place but not unique for an election.

2.6.2.4.3 Voting Tickets are only valid for a set period of time and the duration of the time-out period is configurable. ;

2.6.2.5 Provide the poll worker with the option to override the ballot style read in via the barcode scanner and issue the Voting Ticket with a different ballot style;

2.6.2.6 Provide a means for Voting Tickets to expire after a configurable fixed period of time;

2.6.2.7 When a Voting Ticket is issued, broadcast the Voting Ticket number information to every other BCS linked to the network, encrypted with each of those BCSs public keys; include, encrypted with each of the BCSs public keys, the number of Voting Tickets issued to this voter thus far: 1 for the first ticket, incremented thereafter;

2.6.2.8 Maintain an internal table of outstanding Voting Ticket numbers and how many Voting Tickets have been issued to the associated voter by linking prior tickets to the new one, as transmitted with the Voting Ticket;

2.6.2.9 When a Voting Station indicates that a Voting Ticket number has been entered, the BCS verifies if the entered ticket is valid:

2.6.2.9.1 If the Voting Ticket number is valid, the BCS must broadcast a message over the network indicating that the relevant Voting Station is authorized and the ballot style for which that voter is authorized;

2.6.2.9.2 If the Voting Ticket number is not valid, the BCS must send a message over the network indicating that the voter is not authorized to vote a ballot;

2.6.2.10 After the voter has received a Voting Ticket or at the time the voting process is disrupted at the Voting Station, provide a means of determining the status of the Voting Ticket. This must be made available to the voter in a printed copy. The printed copy must include the time of the reported status, the polling location name, the Voting Station ID, and the ballot style opened by the ticket. Possible statuses include:

2.6.2.10.1 Ticket Entered;

2.6.2.10.2 Ticket Cancelled;

2.6.2.10.3 Ticket Expired;

2.6.2.10.4 Voting in Progress;

2.6.2.10.5 Vote Record Completed;

2.6.2.10.6 Vote Record Printed;

2.6.2.10.7 Vote Record Spoiled; and

2.6.2.10.8 Vote Record Submitted to Ballot Box and the Ballot Manifest has been updated.

2.6.2.11 Monitor all network messages, and from this:

2.6.2.11.1 Accumulate a Message Log containing all messages received or sent, and any device connections/disconnections;

2.6.2.11.2 Perform the following actions when the BCS receives a Ballot Submitted message from a Voting Station:

2.6.2.11.2.1 Decrypt the PCIDs using the BCS's private key, and store the ballot's PCIDs, the associated page numbers, and the audit crypto hash, z_i , in a ballot lookup table, indexed by the PCID. This table must be stored in Volatile Memory and must not be committed to Non-volatile Memory;

2.6.2.11.2.2 Verify each of the following:

2.6.2.11.2.2.1 That there is a record of the Voting Station having been authorized to vote;

2.6.2.11.2.2.2 That the Ballot Style in the submitted EVR matches the Ballot Style for which the Voting Station is authorized;

2.6.2.11.2.2.3 That the hashes included in the message and the NIZK proofs included in the EVR are valid;

2.6.2.11.2.2.4 That the candidates/options included in the EVR correspond to those in the ballot style for which the voter is authorized to cast a ballot;

2.6.2.11.3 Require no further action if all elements 1–4 listed above are verified;

2.6.2.11.4 Require the following actions if any element listed above in 1-4 cannot be verified:

2.6.2.11.4.1 Broadcast a message indicating detection of the error;

- 2.6.2.11.4.2 Notify election personnel of the relevant machine's error;
- 2.6.2.12 The BCS software must perform the following actions when a Ballot Cast message is received from a Ballot Box Scanner:
 - 2.6.2.12.1 Decrypt the ballot's PCID from the message, and compare it to the ballot lookup table;
 - 2.6.2.12.2 If the PCID is found and the related ballot is not Provisional:
 - 2.6.2.12.2.1 If the time since the related EVR was received does not exceed the configurable timeout for PVRs, then the BCS broadcasts that the associated page of the EVR with hash z_i is cast, and responds to the scanner that the page should be accepted, and the PCID is removed from the lookup table;
 - 2.6.2.12.2.2 If the time since the related EVR is received does exceed the configurable timeout for PVRs, then the BCS broadcasts that the PVR page has timed out and should not be accepted. The scanner rejects the page and returns it to the voter;
 - 2.6.2.12.3 If the PCID is found and the related ballot is Provisional, the BCS broadcasts that the PVR page is provisional and should not be accepted at that time. The scanner rejects the page and returns it to the voter;
 - 2.6.2.12.4 Enable the BCS to use its attached barcode scanner to that it can scan in the PCID on Printed Vote Records and declare the associated Electronic Vote Records spoiled under the direction of Election Officials. When this is performed:
 - 2.6.2.12.4.1 Look up the Voting Ticket number used by the voter to create the ballot being spoiled. Using this, look up the number of Voting Tickets this voter has been previously issued;
 - 2.6.2.12.4.2 If a newly issued Voting Ticket would be the last legal Voting Ticket for this voter according to the configured election Voter Ballot Count Limit, place a visible warning on the screen so that the poll worker can inform the voter that this is their last legal ballot;
 - 2.6.2.12.4.3 If a newly issued Voting Ticket would exceed the configured election Per Voter Spoiled Ballot Limit, disable the default ability to create a new Voting Ticket for the voter, with an appropriate explanation. ;
 - 2.6.2.12.4.4 Provide an option to create a new Voting Ticket for the voter that retains the original ballot style. This ballot style may be overridden by the poll worker;
 - 2.6.2.12.4.5 Upon issuing a new Voting Ticket to a voter with a spoiled ballot, perform all tasks required of the BCS after issuing in initial Voting Ticket;
 - 2.6.2.12.5 Update the Ballot Manifest with the appropriate status
 - 2.6.2.12.6 Provide a user interface denoting the status of all connected devices, including whether running on battery, battery level, whether the device is in an error state (with additional error information

available), and any additional information the vendor deems appropriate;

2.6.2.12.7 Perform any additional actions required to fulfill the behaviors described elsewhere in this RFR;

2.6.2.13 Be able to join a Polling Location Network for an election already in progress and request a copy of a Message Log of a device on the network that is added to its own, but clearly marked as having been retrieved from another device rather than observed directly;

2.6.2.14 Handle the failure of the BCS. If the software crashes, or the BCS hardware reboots or fails, the software must be able to accommodate being reconnected to a Polling Location Network for which an election has already begun and efficiently enable the continuation of that election;

2.6.2.15 Provide a mechanism for relaying a complete copy of its Message Log to any authenticated device that requests it over the network, with the entire Message Log being provided only to the requesting device and a confirmation message broadcast to the entire network that the Message Log was transmitted and received;

2.6.2.16 Provide a means to flag a Voting Station or Ballot Box/Scanner as ‘malfunctioning’, or some equivalent thereto, at which point the device may be removed from the polling location network for maintenance or replacement without any audible alarms or alerts sounding. Note that the Voting Station must still display on the BCS after being disconnected but with some visual cue that the device is not available (such as greying out) and with a status of “disconnected for maintenance” or its equivalent.

2.6.2.17 Provide a means to enable a Voting Station for a curbside ballot:

2.6.2.17.1 The BCS provides an option to print a “Curbside Voting Ticket”

2.6.2.17.2 A poll worker selects a Voting Station and enters the 5-digit Voting Ticket code to provide the ballot style to be presented;

2.6.2.17.3 Broadcast that the Voting Station is authorized for curbside voting including the ballot style of the expected ballot;

2.6.2.17.4 Allow the Voting Station, including the printer, to be disconnected from the polling location network while being used by that voter without indication of an error. The Voting Station must continue to be displayed as part of the polling location network, but greyed out (or otherwise indicated to not be available) with a status indicating that it is currently in use for curbside voting;

2.6.3 After the Polls Close

The BCS software must:

2.6.3.1 Continue to support network connections, and log and fulfill requests over the network for a full copy of its Message Log;

2.6.3.2 Provide a mechanism to notify all devices on the network that the polls have closed;

2.6.3.3 Provide necessary reports for closing the polls;

2.6.3.4 Provide a means for generating a printed receipt which includes, in printed text and within a barcode, the time and date the receipt was printed, the audit

information required for the Closed Poll Audit Module, as specified in Appendix C, Section 4.2.1.

2.6.3.5 Provide a mechanism for transferring a complete copy of its Message Log to a secure data storage medium; and

2.6.3.6 Provide a mechanism for deleting information related to a past election from the BCS.

2.6.3.7 Finalize the Ballot Manifest

2.6.4 Interfacing with devices

The BCS software must:

2.6.4.1 Be capable of interfacing with printer hardware to enable the creation of Voting Tickets;

2.6.4.1.1 If specialized software is used for printing (i.e. API calls within the software that goes beyond the use of standard system-level printing APIs), then all printer-specific logic must be maintained within a Componentized Software Element;

2.6.4.1.2 Enable configuration of the printer that is used by the BCS software in the case that multiple printing devices are being used for the election;

2.6.4.1.3 In the event of a printer device error, or low or insufficient paper, provide immediate notification of the condition;

2.6.4.2 Interface with a COTS barcode reader or other hardware capable of reading the Ballot Style code from a Ballot Style Token and the barcode on a Printed Vote Record;

2.6.4.3 Write the EVR Hash to a portable memory device for transferring the data to the Voter Check-in Station for transmission by a STAR-Vote™ application running on the Voter Check-in Station, where:

2.6.4.3.1 The application on the Voter Check-in Station transmits the EVR Hash to an assigned Receiving Substation, and;

2.6.4.4 Detect the presence of one or more connected batteries, and provide information on the BCS's power state to the poll worker (charging/discharging/connected, % power remaining, etc.). The batteries powering the network switches must be connected to a BCS station to be monitored, and must be able to be identified and displayed individually.

2.7 Voting Station Module

2.7.1 Before the polls open and prior to inclusion in a Polling Location Network, the Voting Station Software must:

2.7.1.1 Accept a complete In Person Election Definition File as produced by the Image Creation and Deployment module as part of the System Image deployed to the device. This System Image must include all settings that must be configured on the device with the exception of the device-specific Machine Identifier (MID) and Digital Certificate;

2.7.1.2 Accept a Digital Certificate specific to this device used to sign all outgoing network messages;

- 2.7.1.3 Include a unique Machine Identifier (MID). This is a permanent number assigned to the machine (or software installation) during its useful life.;
- 2.7.1.4 Establish a Message Log for use throughout the Election. This Message Log must:
 - 2.7.1.4.1 Employ a defined ordering and provide tamper evidence through the use of a hash chain;
 - 2.7.1.4.2 Contain a record of all messages received by the Voting Station via a Polling Location Network, and retain all message meta-data;
 - 2.7.1.4.3 Contain a record of all messages sent by the Voting Station over a Polling Location Network, and retain all message meta-data;
 - 2.7.1.4.4 Contain a record of all device connections/disconnections, or network errors;
 - 2.7.1.4.5 Contain any additional information to enable compiling the Public Audit Log as detailed below;
- 2.7.1.5 Maintain independent public audit hash chains for each Voting Station, in each Voting Station. That is, if there are the maximum of 20 Voting Stations in a precinct, each machine maintains copies of 20 public audit hash chains – one for each Voting Station.
- 2.7.2 After a Voting Station is connected to the Polling Location Network, the Voting Station software must:
 - 2.7.2.1 Begin monitoring for Polling Location Network messages related to the election;
 - 2.7.2.2 Connect to and accept connections from any device on the network and check that it has a valid Digital Certificate issued by the Election Certification Authority;
 - 2.7.2.2.1 If authenticated, note the device role (Voting Station, BCS, Ballot Box/Scanner) indicated in the device's Digital Certificate and only treat as valid messages from the device that are appropriate for that device role;
 - 2.7.2.2.2 If not authenticated, refuse to accept messages from the device, and do not send messages to the device.;
 - 2.7.2.3 Send any messages sent over the network to all connected devices except where otherwise stated;
 - 2.7.2.4 Accept any messages received from an authenticated device;
 - 2.7.2.4.1 All such messages must be logged in the Message Log;
 - 2.7.2.4.2 Messages that are received from an authenticated device, but not expected from its device role, it must be ignored once logged and a network error reported by a BCS. An example would be receiving a "Ballot Submitted" message from a BCS or Ballot Scanner, or a "Ballot Cast" message from a Voting Station;
 - 2.7.2.5 Every message received must be stored in the Message Log and included in the Internal Audit Hash Chain to ensure good ordering and tamper evidence;
 - 2.7.2.6 Accept each Ballot Control Station's Public Key for use in encrypting Page Casting Identifiers;

- 2.7.2.7 Display in very large text a sequential short identifier that uniquely identifies this Voting Station within the precinct as assigned by the BCS. Note that this should be distinct from, and not related to, the Machine Identifier. On the same screen, in smaller text must be displayed: the assigned Polling Location, the assigned Machine Identifier, and whether the voting station is assigned for use on Election Day, Early Voting, or both; and
- 2.7.2.8 Accept a Launch Code transmitted by one of its BCSs just prior to the election's start. This launch code is included in the Audit Log, and the Voting System does not accept an instruction to begin an Election until a Launch Code has been received;

2.7.3 When the Polls Open

The Voting Station receives notification from a BCS that the election has begun (or resumed, if the station is involved in a multi-day election, or the election is interrupted), at which time, the Voting Station must:

- 2.7.3.1 Provide an appropriate user interface for consuming a Voting Ticket;
- 2.7.3.2 Upon entry of a Voting Ticket, encrypt the ticket with the BCS public keys, broadcast that a ticket has been consumed along with the encryptions, and await confirmation by the BCS that the Voting Ticket is valid;
 - 2.7.3.2.1 If the Voting Ticket is invalid, provide an appropriate error message, and an opportunity to reenter the Voting Ticket. Upon a configurable number of consecutive failed entries, notify the BCS of a problem, and display an error message indicating that there is a problem and that Election Officials have been notified to assist the voter;
 - 2.7.3.2.2 If the Voting Ticket is valid, the Ballot Style associated with that Voting Ticket is provided by the BCS that issued the Voting Ticket alongside its confirmation of the Voting Ticket's validity. The system must then:
 - 2.7.3.2.2.1 Display the Ballot Style provided by the BCS according to the Ballot User Interface specifications in this RFP and accept the Voter's selections;
 - 2.7.3.2.2.2 Generate unique Page Identifiers (PIDs) for each page of the Voter's PVR;
 - 2.7.3.2.2.2.1 The PIDs are recommended to be Universally Unique Identifiers (UUIDs) if deemed feasible;
 - 2.7.3.2.2.2.2 The PIDs must be created via a cryptographic random number generator;
 - 2.7.3.2.2.3 Calculate an encryption of each PID using the Election Public Key, that is referred to as C^E_{PID} ;
 - 2.7.3.2.2.4 Generate Page Casting Identifiers (PCIDs) for each page of the Voter's PVR;
 - 2.7.3.2.2.4.1 The PCIDs may be sequential, and are specifically not required to be random;
 - 2.7.3.2.2.4.2 The PCIDs must begin with the Voting Station's MID number;
 - 2.7.3.2.2.4.3 Each Voting Station must guarantee that every PCID it generates during a given election is unique; combined with

the requirement that the PCID include the Voting Station's MID number, this implicitly requires that each PCID in an election be unique;

- 2.7.3.2.2.4.4 For Provisional ballots, the final character of the PCID must be 'P'; for non-provisional ballots, the final character of the PCID must not be 'P'. The PCID must not directly reflect, incorporate, or be dependent upon any other attribute of the ballot;
 - 2.7.3.2.2.5 Calculate an encryption of each PCID using the Election Public Key, that is referred to as C_{PCID}^E ;
 - 2.7.3.2.2.6 Calculate an encryption of each PCID using the assigned BCS's Public Key. The combination of these encryptions is referred to as C_{PCID}^C ;
 - 2.7.3.2.2.7 Print a human-readable PVR and Voting Receipt according to the specifications in this RFP;
 - 2.7.3.2.2.8 Create an Electronic Vote Record (EVR) from the Voter's selections according to the specifications in this RFP;
 - 2.7.3.2.2.9 Create a Public Electronic Vote Record (PEVR) based on the EVR according to the specifications in this RFP;
 - 2.7.3.2.2.10 Calculate an audit cryptographic hash for this Voter's ballot, z_i , of:
 - 2.7.3.2.2.10.1 The previous ballot's hash, z_{i-1} (For the first ballot in the election, this is the Audit Hash Chain Seed hashed with the Launch Code);
 - 2.7.3.2.2.10.2 MID, the current time, the Ballot Style, C_{PCID}^C , C_{PCID}^E , C_{PID}^E , a hash of the ballot style data used to display this voter's ballot, and the Electronic Vote Record;
 - 2.7.3.2.2.11 Broadcast and immediately commit to non-volatile memory as part of the Voting Station's Message Log a Ballot Submitted message containing MID, the time used in the hashes above, the Ballot Style, C_{PCID}^C , C_{PCID}^E , C_{PID}^E , the EVR, the PEVR, a hash of the ballot style data used to display this voter's ballot, and the hash z_i ;
- 2.7.3.3 Upon receipt of a Ballot Submitted message from any other Voting Station:
- 2.7.3.3.1 Immediately commit the message to non-volatile memory as part of the Voting Station's Audit Logs, and retain the message's hashes in volatile memory for use in validating the next Ballot Submitted message from that Voting Station;
 - 2.7.3.3.2 Store the EVR's status, keyed to its internal audit cryptographic hash;
 - 2.7.3.3.2.1 If the Electronic Vote Record is not provisional, record its status as "Submitted;" and
 - 2.7.3.3.2.2 If the Electronic Vote Record is provisional, record its status as "Provisional Pending."

- 2.7.3.4 Upon receipt of a Ballot Cast or a Ballot Spoiled message from a BCS, the status of the associated EVR is updated to “Cast” or “Spoiled” as appropriate with an entry added to the Ballot Manifest.

Additionally, the Voting Station Software must:

- 2.7.3.5 Allow for the connection of a new BCS added to the Polling Location Network, accept a new BCS Public Key that is used for encryption of Page Identifiers and Page Casting Identifiers;
- 2.7.3.6 Correctly integrate with a Polling Location Network if added to the Network mid-election by requesting a copy of one (or more) devices on the network’s Message Log(s), and integrating that information into its own Message Log. It must be clear in the Message Log that this data was downloaded from another device and must include the Machine ID and Digital Certificate of that device;
- 2.7.3.7 Provide a mechanism for relaying a complete copy of its Message Log to any authenticated device that requests it over the network, with the entire Message Log being provided only to the requesting device and a confirmation message broadcast to the entire network that the Message Log was transmitted and received. This is the only case in which all data that is part of a message need not be broadcast to all devices;
- 2.7.3.8 Handle the failure of a BCS when the polls are open;
 - 2.7.3.8.1 While not connected to a BCS, the Voting Station must continue to accept selections from an active voter’s session and allow the voter to finish and print the PVR and Voting Receipt. The Voting Station must immediately transmit its Ballot Submitted message to the network at large and, once a BCS is connected, transmit it exclusively to the BCS;
 - 2.7.3.8.2 While disconnected from a BCS and not enabled for voting, the screen used for accepting Voting Tickets must be replaced by a message screen indicating that the machine is not currently usable;
 - 2.7.3.8.3 The disconnection event must be noted in the Voting Station’s Message Log;
- 2.7.3.9 Handle a temporary disconnection from the BCS or the Polling Location Network;
 - 2.7.3.9.1 The Voting Station must have the capacity to reconnect to the network and any connected BCS without human interaction or guidance;
 - 2.7.3.9.2 While disconnected, the Voting Station must continue to accept selections from an active Voter’s session, and allow the voter to finish and print the PVR and Voting Receipt. Once a connection to a BCS is reestablished, the Voting Station must immediately transmit its Ballot Submitted message to the network at large if the network is available, and, once a BCS is connected, transmit it exclusively to the BCS;
 - 2.7.3.9.3 While disconnected, the screen used for accepting Voting Tickets must be replaced by a message screen indicating that the machine is not currently usable;

- 2.7.3.9.4 Any such event must be noted in the Voting Station's Message Log;
- 2.7.3.10 Provide updated information via network broadcasts a configurable number of seconds, with the default 60 seconds, regarding system status, including:
 - 2.7.3.10.1 Power state (running on external AC power, running on battery power, battery charge status, etc.);
 - 2.7.3.10.2 Other system status that the vendor deems relevant to monitoring and maintaining the health and functioning of the Voting Station, but does not provide any information about the status of a voter making use of the Voting Station, where the minimum requirement is for a 'heartbeat' message;
 - 2.7.3.10.3 If a Voting Station switches from Mains Power to battery power, a status message is sent immediately.
- 2.7.3.11 Detect any error event or state that could adversely affect the ability of the Voting Station to function properly and:
 - 2.7.3.11.1 Immediately broadcast the problem and relevant supporting information to the network, provided that information is in no way related to the state of the voter's selections;
 - 2.7.3.11.2 If the Voting Station is currently in use by a Voter and the state affects the ability of the Voting Station to complete the voting session, immediately display an error message indicating that an error has occurred and election officials have been notified to assist;
- 2.7.3.12 Support use for curbside voting. Upon entry of a Voting Ticket designated as curbside voting, the Voting Station sends a message to the BCS indicating that it is to be used for curbside voting:
 - 2.7.3.12.1 Accept a Voting Ticket and display the ballot style that includes a message on the screen that the unit is for curbside use only;
 - 2.7.3.12.2 Allow the Voting Station to be disconnected from the polling location network without sounding any alarms or displaying or attempting to broadcast an error state;
 - 2.7.3.12.3 While disconnected:
 - 2.7.3.12.3.1 Allow the voter to vote as though he or she is at a Voting Station in the polling location attached to the polling location network;
 - 2.7.3.12.3.2 Any error information that would typically be provided to the poll workers at the BCS must be available through the Voting Station without reconnecting to the BCS;
 - 2.7.3.12.3.3 Store each message that would typically be transmitted during or after the voting process until reconnected to the polling location network;
 - 2.7.3.12.4 Once reconnected to the polling location network:
 - 2.7.3.12.4.1 Broadcast all stored pending messages;
 - 2.7.3.12.4.2 Collaborate with one or more other devices on the network to reconstruct the parts of the message log that the device has missed by being disconnected;

2.7.3.13 If the network cable is disconnected during an election and the Voting Station is not currently set to be used for curbside voting, detect this change and provide a quietly audible alarm and a visual message identifying the Voting Station at the BCS . This alarm must:

2.7.3.13.1 Automatically raise the system volume to a volume determined during configuration to ensure the alarm is not “muted” at the system level; and

2.7.3.13.2 Be able to be disabled during device configuration.

2.7.3.13.3 A noticeable visual indication must be provided on the BCS display

2.7.4 After the Polls Close

Once an election has been completed, the Voting Station must:

2.7.4.1 Continue to support network connections and log and fulfill requests over the network for a full copy of its Message Log;

2.7.4.2 Provide a means for generating and displaying the Data Integrity Audit Hash, which is a cryptographic hash of the complete election data collected from that day. Allow the Audit Hash to be printed out using the same printer as is used to generate Voting Tickets with both a human-readable version and a 1-D barcode version; and

2.7.4.3 Provide a mechanism for transferring a complete copy of its Message Log to a secure data storage medium.

2.7.5 Interfacing with devices

The Voting Station must:

2.7.5.1 Be capable of interfacing with and making use of any printer device that can be successfully attached to, and configured for use on, the Voting Station hardware, and that meets the specifications for the Ballot and Receipt Printer, as specified in this RFP. If specialized software is used for printing (i.e. API calls within the software that go beyond the use of standard system-level printing APIs), then this requirement may be met by containing all printer-specific logic within a Componentized Software Element;

2.7.5.2 Prior to the election, enable configuration of the printer to be used by the Voting Station in the case that multiple printing devices are being used for the election. ;

2.7.5.3 In the event of printer device error or insufficient paper, immediately notify:

2.7.5.3.1 The network of the error or issue;

2.7.5.3.2 The current voter that an error or issue has occurred and stating that election officials have been notified;

2.7.5.4 Detect the presence of one or more connected batteries, and provide information on the Voting Station’s power state to the network (at a minimum: charging/discharging/connected, % power remaining); and

2.7.5.5 Detect and disallow printing to non-physical print devices (such as PDF printers or other virtual printers).

2.7.6 Support for Accessibility Hardware

As stated in the VVSG specifications for Accessible Voting Stations (Acc-VS), the system must:

- 2.7.6.1 Support voters requiring accessibility considerations; and
- 2.7.6.2 Make use of COTS accessibility hardware, whenever possible, as a First-class Input Mechanism.

2.7.7 Demonstration Mode

The system must provide:

- 2.7.7.1 That Voting Stations be able to be designated as demonstration units during initialization;
- 2.7.7.2 Demonstration units that can be pre-loaded with one or more ballot styles, separate from the actual election's ballot styles (these would typically be reduced-size versions of actual ballot styles with substitutions of fictional names and/or races);
- 2.7.7.3 Demo units with the means to be locked down in demonstration mode, such that it can only be changed by the Administrator, and:
 - 2.7.7.3.1 Must give the voter the same experience as the complete Ballot User Interface with a full-fidelity voting station, with the exception that the Voting Ticket screen is given a fixed ticket code;
 - 2.7.7.3.2 Must not provide the ability to print a ballot, but provide instructions on the steps that would follow in the actual voting situation; and
 - 2.7.7.3.3 Must not allow the voter or anyone but the Administrator to access any other software or disable demonstration mode.

2.8 Data Integration/Validation Module

The system must:

- 2.8.1 Accept an In Person Election Definition File;
- 2.8.2 Accept, either via a local Ethernet network, or via COTS removable storage, the election data stored on, or written by, a BCS or Voting Station;
- 2.8.3 For each polling location from which data is accepted, present a hash of the data for comparison to the hash generated at the polling location (to verify that the data was not altered in transit);
- 2.8.4 Once data is accepted from a polling location, validate:
 - 2.8.4.1 That digital signatures on elements within the data are valid and correspond to digital certificates issued or signed by this election's Election Certification Authority;
 - 2.8.4.2 That hash chains are valid and intact;
 - 2.8.4.3 That NIZK proofs embedded in the EVRs are valid and that EVRs are well-formed;
- 2.8.5 On demand, generate a report stating every polling location for which data is received, and for each polling location, the date and time at which data is received, the MID of the device from which the data is received, the means by which the data is received (network or removable media), the hash of the data, and whether the data passes all validation checks;
- 2.8.6 If any validation checks fail for a polling location's data, provide a report specifying the type of error and details of where the error is detected in the data (for

example, the specific EVR at which a hash chain is broken, or for which NIZK proofs are invalid);

- 2.8.7 Via the connected Ethernet network, provide all relevant validated data to the Tabulator Module; and
- 2.8.8 Provide a means for an administrator to specify that a specific polling location's data that failed validation be sent to the tabulator regardless.

2.9 Trustee System Module

- 2.9.1 This system must include a stripped down operating system distribution (such as a minimal Linux distribution or alternatives that achieve the same purpose) with a single piece of user-accessible software called the Trustee Software;
- 2.9.2 The operating system distribution should include only the elements necessary to run that software, and should boot directly in to it.

The Trustee Software must:

- 2.9.3 Allow for Trustee computers to independently generate and store public/private key pairs for the encryption algorithm chosen in compliance with this section and compatible with the homomorphic encryption algorithm used in EVRs;
- 2.9.4 Enable several Trustee computers, networked using the Network and Logging Layer as described in this RFP, to cooperate to create a threshold public key (with a configurable threshold) overseen by a networked Tabulator;
- 2.9.5 Not, in any circumstance, divulge even to the software's user a created private key, each of which must be stored in the computer's Trusted Platform Module (TPM) for further security;
- 2.9.6 Support the use of Hardware Security Modules (HSMs) for storing high-value keys and performing essential cryptographic operations;
- 2.9.7 Support the verifiable mix (via a cryptographic mixnet) and decryption of any data encrypted with that threshold key, when threshold number of Trustee computers are present, supervised by a networked Tabulator. Optionally, the cryptographic mixnet may be split out into an additional independent component to further compartmentalize the code;
- 2.9.8 Not have any domain-specific knowledge – rather, it must only expose general functions for performing cryptographic operations on arbitrary data, and for appropriate key generation;
- 2.9.9 Enable communication over a connected Ethernet network via the shared Network and Logging Layer, provided that:
 - 2.9.9.1 Any action requested by other devices on the network be approved by the user before being executed;
 - 2.9.9.2 All network communication is logged;
- 2.9.10 While communicating over a connected Ethernet network, provide the following services to connected devices:
 - 2.9.10.1 The public key when requested;
 - 2.9.10.2 Participation in the creation of a threshold, commitment consistent public key;
 - 2.9.10.3 Participation in the decryption of Encrypted Vote Tallies;

- 2.9.10.4 Participation in the mixing and decryption of Single Race Selection Vectors (In this instance, ‘mixing’ refers to the application of a verifiable cryptographic mixnet. The goal of this action is to obscure the correspondence between decryptions of Single Race Selection Vectors and their encryptions.);
- 2.9.10.5 During all activities, provide reasonable status information to the user including an estimate of the time remaining to complete the operation during any operation that would normally take more than a few seconds;
- 2.9.10.6 While participating in the decryption of the Encrypted Vote Tallies when the tally has been completely decrypted by the networked Trustee Computers, automatically display the top-level results of the tally as soon as they are available, and without prompting by the user;
- 2.9.10.7 Participation in the decryption of the RLA Ballot Manifest.
- 2.9.10.8 Make available a user-accessible facility for exporting tallies (including all breakdowns of tallies required elsewhere by this document or by applicable law), audit logs, and proofs of all exported tallies;
- 2.9.10.9 Use key lengths and hash sizes that meet or exceed the minimum bit length recommended for Level 7 security as described in section 7.2 of the ECRYPT II Recommendations, ICT-2007-216676 (2011);
- 2.9.10.10 This implies at minimum: 128-bit symmetric keys, 3248-bit asymmetric keys and logarithm group keys, 256-bit Elliptic Curve group keys, and 256-bit hashes;
- 2.9.10.11 This may be reduced to Level 6 security provided that the homomorphic encryption Algorithm Selected does not require the release of full cyphertexts of encrypted ballots to enable independent homomorphic calculation of a commitment-consistent encrypted vote tally by members of the public; and
- 2.9.10.12 Generate all encryption keys independently – i.e. individual trustee keys may not be jointly derived from a single master key or key pair.

2.10 Tabulator Module

To facilitate vote tallying and auditing, and using the shared Cryptographic System, in the post-Election period the Tabulator Module must:

- 2.10.1 Accept a complete audit log from each polling location, the Provisional Integration and Acceptance Software, and support extracting from them a complete set of EVRs for the election;
- 2.10.2 Verify that hash chains in the supplied Election Vote Records are valid;
- 2.10.3 Calculate aggregations of all EVRs that are marked as “cast” or “provisional accepted” by precinct, by the ballot box in which its resulting PVR is placed, and by election using the homomorphic property of the vote count’s encryption, to create Encrypted Vote Tallies;
- 2.10.4 Provide a mechanism for incorporating adjustments into the calculation of tallies (in the case of incorporating other jurisdictions’ results, or to correct for unusual events, for example). To facilitate this:
 - 2.10.4.1 Enable adjustments to be entered for each relevant candidate by precinct, generating a new EVR for each precinct containing the adjustments for that precinct. These EVRs do not need to include NIZK proofs of correctness;

- 2.10.4.2 Include the adjustment EVRs, which may include multiple votes cast for individual candidates or contests, in any relevant tallies decrypted and verified by the Trustees;
- 2.10.4.3 Include these adjustment EVRs in the final set of public EVRs released, but include the randomness used to encrypt the adjustment EVRs so that they may be readily decrypted and verified by members of the public;
- 2.10.4.4 Provide a clear way of recognizing, from the data in the EVR, that it is an adjustment, not a valid cast ballot;
- 2.10.5 Pre-process the EVRs into Single Race Selection Vectors to prepare for the generation and decryption of the Audit Plain Text Commitment files. The final Audit Plain Text Commitment files shall include, at a minimum, the following data elements for each Race in the election:
 - 2.10.5.1 Hash of the PID and Race name/ID; $H(PID \parallel Race)$
 - 2.10.5.2 Each candidate for the Race with encrypted vote selection: $ENC(0/1)$
- 2.10.6 Manage the distributed activities of the networked Trustee Computers:
 - 2.10.6.1 Verifiably mix and decrypt the set of accepted Provisional PIDs, and use this to assign each “Provisional Pending” ballot a status of either “Provisional Accepted” or “Provisional Rejected;”
 - 2.10.6.2 Integrate “Provisional Accepted” EVRs into the Encrypted Vote Tallies calculated above;
 - 2.10.6.3 Decrypt the Encrypted Vote Tallies, giving a complete tally of all votes cast for each;
 - 2.10.6.4 Decrypt all Single Race Support Vectors corresponding to PVR pages that have been spoiled. Portions of Electronic Vote Records that are not “cast” or “spoiled”, and that are not provisional, are assumed spoiled and decrypted;
 - 2.10.6.5 Mix and decrypt all write-in slots;
 - 2.10.6.6 Verifiably mix and decrypt all of the encrypted values in each Single Race Selection Vector from each EVR;
 - 2.10.6.7 Decrypt the RLA Ballot Manifest
 - 2.10.6.8 As required to verify claims of election problems, the election management software must have a means to accept a PEVR Hash (as found on a voter’s Receipt) by scanning the barcode on that Receipt, or by typing in the code. The system must then have the Trustee Computers decrypt the PID and PCID for each page of that record’s associated PVR, and provide them to Election Officials, along with the ballot box in which that PVR’s pages must be found;
- 2.10.7 Provide vote tallies based on the information decrypted above for each aggregation of EVRs for publishing;
 - 2.10.7.1 Tallies must be exportable in multiple formats. At a minimum:
 - 2.10.7.1.1 A defined standard for eXtensible Markup Language (XML) or JavaScript Object Notation (JSON) or other suitable Human Readable format;
 - 2.10.7.1.2 As a hard-coded PDF report;

- 2.10.7.1.3 In such a format as to be successfully consumed by the County's existing election night reporting system without alteration;
- 2.10.7.1.4 Tab or comma delimited text file;
- 2.10.7.1.5 The file format agreed to between successful proposers of Elements A and B during contract negotiations.
- 2.10.7.2 Provide a mechanism for creating and publishing sufficient data such that independent observers can verify that the encrypted published vote totals correspond precisely to the aggregation of the published, encrypted, cast ballots. This includes:
 - 2.10.7.2.1 The Encrypted Vote Tallies;
 - 2.10.7.2.2 PEVRs derived from each Electronic Vote Record, and the Audit Hash associated with each PEVR;
 - 2.10.7.2.3 All information necessary to validate the public hash chains in the encrypted ballot information above;
 - 2.10.7.2.4 The information that is needed to prove that the tallies are consistent with the information stored in the released PEVRs;
 - 2.10.7.2.5 The Audit Plaintext Commitment File; and
 - 2.10.7.2.6 The plaintext decryptions of each spoiled EVR, including the decryption of the randomness from each SRSV so that the decryption can be verified. The option must exist for inclusion of the decrypted EVRs and associated randomness to be disabled by election administrators.

2.11 Provisional Ballot Resolution and Acceptance

The provisional Integration and Acceptance Software enables resolution of provisional ballots and acceptance of provisional ballots separate from a polling location.

This software must:

- 2.11.1 Enable the acceptance of Provisional ballots at any time up until final canvass;
- 2.11.2 When a provisional ballot is to be accepted:
 - 2.11.2.1 Allow for the PID on each PVR page to be scanned via its barcode. This can optionally be accomplished by requiring that it be fed into a Ballot Box/Scanner;
 - 2.11.2.2 Encrypt each PID with the Election Public Key for ultimate decryption by the Trustees;

2.12 In-Person Voting/Tabulation Reports

The following is a list of reports that are used regularly and that the In-Person Voting/Tabulation module and the Support Modules must be able to produce:

2.12.1 Device Preparation Reports

The following includes, but is not limited to a list of Administrative reports for a specified election:

- 2.12.1.1 Device ID report listing each BCS and Voting Station and the ID associated with each device;

- 2.12.1.2 Device and ballot style report listing each BCS with the device ID and the precinct/ballot styles assigned to each device;
- 2.12.1.3 Device and polling location assignment report listing each BCS with the device ID and Voting Station and the polling location assigned to each device;
- 2.12.1.4 Back up (emergency) device report listing all BCSs with device IDs assigned as back up (emergency) devices, the status of each device throughout the election (deployed or not deployed), and the polling location, if deployed;
- 2.12.1.5 Pre-election functional testing report documenting each stage of functional testing of all equipment used to vote, print, count, and tabulate ballots with their device IDs;
- 2.12.1.6 Zero report documenting that a Voting Station is deployed with no votes recorded.
- 2.12.1.7 Zero reports must support efficient Election Day voting sites, in both electronic and paper formats.
- 2.12.1.8 Zero reports must support efficient Early Day voting sites, in both electronic and paper formats.
- 2.12.1.9 Zero reports must support efficient Vote Center Day voting sites, in both electronic and paper formats.
- 2.12.2 Polling Location Reports for Every Day of Early Voting and Election Day
 - The following includes, but is not limited to a list Administrative and polling location reports for a specified election:
 - 2.12.2.1 Zero reports used on the first day of Early Voting and at the opening of Election Day. A zero report documents that no votes are on the device at the time it begins service for an election.
 - 2.12.2.2 Daily reports created at the start of each day of Early Voting that document the cumulative number of votes cast at that location by that date for that election;
 - 2.12.2.3 Daily closeout reports at an Early Voting polling locations that include:
 - 2.12.2.3.1 The total number of Voting Tickets issued at each BCS. There must also be a breakout showing the status subtotals for this number including the number of tickets voted, expired, canceled, spoiled/challenged, voted provisional, or left behind without explanation by a voter;
 - 2.12.2.3.2 Votes cast report documenting the number of votes cast on the BCS (including a provision to include the number of emergency ballots issued and cast);
 - 2.12.2.3.3 Total votes cast report documenting the total number of votes cast at that location for the entire election;
 - 2.12.2.3.4 Polls closed reports that contain audit information and the Election Data Integrity Hash.
- 2.12.3 Daily Detail Summary Reports for Early Voting

- 2.12.3.1 Ballot allocation report listing the number of Voting Tickets used for the day broken down by status (voted, expired, canceled, spoiled/challenged, voted provisional, or left behind without explanation by a voter), precincts voted and number of Voting Tickets by precinct for all ballots issued in the polling place. Election title, date and time are used to identify the Daily Detail Summary, and;
 - 2.12.3.2 Polling location device activity report listing machine IDs in operation and the breakdown of activity of each machine for the categories listed above for any given day or the entire voting period as well as summary numbers for a location on any given day or for the entire voting period.
- 2.12.4 Close of Polls on Election Day
- 2.12.4.1 Summary of the total number of Voting Tickets issued and a breakdown of the status of each.
 - 2.12.4.2 Detailed results by precinct report for Election Day voting sites.
 - 2.12.4.3 Detailed results by precinct reports for Vote Center voting.
 - 2.12.4.4 Close of Polls reports are required to be produced in 15 minutes or less for both Electronic and paper formats.
- 2.12.5 Central Counting Station (CCS) Reports
- All CCS reports must be relayed in real time throughout election night. These reports are not one-time, end-of-night reports. Some reports may continue to be used through to the final canvass. The list of these reports includes:
- 2.12.5.1 Device integrity report validating that the BCSs or Voting Stations delivered to the CCS have not been altered or tampered with;
 - 2.12.5.2 Receiving Substation (RSS) physical security assignments report for seals or other forms of physical security assigned at the RSS for transport to CCS;
 - 2.12.5.3 Polling locations/RSS assignments report listing which locations go to which RSS;
 - 2.12.5.4 Closed poll audit report that displays, compares, and analyzes close out information from the polling locations, RSS, and Central Counting Station, and tabulation reports from the Reporting Module.
 - 2.12.5.5 Hash code compilation report documenting the hash code compilation of all results by location from the tabulation software;
 - 2.12.5.6 Early Voting (EV) in-person tabulation reports documenting the number of ballot-by-mail and EV in-person votes cast with and without provisionals;
 - 2.12.5.7 Raw cumulative report representing a basic raw report from the tabulation software of all cumulative and precinct contest results with and without over votes and under votes;
 - 2.12.5.8 Locations reported/not reported report from the tabulation software listing all locations reported and not reported on election night;
 - 2.12.5.9 Total number of votes cast report from the tabulation software documenting the total number of votes cast (including and not including

provisional votes and spoiled ballots) in each location to compare against the reports received from the polling locations;

2.12.5.10 Provisional compilation report from the tabulation software of all provisional ballots cast by location and precinct/ballot style; and

2.12.5.11 Spoiled/challenged ballot compilation report from the tabulation software of all spoiled ballots by location and precinct.

2.12.6 Post-election-night Reports Not Addressed in CCS Reports Section

These reports include:

2.12.6.1 Number of Provisionals accepted and rejected report from tabulation software documenting the total number of provisional ballots accepted and rejected by polling location;

2.12.6.2 Device and polling location assignment report listing each BCS and Voting Station, the polling location assigned to each device, and the number of votes assigned, cast, cancelled, spoiled, and expired on each device;

2.12.6.3 Device integrity report validating that the BCSs or Voting Stations delivered to the RSS from the polling locations have not been altered or tampered with; and

2.12.6.4 Device association report listing the ID numbers of each BCS and the ID numbers of the Voting Stations initially assigned to each BCS, and in comparison, the ID numbers of the Voting Stations that were actually connected to each BCS at any time during the voting period.

2.12.7 Election Backup and Archiving

The following includes, but is not limited to a list of reports necessary for backup and archiving:

2.12.7.1 Device ID report listing each BCS and Voting Station, the ID associated each device, and the vote totals cast on each device;

2.12.7.2 Device and ballot style report listing each BCS with the device ID and the precinct/ballot styles assigned to each device and the number of votes cast on each ballot style;

2.12.7.3 Device and polling location assignment report listing each BCS with the device IDs and Voting Station IDs and the polling location assigned to each device; and

2.12.7.4 Back up (emergency) device report listing all emergency BCSs and their associated IDs showing a final status of not deployed along with a zero report for confirmation.

2.13 Risk Limiting Audit Support Module

The STAR-Vote™ system must support risk-limiting audits by generating random samples, reconstructing electronic records for comparison, and managing statistics. This risk-limiting audit support software must integrate the data produced by the Election Trustees and simplify the process of running the audit as much as possible. In particular, the software must:

2.13.1 Accept a random seed from which all successive random selections are derived using a publicly available cryptographic random number generation system that is disclosed;

- 2.13.2 Accept a confidence level to be required from the Risk Limiting Audit;
- 2.13.3 Generate, using the contest margin of victory in each race, and the known races on each ballot style page, the number of each ballot style pages that must be randomly verified to achieve the accepted confidence level. These calculations must be in accordance with Dr. Philip Stark's work available at this website:
<http://stat-www.berkeley.edu/~stark/Java/Html/auditTools.htm>
- 2.13.4 Accept electronic Ballot Manifest created by the BCS/Voting Station/Ballot Box Scanner that is a list of the PCIDs of each PVR page expected to be found in each Ballot Box, including for each the Ballot Box in which each is expected to be found. The RLA Ballot Manifest shall include, at a minimum, the following data elements:
 - 2.13.4.1 PCID of the ballot
 - 2.13.4.2 Precinct name or number
 - 2.13.4.3 Ballot Box ID where the ballot is located, and;
 - 2.13.4.4 Hash of the PID and Races; $H(PID_i || Race_j)$
- 2.13.5 Enable election officials to provide an estimated page count in each ballot box based on the use of a counting scale and provide a report of the deviation of each ballot box from the expected count;
 - 2.13.5.1 If any ballot box has a statistically significantly different estimate for the number of pages than is expected, flag it to possibly be manually checked;
- 2.13.6 Using known information about the number of each ballot style page that is expected to be in each ballot box and their associated PCIDs, produce a list of randomly selected paper ballot pages consistent with the numbers calculated using the Stark calculations (described above):
 - 2.13.6.1 These should be of the form: "The PVR Page with PCID xxxxxxxx in ballot box yy," grouped by ballot box. Alternative formats are acceptable so long as the same information is provided.
 - 2.13.6.2 The formula used in producing this list is ultimately disclosed so that independent third parties can precisely reproduce, from the random seed and publicly released election data, the exact same list of randomly selected ballots;
- 2.13.7 Provide the means for a user to load the list of randomly selected paper ballot pages produced in 2.12.4 segregated by ballot box, onto a computer connected to a high-speed scanner, feed the entire content of the ballot box ballots into the scanner and out sort the randomly selected ballots. Out-sorting can be performed mechanically by the scanner or the scanner can be caused to stop when a selected ballot is identified and the ballot manually retrieved from the scanner. If using the latter method, the scanner should be able to resume scanning until all selected ballots are retrieved from the ballot box. A hand barcode scanner should also be provided to scan individual PCIDs
- 2.13.8 Provide a means for the user to enter the PID from the ballot page, both by hand or using a barcode scanner, and immediately:

- 2.13.8.1 Using the PID, page number, and ballot style of the PVR page, determine the votes from the Audit Plaintext Commitment File that are expected to be found on that ballot page;
- 2.13.8.2 Display the PID, ballot style, ballot style page, and reconstructed electronic ballot for viewing by the public observers and audit personnel;
- 2.13.9 For each ballot checked, provide a means to indicate any electronic votes that do not match the paper votes. Additionally, provide a means to indicate that the ballot was not found;
- 2.13.10 After all ballots have been checked, if any errors are encountered, generate the number of new samples needed, and continue as above until either:
 - 2.13.10.1 A complete list is finished with no errors, or
 - 2.13.10.2 The confidence in the manual count increases to 100%;
- 2.13.11 The RLA support utility must include provisions for the users to calculate relevant statistics based on the margin, results, error bounds, number, size of the audit units for one or more stages of audits as outlined by the Stark audit tools and/or the Open Source RLA module developed by Neal McBurnett as published at:
<https://launchpad.net/electionaudits>
- 2.13.12 Audit Termination: the audit can be terminated when one of the follow conditions are met:
 - 2.13.12.1 The Risk Limit is achieved from the stage 1 audit that confirms the committed contest winner based on the outcome reported by the Tabulation module, where the audit size is determined by the RLA support utility; or
 - 2.13.12.2 The Risk Limit is achieved after stage N, where additional audit unit sizes are determined by the RLA support utility and confirms the contest winner reported by the Tabulation module; or
 - 2.13.12.3 A full hand count of all ballot determines the contest winner

APPENDIX C

SUPPORT MODULES

3.0 REQUIREMENTS FOR SUPPORT MODULES

3.1 Sample Ballot and Public Web View Module

3.1.1 Sample Ballots in Voting Station Format

The system must:

3.1.1.1 Allow the printing of each ballot style for use as a sample ballot.

3.1.1.2 Provide a means for placing a watermark across a sample ballot that says, "Sample Ballot." This watermark must be easily picked up by a photocopier, but should not obscure any language on the ballot.

3.1.2 Comprehensive Sample Ballot

In addition to sample ballots by ballot style, the system must be able to generate a Comprehensive Sample Ballot (sometimes called a "bedsheet ballot") that includes all elections and all races to be conducted within the County on a particular election date. An example of this type of sample ballot is provided in Attachment 7. The system must:

3.1.2.1 Provide a customizable template for creating a comprehensive sample ballot. Below each race, the administrator must be able to select or unselect whether or not the list of applicable precincts is included; and

3.1.2.2 Provide the ability to export the information to an MS Word document where it can be formatted for final use.

3.1.2.2.1 The export must use the Microsoft Office Open XML document format for Word (*.docx file); and

3.1.2.2.2 The software for exporting to this format must not rely on an installation of Microsoft Office being available on the computer, or on any library that is not deployed with the software itself (aside from standard operating system files).

3.2 Web Voter Ballot Style Lookup and Viewer System

The County Clerk's website allows voters to look up their voter information and view sample ballots that pertain to their location within the County. The system must take the data output, as well as exported data from the voter registration system, and enable a voter, through a web interface, to look up his or her ballot for an upcoming election and see precisely what will be seen/heard on Election Day.

The system must have an interface with the website that allows the voter to:

3.2.1 View and print a PDF copy of the sample ballot associated with his or her ballot style; and

3.2.2 Download the election's sample ballot in any applicable language and include all elections, races, candidates, and proposition language. Each race must list all precincts eligible to vote in those races.

3.3 In-Person Device Initialization and System Load Module

This should be a recommended commercially-available system for deploying System Images, with a STAR-Vote™ specific piece of software that handles providing data for a

specific election to those machines, along with any information relevant to that specific Voting Station or Ballot Control Station. This piece of software must be able to be run on multiple computers simultaneously so that voting stations can be initialized in parallel. This set of software must:

- 3.3.1 Accept a “clean” System Image that can be deployed to all of the voting stations before each election;
- 3.3.2 Provide a means of initializing each voting station and each BCS that receives the System Image with the election-specific data necessary to function as part of its assigned polling location. This includes, at a minimum:
 - 3.3.2.1 A digital certificate specific to that device;
 - 3.3.2.2 The Election Definition data;
 - 3.3.2.3 Any additional supporting information required for the device to function in its specified role at its specified location; and
- 3.3.3 Provide an efficient mechanism for parallel initialization, deployment of System Images, backing up, archiving, and removal of past election data.

4.0 REQUIREMENTS FOR DATA COLLECTION, AUDITING, AND TESTING MODULES

4.1 In-Person Voting Test Data Generator

Extensive testing must be performed to confirm that every aspect of the voting system is accurate before it is deployed in the field. Numerous logic and accuracy tests are performed to make certain the system is correctly recording and tabulating the results for every candidate and option in every ballot style. This module is not networked to the EAC Certified Module. It efficiently generates data to test functions such as: the accuracy of ballot content and styles; electronic ballot generation and tabulation; the processing of challenged/spoiled, provisional, and limited ballots; encryption processes and tabulation, the Trustee system, the Bulletin Board; reporting; and risk-limiting audits. Testing routines must meet or exceed all laws and Texas Secretary of State guidelines.

The system must:

- 4.1.1 Accept an Election Definition File and perform a comprehensive test of all the functions of the voting system, from ballot content to risk-limiting audits;
- 4.1.2 Create test data for all or part of the system, and if necessary, multiple versions of that test data;
- 4.1.3 Allow test data to be created for isolated portions of the ballot;
- 4.1.4 Generate test files in a logical sequence and/or allow that data to be randomized;
- 4.1.5 Generate Logic and Accuracy test materials and strategies for any given election by producing test data that includes, but is not limited to data for:
 - 4.1.5.1 Ballot Control Station(s) and Voting Stations by generating spreadsheets or test ballots (including Challenge ballots) for which the results are already known and can be voted through the BCS and the Voting Stations;
 - 4.1.5.2 The test data must account for and include materials to test special election scenarios, such as:
 - 4.1.5.2.1 Primary and General elections with Federal only ballot styles; and

- 4.1.5.2.2 Straight party races, write-in races, multiple candidate races (vote for one, two, three, or more).

4.2 Data Collection, Auditing, and Testing Module for In-Person Voting Module

This module resides on the laptops used at the polling locations for Voter Check-In, on a computer used to track the receipt of daily Early Voting BCSs, at the office of the Administrator, at each Receiving Substation, and the Central Counting Station. The purpose of this module is to create a chain of custody, confirm data and equipment is not tampered with during transport or storage, and transmit election results.

4.2.1 For purposes of this module, “audit data” from a polling location, during each day of Early Voting and on Election Day, is defined as consisting of (at a minimum):

- 4.2.1.1 Time polls opened and closed,
- 4.2.1.2 Time at which each BCS, Voting Station, and Ballot Box/Scanner were connected to the network and, for any of these devices later disconnected from the network prior to the close of the polls, the time the device was disconnected;
- 4.2.1.3 Number of Voting Tickets issued by the BCS;
- 4.2.1.4 Number of votes cast;
- 4.2.1.5 Number of emergency ballots cast;
- 4.2.1.6 Number of provisional ballots cast;
- 4.2.1.7 Number of spoiled/challenged ballots that occurred;
- 4.2.1.8 Election Data Integrity Hash

At the Polling Location: At the close of the polls (or if a BCS is being removed from a location), the poll worker prints out a receipt with a barcode from the BCS with audit data, the date and time the receipt was run, the device ID of the BCS, the polling location, and a hash code of the encrypted electronic vote records (EVR Hash). Using the Voter Check-In Station, this data is transmitted. If it is during Early Voting, the information is transmitted to the Administrator. If it is an Election Day, it is sent to the Administrator, each Receiving Substation, and the Central Counting Station.

At the Receiving Substation: As poll workers arrive, RSS workers download the election data from the BCS, and from this, print the audit data, the date and time the receipt was run, and the EVR Hash from each BCS. The RSS workers also review and add data such as the number of signatures they count on the poll lists. If inconsistencies are found, the system allows the RSS worker to enter in explanatory data or to attach a scanned copy of an affidavit. The collected data is sent out to the Administrator, the other RSS stations, and the Central Counting Station.

At the Counting Station: When the BCS arrives at the Counting Station, the RSS receiving process is repeated now indicating that the Central Counting Station Judge has received the information. The receipt showing the date and time of the printing, audit data, and the EVR Hash is printed from the data downloaded from the BCS or Voting Station and scanned into the CCS copy of the module. The system allows the Central Counting Judge or Administrator to scan and attach any relevant affidavits.

This module continuously collects and compares information and highlights any inconsistencies. For each inconsistency, there is a place to document results of any reviews conducted. There is a way for a sign off to be notated to indicate that all the data for that polling location has been reviewed.

The system must:

- 4.2.2 Provide a means for Receiving Substations and the Central Counting Station to collect, easily view all location information, monitor, archive, and prepare reports using the data collected from all locations.
- 4.2.3 Perform validity checks on any election data received including (but not limited to):
 - 4.2.3.1 Validation of hash chain integrity;
 - 4.2.3.2 Verification of NIZK proofs; If complete NIZK validation is deemed too computationally expensive once a practical system is available to evaluate, a small random sample of the NIZKs may be validated by this module instead;

At the polling location, the system must:

- 4.2.4 Provide a means for Receiving Substations and the Central Counting Station to collect, easily view all location information, monitor, archive, and prepare reports using the data collected from all locations.
- 4.2.5 Make use of an attached 2-D barcode scanner to read the barcode containing the Election Data Integrity Hash from BCS printouts; and
- 4.2.6 Provide a means of transmitting over the internet the polling location and Election Data Integrity Hash (as scanned from a BCS printed barcode) to the Administrator, RSS, and CSS (as needed). These data must be transmitted securely, using industry standard technologies for transmitting secure data across public networks;
 - 4.2.6.1 This module include a software communication application for transmitting the above information in a secure manner. The software communication application is installed on the Voter Check-in station computer as part of the election set up process.;

At the RSS, the system must:

- 4.2.7 Provide a means of securely receiving (over the internet) the Election Data Integrity Hash for each polling location;
- 4.2.8 Ensure that data is only accepted from actual authorized devices through the use of Digital Certificates;
- 4.2.9 Be capable of downloading the complete election data for the current Election Day from any connected BCSs or Voting Stations;
- 4.2.10 Calculate the Election Data Integrity Hash on the data downloaded from each device, and validate that it matches the Election Data Integrity Hash received via the internet from the polling location. Enable printing this hash with the audit data for comparison with the expected results from the polling location;
- 4.2.11 Provide an appropriate interface for RSS workers to validate that the Election Data Integrity Hashes match the expected values, or warnings if they do not;
- 4.2.12 Enable RSS workers to enter comments regarding any irregularities;
- 4.2.13 Provide a means for all data collected at the RSS to be transmitted securely to the CCS over the internet or a private network. Provide the means to send this data in total, or incrementally (including only the data not yet sent previously);
- 4.2.14 Provide the means to save data down to a write-once data storage device (such as a DVD-R) instead of transmitting over a network, while retaining the full

functionality described for this module;

At the CCS, the system must:

- 4.2.15 Provide a means of securely receiving (over the internet) the expected Election Data Integrity Hash from each polling location;
- 4.2.16 Provide a means of downloading (directly from a connected BCS or Voting Station) or securely receiving (over the internet, and via write-once data storage devices such as a DVD-R) one or more sets of election data;
- 4.2.17 Ensure that data is only accepted from actual authorized devices through the use of Digital Certificates;
- 4.2.18 Calculate the Election Data Integrity Hash on the data downloaded from each device, and validate that it matches the Election Data Integrity Hash received via the internet from the polling location;
- 4.2.19 Provide an appropriate interface for RSS workers to validate that the Election Data Integrity Hashes match the expected values, or be shown warnings if they do not;
- 4.2.20 Provide a mechanism to consolidate all the data received and write it onto a write-once data storage device (such as a DVD-R) for transfer to the Tabulation module;

4.3 **Bulletin Board Module**

A web interface must be provided for disclosure of public audit data and for enabling voters to look up the status of their ballot based on the hash on their receipt. This RFP limits the Bulletin Board to internal use only, where citizens may come in to Administrator's office to perform any election verification operations. The Bulletin Board also provides a way for voters to check that the encrypted cumulative tally posted at the polling location at the end of Election Day is the same as those reported to and used at the Counting Station.

These requirements also provide an Audit Data API, web service or other suitable interface portal that creates a standard access layer for independent analysis of information and verification data.

This interface must include the ability to provide all information for multiple elections and for each election must include:

- 4.3.1 A means to access a digitally signed file containing all public audit data from the election;
- 4.3.2 A list of hashes of all Electronic Vote Records from the election. Next to each hash must be either:
 - 4.3.2.1 An indication that the related ballot is fully cast;
 - 4.3.2.2 An indication that the related ballot is spoiled (not cast); or
 - 4.3.2.3 An indication that some, but not all, pages of the voter's ballot are cast;
- 4.3.3 A look-up tool for cast ballots (ballots placed in the ballot box at the polling location) that enables a voter to type in the hash from the receipt, view the hash in a list of hashes representing all cast ballots, and view the status of his or her vote;
- 4.3.4 A ballot look-up tool that enables the voter to enter the receipt hash code and look up his or her ballot's status. This can take the voter to the appropriate point in the hash list or a separate status page. For spoiled or partially cast ballots, this must

include a means to view the decryption of any spoiled pages of the ballot unless inclusion of spoiled ballot decryptions was disabled by election administrators;

- 4.3.5 Access to a digitally signed file containing the commitment to the mixed plain-text votes for use by observers during the Risk Limiting Audit;
- 4.3.6 Unofficial tallies for each candidate/option in each race, broken out by precinct and stored in XML/JSON/Human Readable;
- 4.3.7 A list of the hashes of encrypted totals from each polling location that can be matched up with the hash totals posted on the doors of the polling locations.
- 4.3.8 A complete list of valid PEVR hashes from the election, as well as the status of each (cast/partially cast/spoiled);
- 4.3.9 A complete set of PEVRs, including the status of each (cast, spoiled, partially cast with cast pages specified);
- 4.3.10 A complete dump of an audit log from each polling location;
- 4.3.11 The Audit Plaintext Commitment file; and
- 4.3.12 For each Election Day, an indication must be provided both on the page and in the files specifying whether the data is preliminary, final pending audit, or audited.

For the Election Results and Audit Data API, web service or other suitable interface portal, the system must:

- 4.3.13 Interface with and provide relevant data to the Administrator's existing Election Night Reporting system (ENR) and website;
- 4.3.14 Provide an Application Programming Interface (API), web service or other suitable interface portal for accessing election results and audit data;
 - 4.3.14.1 This API, web service or other suitable interface portal must make use of modern web standard technologies (e.g. ODATA) and be fully documented; and
 - 4.3.14.2 The API, web service or other suitable interface portal must enable discoverability of available data, under the assumption that other election Administrator may provide data through the same source (i.e. other counties could join with Travis County to provide a central electronic repository for all the counties' official election records, and this should require no software changes either to the API or to properly written API consumers).

For election verification data generated by the Tabulator module, the Bulletin Board must provide a simple web page that includes and allows for the download of the following digitally signed files:

- 4.3.15 Official tallies for each candidate/option in each race, broken out by precinct and stored in XML/JSON/Human Readable format;
- 4.3.16 A list of the hashes of encrypted totals from each polling location that can be matched up with the hash totals posted on the doors of the polling locations.
- 4.3.17 A complete list of valid PEVR hashes from the election, as well as the status of each (cast/partially cast/spoiled);
- 4.3.18 A complete set of PEVRs, including the status of each (cast, spoiled, partially cast with cast pages specified). Unless disabled by election administrators, spoiled or partially cast ballots also include the decryptions of any spoiled pages, with the exception of Provisional spoiled or partially cast ballots;

- 4.3.19 The list of Election Data Integrity Hashes for each polling location, for each day the polls were open which must encompass all in-person voting data included in the audit data;
- 4.3.20 The Audit Plaintext Commitment file; and
- 4.3.21 For each Election Day, an indication must be provided both on the page and in the files specifying whether the data is preliminary, final pending audit, or audited.

5.0 REQUIREMENTS FOR OPEN SOURCE REFERENCE MODULES

The successful proposer must include certain components that are released to the public as “open source” under a license that permits both derivation and use of the code and its derivatives without permission or payment of royalties or licensing to the vendor. This must include at a minimum those components listed within this section, but the vendor may propose to make other components of the software open source as they deem appropriate.

5.1 Guiding Principles:

- 5.1.1 Any component whose precise operation must be known in order for an independent auditor to reproduce or interpret any output of the system described within this RFP, or to recreate any audit procedure enabled by this RFP, shall be made open source; and
- 5.1.2 At any point where components of the system interact there shall be released an open source and functioning reference implementation that could be substituted in on either side of the interaction such that it could correctly interpret any intermediate outputs of a component of the system, or correctly produce valid inputs to the component of the system.

5.2 The minimum set of components to be released as open source for general use are:

5.2.1 Polling Location Network Traffic Inspector

A working reference implementation of software that can:

- 5.2.1.1 Connect to and interface with a polling location’s network;
- 5.2.1.2 Receive, interpret, and verify all messages from other devices on the network; and
- 5.2.1.3 Present a human-readable representation of the data captured;

5.2.2 Public Audit Data Inspector and Verifier

A working reference implementation of software that can:

- 5.2.2.1 Consume the publicly released audit data;
- 5.2.2.2 Verify the NIZK proofs and cryptographic hashes of electronic vote records, and the integrity of hash chains;
- 5.2.2.3 Given the cryptographic hash from a Voter’s receipt, look up the Voter’s electronic vote record, and:
 - 5.2.2.3.1 If the electronic vote record is marked “cast” or “provisional accepted”, determine whether the electronic vote record is included in relevant tallies;
 - 5.2.2.3.2 If the electronic vote record is not marked as “cast” or “provisional”, locate its decryption, verify that this decryption is correct, and display the decrypted selections to the voter.

5.2.3 Ballot Style Definition Inspector

A working reference implementation of software that can:

- 5.2.3.1 Read in digitally signed files containing ballot style definitions; and
- 5.2.3.2 Make use of the shared Ballot UI to demonstrate how each ballot style is presented to a voter, including non-visual elements.

5.2.4 Public Tally Verifier

A working reference implementation of software that can:

- 5.2.4.1 Consume the publicly released audit data;
- 5.2.4.2 Independently calculate encrypted tallies from the included electronic vote records that are marked as cast; and
- 5.2.4.3 Verify the correctness of the official tallies using the independently calculated encrypted tallies, and the NIZK proofs released alongside the official tallies;

- 5.2.5 Any element that is this requires to be implemented as a Componentized Software Element must include an open-source reference implementation of a software module which could be used in place of the module included as part of the proposed software. This requirement may be met by releasing the portion of the proposed software that implements that Componentized Software Element as open-source.

6.0 REQUIREMENTS FOR BACK UP AND ARCHIVING MODULE

When voting devices are returned to the Administrator after Election Day, a process must occur to back up and archive all data resident on all devices. Methods, processes, storage, and reports for back up must be easily and clearly retrievable as forensic evidence in the case of a contest of election, and the entire election should be easily reconstructed for review.

The system must:

- 6.1 Provide a means for efficiently backing up and archiving all data resident on all devices after each election;
- 6.2 Provide a means for parallel operations so that more than one device can be backed up at a time;
- 6.3 Organize information so that it can be quickly searched and rapidly retrieved; and
- 6.4 Create reports regarding the status of backup operations for each election.

7.0 REQUIREMENTS FOR ACCESSIBILITY

Giving all voters the right to vote using the same type of voting device is an important principle that drives the design of the STAR-Vote™ system. The STAR-Vote™ accessibility solution must give voters with a variety of disabilities the ability to vote and verify their paper record privately and confidently. The solution must include providing equal voting opportunities to curbside voters and voters who have their own preferred accessibility input devices (jelly switch, sip & puff, etc.).

Any proposed system must:

- 7.1 Provide the same type of equipment and processes as other voters whenever possible;
- 7.2 With few exceptions, allow voters with disabilities the ability to cast a secret ballot by himself or herself;

- 7.3 Provide an audio tactile interface at any Voting Station;
- 7.4 Be able to interface with new accessibility hardware as it emerges;
- 7.5 Be designed to use standard generic accessibility interfaces and flexible enough to be installed on hardware for curbside voting (such as a tablet or touch-screen laptop) that can be taken outside by a poll worker;
- 7.6 Support a pure visual interface (with optional large font, high contrast, etc.), a pure audio interface, and a synchronized visual/audio interface; and
- 7.7 Must comply with all accessibility requirements of the Voluntary Voting System Guidelines (VVSG) v. 1.1 (2012), Help America Vote Act (HAVA), Americans with Disabilities Act (ADA), or any other more current and comprehensive version that may be released during the time this project is being completed.

APPENDIX D

SOFTWARE SPECIFICATIONS

8.0 Software Specifications

8.1 Quality of Design

Every aspect of this software must be:

- 8.1.1 Designed using coding best practices;
- 8.1.2 Built using a logical and modular structure;
- 8.1.3 Designed with thorough and meaningful comments and documentation;
- 8.1.4 Engineered with for straightforward extensibility and interoperability with external components; and
- 8.1.5 Built, implemented, and maintained using an industry standard version control solution.

8.2 Modularity/Extensibility

The system must:

- 8.2.1 Make use of Componentized Software Elements that communicate through well-defined interfaces and are constructed, implemented, and referenced in a way that makes the replacement of any given module with an alternate as simple as possible;
- 8.2.2 Have the ability to replace any software element needing replacement with a new element that serves a similar purpose;
- 8.2.3 Replace components with minimal overhead. Ideally, this would be by selecting a new archive or library (such as DLL files in Windows) during configuration of the software as the proper component to use, without requiring a completely new software installation or distribution. This could entail the use of technologies such as .Net's Managed Extensibility Framework to completely decouple code publishing and make use of interfaces from components implementing them;
- 8.2.4 Prohibit automatic loading of programs, or program components produced in fulfillment of this specification, into memory and executing newly introduced software in an attempt to achieve modularity. Before any newly introduced component is executed, the Administrator must select it for execution during configuration;
 - 8.2.4.1 For example, a model wherein any library file (such as a .dll under Windows) placed in a specific folder is automatically loaded is explicitly not allowed;
 - 8.2.4.2 At most, the software may read meta-data from such components to provide administrators with additional information about them to determine what interfaces the component satisfies, and to verify digital signatures;
- 8.2.5 Be balanced with the minimal-attack-surface bias explained below; and
- 8.2.6 Follow the minimum list of particular elements that must be contained within each Componentized Software Element as defined in the Shared Components section.

8.3 Robustness

- 8.3.1 The code must be resistant to failures, able to detect faults, and able to recover from failures where possible; and
- 8.3.2 Where recovery is not possible, it must employ user-friendly error messages that aid both immediate recovery and future software improvement. Fatal errors must be logged with relevant exception information to aid future debugging.

8.4 Minimal Attack Surface

To minimize the attack surface of the code in all In Person Voting systems, the number of external dependencies on which the code relies must be minimized. Examples of this principle would be displaying User Interface (UI) elements as pre-rendered bitmaps, rather than using layout and text rendering inside of the final device, or preferring an audio format that is understood natively by the system and does not require an external codec to use. Please note that these precise methods are examples, not specific requirements or recommendations.

8.5 Measurability

- 8.5.1 The code must be designed to enable documentation of information at a detailed level. This shall include:
 - 8.5.1.1 Amount of time for UI elements to display;
 - 8.5.1.2 The number of 'taps' outside of touch-targets;
 - 8.5.1.3 The frequency of changing initial selections; and
 - 8.5.1.4 Any additional information potentially useful for measuring or validating the system's performance.
- 8.5.2 These data are not collected during normal election circumstances, but must support debugging and usability testing. Any measuring/logging logic that could violate, or create the appearance of violating voter anonymity must be contained in an alternate "debug" compile configuration such that final production binaries do not contain that code.

8.6 Scalability and Adaptability

The system must be:

- 8.6.1 Flexible enough to adapt to new laws, requirements and guidelines, and procedural changes;
- 8.6.2 Anticipate and have a strategy for regularly updating software, firmware, and hardware;
- 8.6.3 Designed to anticipate that other counties in Texas and the United States will need to customize certain aspects of this software to meet their individual needs; and
- 8.6.4 Designed in an organized structure that allows changes to be made efficiently and with minimal cost.

8.7 General Security Requirements

The system must:

- 8.7.1 Be comprised exclusively of digitally signed assemblies;
- 8.7.2 Automatically verify digital signatures on any loaded files;
- 8.7.3 Verify all NIZK proofs on ballots received over the network, unless it proves too computationally intensive to execute in real time;
- 8.7.4 Verify the integrity of hashes for new ballots, instructions, and other items involving hash chains from other machines on the network as they are received;
- 8.7.5 Detect any malformed, erroneous, or unauthorized communication in the polling location during an election and immediately display a warning at the BCS. Examples of such communications include, but are not limited to:
 - 8.7.5.1 Receiving a ballot from a Voting Station not authorized to cast a ballot;
 - 8.7.5.2 Receiving a scanned PID for which no electronic vote record is known;
 - 8.7.5.3 Noting a hash on a received EVR that does not match the calculated hash based on the previous ballot received from that Voting Station; and
 - 8.7.5.4 Receiving a malformed or unrecognized message of any kind.
- 8.7.6 Flag to poll workers on each BCS user interface any machine in use during an election that is detected to have behaved erroneously by other devices on the network; and
- 8.7.7 Allow for the introduction of independent hardware into the network to capture traffic and independently audit network communication.
- 8.7.8 Adhere to key lengths and hash sizes that meet or exceed the minimum bit length recommended for Level 7 security as described in section 7.2 of the ECRYPT II Recommendations, ICT-2007-216676 (2011);
 - 8.7.8.1 This implies at minimum: 128-bit symmetric keys, 3248-bit asymmetric keys and logarithm group keys, 256-bit Elliptic Curve group keys, and 256-bit hashes; and
 - 8.7.8.2 This may be reduced to Level 6 security provided that the homomorphic encryption Algorithm Selected does not require the release of full ciphertexts of encrypted ballots to enable independent homomorphic calculation of a commitment-consistent encrypted vote tally by members of the public;

8.8 Air-Gapped Systems

- 8.8.1 All components in an Air-Gapped System must communicate with other devices exclusively through the use of the shared Network and Logging Layer except in such cases as are explicitly outlined below;
- 8.8.2 Any communication not through the shared Network and Logging Layer must be logged; and
- 8.8.3 The successful proposer must propose any additional software or functionality within

the Air-Gapped System necessary to ensure the complete system meets the logistical requirements of a practical election.

- 8.8.4 The EAC Certified Modules may transfer data to/from the In Person Voting/Tabulation Modules using portable memory devices if support of the shared Network and Logging Layer is not a current feature of the individual certified products.

8.9 Shared Components

The shared components in the subsections below must be implemented as independent, compiled (if applicable) modules that can be included in final discreet software programs as-is, without modification. This requirement is waived if the component's requirements are fully satisfied by elements of a software library that is publicly available, may be used in open source projects without licensing fees, and is used by this software. The list of shared components include:

Cryptographic systems (detailed in Appendix E), data importers/exporters, digital signatures/certification authority, network and logging layer, and ballot display and interaction system.

8.9.1 Data Importers/Exporters

For any code used to take internal representations of data and write them to standardized data formats as described, or any code used to import data from those standardized data formats:

- 8.9.1.1 The code must be written to be reusable and readily replaceable; and
- 8.9.1.2 Any referencing code must be open to additional input/output modules supporting new formats with no modification to existing code, aside from, at a maximum, assigning new references from existing code to the new module.

8.9.2 Digital Signatures/ Certification Authority

The system must provide:

- 8.9.2.1 A common software base for creating and validating digital certificates, signing data with them, and validating those signatures must be provided;
- 8.9.2.2 To minimize the attack surface, the signing, certificate and signature validation must be performed by the software or a referenced library directly; and
- 8.9.2.3 This requirement may be fulfilled by use of a third party library if that library is freely available for general use and inspection by the public. It may also be fulfilled through the use of system-level cryptographic APIs if and only if it properly leverages an available Trusted Platform Module, and the operating system supports UEFI secure boot technology.

8.9.3 Network and Logging Layer

The Network and Logging Layer provides for all network interaction between software systems within the Air-gapped portions of STAR-Vote™. The Network and Logging Layer acts as a message-based network transport layer, and:

- 8.9.3.1 Broadcasts the device's existence on the network to other STAR-Vote™ compatible devices;

- 8.9.3.2 Discovers other STAR-Vote™ compatible devices on the network;
- 8.9.3.3 Transmits well-formed messages from a device's software to all connected STAR-Vote™-compatible devices;
- 8.9.3.4 Digitally signs all such messages with the device's election-specific certificate;
- 8.9.3.5 Ensures that all messages received from any device are received by all devices. The referencing software may disable this function if the provided device certificate is not for a Voting Station, BCS, or Ballot Box/Scanner;
- 8.9.3.6 Logs all messages received automatically, and ensures good ordering of the message log through retention of a hash chain;
- 8.9.3.7 Enforces Device Roles – messages received from any device must only be accepted and passed along if the sending device has provided a valid digital certificate issued by the Election Certification Authority that specifies a Device Role enabling the type of message received;
- 8.9.3.8 Assists newly-connected devices in reconstructing the historical audit log in the polling location for the current election (when requested by the device, and where applicable); and
- 8.9.3.9 Uses messages with these constraints:
 - 8.9.3.9.1 Must have a format that is straight-forward to test that messages are well-formed;
 - 8.9.3.9.2 Be readily hashed; and
 - 8.9.3.9.3 Must not be modified at the software level prior to logging.

8.9.4 Audit Plaintext Commitment File

The system must provide:

- 8.9.4.1 In the tabulation process described in the In-Person Tabulator requirements and the Trustee Software requirements, production of a file of plaintext votes as one of its outputs and produce an Audit Plaintext Commitment File;
- 8.9.4.2 For each Audit Plaintext Commitment File contained as part of its header, an indication of whether it is preliminary or final (all accepted provisional and write-in votes are incorporated, and the election results canvassed), and not subject to additional alteration;
- 8.9.4.3 For this Audit Plaintext Commitment File, the complete set of plaintext votes for the election, including for each entry:
 - 8.9.4.3.1 The Race ID of the race in which that vote is cast;
 - 8.9.4.3.2 The Candidate ID of the candidate/option for which that vote is cast;
 - 8.9.4.3.3 The decrypted Audit Plaintext Reference Key for that vote; and

8.9.4.3.4 If the vote is for a write-in, a decryption of the text written in by the voter;

8.9.4.4 The Audit Plaintext Commitment File in two formats: a XML/JSON format, and a fixed-width, human readable, text format.

8.10 Data Formats for Elements B and C

All data that is transferred between local software programs or transferred between or from web systems must be contained in standardized data formats. The following conditions are required:

8.10.1 The use of proprietary binary formats is not allowed;

8.10.2 For data that must be hashed according to this document's requirements:

8.10.2.1 Data is stored using Google Protocol Buffers;

8.10.2.2 The vendor is responsible for defining and providing the .proto files describing the data formats of every relevant information type consistent with the .proto language definition available here:

<https://developers.google.com/protocol-buffers/docs/proto>

8.10.2.3 In any instance in which the software interacts with these data formats, it must make use of code automatically generated from the relevant .proto file. Specifically, the vendor may not write their own implementation of either a protocol buffer reader or writer unless a canonical or functioning implementation is not available for the relevant language or software framework, in which case the vendor is responsible for contributing any resulting protocol buffer implementation back into the open source community and ensuring there are no legal impediments to doing so.

8.10.2.4 For data that does not need to be hashed in accordance with this document's requirements:

8.10.2.4.1 The vendor must rely on industry standard data formats where such formats exist. Variations on or additions to any such standard must be documented and released along with the resulting software;

8.10.2.4.2 Where no standard exists and the data does not need to be hashed, XML/JSON/Human Readable must be used if possible including a well-defined schema describing correctness for each format, or, where a variety of data types are required, a standard compressed archive file format that includes an XML/JSON/Human Readable manifest file is used; and

8.10.2.4.3 Where the data does not need to be hashed, no standard exists, and XML/JSON/Human Readable is not appropriate; formats that can be inspected with standard software tools such as a text editor, zip/rar/7z file inspector, or a combination of such standard tools are required.

Details related to specific data formats with additional requirements are laid out in the subsections below.

8.10.3 Electronic Vote Record (EVR)

The EVR must include:

8.10.3.1 Each race stored as a Single Race Selection Vector (SRSV), that is a data structure containing:

8.10.3.1.1 The Race ID for the race for which this SRSV encodes selections;

8.10.3.1.2 An encrypted counter for each candidate/option with the following requirements:

8.10.3.1.2.1 Each counter contains the number of votes the voter has indicated for that candidate/option. This generally means that the counter must contain a 1 or 0 except in such case as a voter may vote more than once for a given candidate/option;

8.10.3.1.2.2 Each counter must be encrypted using a Homomorphic Encryption Algorithm as described in this RFP and using the Election Public Key;

8.10.3.1.2.3 The counter must be associated with the unique publicly disclosed candidate ID for that candidate; and

8.10.3.1.2.4 If a write-in is permitted for the race, an encrypted counter for the write-in option must be included that contains a 1 if the voter's selection is a write-in vote and 0 otherwise;

8.10.3.1.3 A hash of the Race Identifier (RID) combined with the Page Identifier (PID) for the page of the PVR on which this race is displayed. This hash must then be encrypted with the Election Public Key;

8.10.3.1.4 If a write-in is permitted, an encrypted text field in which the voter's write-in may be stored;

8.10.3.1.4.1 This field must be either an encryption of the voter's write-in (if the voter selects to vote for a write-in candidate), or an encryption of an empty string;

8.10.3.1.4.2 Each time a SRSV is created without a write-in candidate selected, a new encryption of the empty string must be calculated to avoid violating the anonymity of write-in voters;

8.10.3.1.5 The random seed used to initialize the encryption algorithm just before this SRSV is created must be encrypted with the Election Public Key and stored as part of the SRSV;

8.10.3.2 A vector of the Page Identifiers (PIDs) for each page of the associated PVR, encrypted using the Election Public Key (used to reconstruct the plaintext EVR during a risk-limiting audit);

- 8.10.3.3 A vector of the Page Casting Identifiers (PCIDs) for each page of the associated PVR, encrypted using the Election Public Key (used to reconstruct the plaintext EVR during a risk-limiting audit);
- 8.10.3.4 For each connected BCS, a vector of Page Casting Identifiers (PCIDs) for each page of the associated PVR, encrypted using that BCS's public key (separately, so that each BCS can correctly decrypt one copy of the vector). Each vector must be annotated in some manner such that each BCS can determine which copy of the vector it should be able to decrypt;
- 8.10.3.5 For each Electronic Vote Record, a Non-Interactive Zero Knowledge (NIZK) Proofs sufficient to demonstrate that it is well formed:
 - 8.10.3.5.1 Every candidate/choice must include a NIZK proof that the candidate/choice's vote counter is either 0 or 1 (unless more than one vote is allowed for a candidate in that race, in which case the NIZK must prove that the voter has not cast more votes than are permitted);
 - 8.10.3.5.2 Any race in which only one candidate/choice may be selected must include a NIZK proof that the sum of the available candidates' vote counters is either 0 or 1;
 - 8.10.3.5.3 For a vote for K of N races, or races in which more than one vote may be cast, an appropriate proof must be included to provide a high degree of confidence that the ballot is well formed;
 - 8.10.3.5.4 For Write-in candidates, a NIZK proof must be included to ensure that the write-in slot contains a string or the associated counter is zero. The NIZK proof must be included whether or not a write-in vote is cast in order to ensure vote anonymity; and
 - 8.10.3.5.5 It is suggested that proposals make use of Sigma and disjunctive Fiat-Shamir proofs, though no preference will be given to proposals making use of these technologies. See Attachment 8 for further discussion.

Further requirements for the EVR are that:

- 8.10.3.6 The EVR must be stored as a Google Protocol Buffer, and the structure of the EVR must be that it includes two items:
 - 8.10.3.6.1 A required PEVR;
 - 8.10.3.6.2 An optional data structure that contains all of the data required by the EVR, but that is not in the PEVR; and
- 8.10.3.7 A voter's selections in an EVR may not be stored in an unencrypted form in non-volatile memory for any reason during an election, and portions may only be stored in unencrypted form after an election if those portions are determined to have been spoiled (not part of the final vote tally);

8.10.4 Public Electronic Vote Record (PEVR)

The Public Electronic Vote Record (PEVR) is a version of the EVR for public distribution. It has the property that it:

- 8.10.4.1 Allows a member of the public to calculate a Homomorphically Encrypted sum of the votes for each candidate when a complete list of PEVRs are released;
- 8.10.4.2 When combined with information published by Election Officials, allows a member of the public to verify the validity of the vote selections, and that the official tallies are released correctly and reflect the votes contained in the PEVRs.
- 8.10.4.2.1 Encryptions of the PIDs and PCIDs are not included in the PEVR.
- 8.10.4.2.2 The precise information that must be included in the PEVR depends on the Homomorphic Encryption algorithm selected. For example, if ElGamal Encryption is selected, the PEVR encryptions will be equivalent to the EVR encryptions; whereas if PPAT1 is selected, the PEVR would not include the complete cyphertext. See Attachment 8 for further discussion (In the technical discussion in Attachment 8, the cryptographic data included in the PEVR is governed by the CCEXT() function [Commitment-Consistent Extraction] for a given algorithm);
- 8.10.4.3 The PEVR must be stored as a Google Protocol Buffer; and
- 8.10.4.4 The PEVR must contain a hash of the data structure, as described previously, from its associated EVR.

APPENDIX E CRYPTOGRAPHY

9.0 REQUIREMENTS FOR CRYPTOGRAPHY

The cryptographic system for STAR-Vote™ consists of four core technologies –homomorphic encryption; commitment-consistent proofs of correct decryption; non-interactive zero-knowledge proofs; and a distributed threshold key creation/decryption system. Additional technical information on the cryptographic requirements can be found in Attachment 8: “STAR-Vote™ Cryptographic Aspects.”

9.1 Encryption of vote tallies and other information as provided in this RFP requires an encryption algorithm with the following properties:

- 9.1.1 Additive homomorphism – There must be an operation that, when applied to an encryption of n and an encryption of m , yields an encryption of $n+m$;
- 9.1.2 Commitment consistency – Given an encryption, it must be possible to provide a proof that the encryption is a valid encryption of its known decryption;
- 9.1.3 Non-Interactive Zero-Knowledge proofs – It must be possible to provide NIZK proofs that an encrypted ballot has a legal and well-formed decryption;
- 9.1.4 Compatibility with a threshold key generation scheme;

The recommended algorithm is exponential ElGamal. If using exponential ElGamal, a further recommendation is ElGamal over elliptic curves to substantially reduce the size of ciphertexts and resolve the issue discussed in Attachment 8, section 2.3. The County will consider alternate algorithms that would not require publishing of full ballot ciphertexts as part of the audit process (such as PPAT1). Additionally:

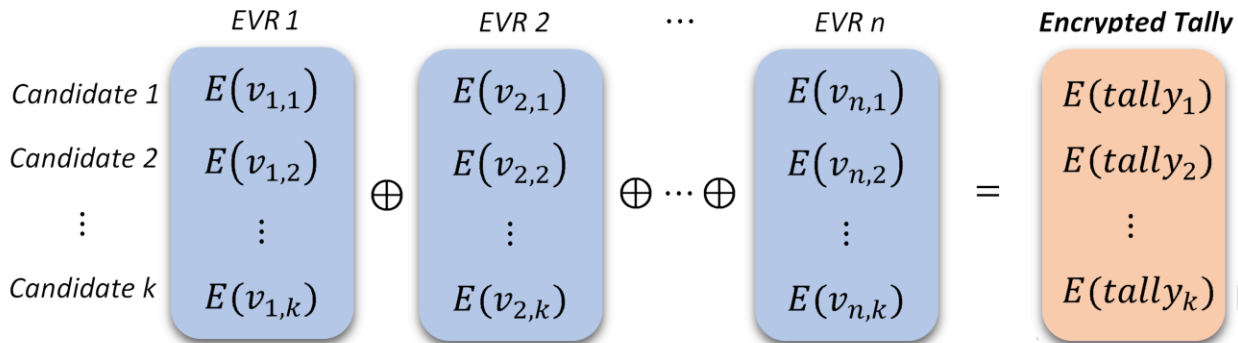
- 9.1.5 The algorithm chosen must be clearly specified and justified in the proposal;
- 9.1.6 The method by which the selected cryptographic system will address any difficulties that would be expected in its practical implementation (including, but not limited to those discussed in Attachment 8) must be clearly stated.
- 9.1.7 For other elements of the system requiring encryption, use generally accepted standard encryption algorithms, provided that each algorithm to be used is specified in the proposal; and
- 9.1.8 Separate each encryption system into a software module that is designed to be readily replaceable in the event advances in cryptanalysis or computer technology renders a part of the encryption system insecure.

9.2 Homomorphic Encryption

Votes stored in electronic vote records (EVRs) are encrypted using an additively homomorphic, commitment-consistent threshold encryption scheme, most likely Exponential ElGamal for this initial implementation. An additively Homomorphic Encryption algorithm is one that provides a means to take two encrypted numbers and combine them into an encryption of the sum of the two numbers.

Each EVR contains a slot for an encrypted vote (0 or 1) for each candidate/option for which that voter is authorized to cast a vote. Because of the additive homomorphic property, given a set of EVRs with encrypted votes of 0 or 1 for each candidate/option on

the ballot, it is possible to homomorphically combine all the encrypted votes and arrive at a valid encryption of the tally for each candidate/option without ever decrypting individuals' votes and therefore compromising their privacy. Here is an illustration of this principle:



9.3 Commitment Consistent Proofs of Correct Decryption

Commitment Consistency, the second property of the selected encryption system, means that given that you have an encryption of n , $E_k(n)$, if another party claims that they are able to decrypt $E_k(n)$ and that its decryption is n , they can provide additional information to prove that $E_k(n)$ is a valid encryption of n , and can do so with very high confidence, without providing the decryption key.

In the case of STAR-Vote™, because the homomorphic property allows members of the public to independently create an encrypted tally, commitment consistency makes it possible for election officials to prove that the officially released tally is a valid decryption of that encrypted tally. Because the public knows which PEVRs are included in that tally, this method effectively enables members of the public to independently verify the complete set of PEVRs that are included in the tally, and verify that the published tally corresponds to the sum of these votes.

When a voter finishes voting in a polling location, he or she receives a written confirmation with a 15-20 digit alphanumeric code on it. This code is the cryptographic hash (for a selected and public cryptographic hash function, most likely SHA256) of the PEVR containing their votes. This is an oversimplification to make the process clearer. In truth, the hash involves additional information, including the previous voter's hash to increase tamper resistance. When the election night results are posted and the complete set of PEVRs is published, interested members of the public can independently calculate the cryptographic hash of every PEVR that has been proven to be counted in the final tally.

9.4 Non-Interactive Zero-Knowledge Proofs

Non-Interactive Zero-Knowledge (NIZK) proofs are used extensively to support independent verification of encrypted data without revealing the contents of that data. The specific scenarios in which NIZK proofs must be included are:

- 9.4.1 Proving that a given encrypted vote counter for a given candidate/option in an EVR is either 0 or 1 (In the common case that the race only allows a single vote);
- 9.4.2 Proving that the given encrypted vote counters for all of the options in a race sum to no more than the maximum allowed number of votes for that race;
- 9.4.3 Proving that the write-in vote counter for a given race is either 0 or 1, and that if it is 1, the write-in text slot contains a valid string; and

- 9.4.4 Proving that the published plaintext vote tally corresponds to an independently calculated encrypted homomorphic sum of the PEVRs (or portions of PEVRs) that are released in tandem with the unofficial and final official results, and that are marked as ‘cast.’

9.5 Distributed Threshold Key Creation/Decryption (Trustee System)

The final technology key to ensuring the relative privacy of voters once their votes are received is the Threshold Public Key Encryption that is used to create the Trustee System. Threshold Public Key Encryption allows you to have n individuals generate separate private/public key pairs (as would be used in traditional asymmetric key encryption), and from their public keys calculate a combined threshold public key for a selected threshold k (where $k \leq n$), that may be used to encrypt data such that in order to decrypt that data, at least k of the original private keys must be available.

The advantage is that a single public key can be created that encrypts all vote data and requires multiple individuals, the Election Trustees, to cooperate in order to decrypt it. The Election Trustees are composed of multiple individuals with differing interests (party representatives, members of the local Election Board, etc.) to minimize the likelihood of collusion. In order to decrypt any votes, at least the agreed upon threshold number of Trustees must be present and take part in the process. Under such a system it becomes nearly impossible for a single individual or even an entire election office to violate the privacy of voters or the integrity of the election via the electronically stored votes.

For key creation and appropriate security level, the system must:

- 9.5.1 Adhere at a minimum to the general security requirements outlined in Appendix D, Section 8.7.8; and
- 9.5.2 Generate threshold joint encryption keys from a set of independently generated public keys – i.e. individual threshold keys may not be derived from a master public/private key or key pair.
- 9.5.3 Adhere to key lengths and hash sizes that meet or exceed the minimum bit length recommended for Level 7 security as described in section 7.2 of the ECRYPT II Recommendations, ICT-2007-216676 (2011);
- 9.5.4 This implies at minimum: 128-bit symmetric keys, 3248-bit asymmetric keys and logarithm group keys, 256-bit Elliptic Curve group keys, and 256-bit hashes; and
- 9.5.5 This may be reduced to Level 6 security provided that the homomorphic encryption Algorithm Selected does not require the release of full ciphertexts of encrypted ballots to enable independent homomorphic calculation of a commitment-consistent encrypted vote tally by members of the public;

APPENDIX F

HARDWARE REQUIREMENTS

10.0 REQUIREMENTS FOR HARDWARE

10.1 Areas Where Equipment and Devices Are Required

Successful proposers must provide information on equipment and devices required for:

Operation of Modules: This includes equipment and devices (including servers, computers, scanners, barcode readers, printers, paper handling equipment, furniture for supporting this equipment, etc.) for RFP Elements A, B and C;

Early Voting and Election Day Polling Locations: This includes equipment and devices (including servers, computers, scanners, barcode readers, printers, paper handling equipment, furniture for supporting this equipment, etc.) for the Ballot Control Stations, Voting Stations, Audio Ballot Readers, Ballot Box/Scanner. Accessibility hardware is also required and when possible should be a first-class input mechanism;

Ballot-by-Mail: This includes equipment and devices (including servers, computers, scanners, barcode readers, printers, paper handling equipment, furniture for supporting this equipment, etc.) for activities to support the preparation of unvoted and voted by-mail ballots;

Storage and Transportation: This includes equipment and devices (including specialized shelving, carts, etc.) needed to store, manage, and maintain the equipment; and

Other Administrative Requirements: This includes any other equipment or devices determined necessary by the Proposer.

10.2 **Mechanical, Electrical, Software/Firmware and Accessibility Requirements**

All proposed hardware and associated Software/Firmware shall meet the VVSG requirements for mechanical, electrical, software/firmware and accessibility. The following paragraphs contain additional requirements and desirable characteristics, the latter being used as a subjective component during proposal evaluation.

10.3 **Plan for the Storage, Transportation, Handling, and Maintenance of Hardware**

Proposer must include information on:

10.3.1 How equipment is to be stored, transported, handled, and maintained;

10.3.2 Special containers or transport tools that can be used to ensure equipment is secure from damage;

10.3.3 Devices or physical arrangements that can be used to operate software and data image distribution and archiving;

10.3.4 Securely storing equipment at polling locations.

10.4 **General Desirable Characteristics for the Polling Location**

10.4.1 The design for the polling location must incorporate modern, imaginative, easy-to-use, and cost-effective solutions;

10.4.2 The equipment must be familiar to the types of computing equipment voters see in their daily lives;

10.4.3 Components in the polling location must consist of minimal, lightweight, and easy-to-assemble equipment and devices. The physical setup and breakdown of the polling location should be easy to understand and require minimal effort or strength. Consideration must be given to the fact that many poll workers are older citizens. For example, a vendor might propose a type of computer privacy screens that could replace bulky booth wings. That simple change allows a voting station to go from being bulky furniture that requires complicated instructions and a team of two to assemble to involving a simple, lightweight device that clamps to a table or another easy-to-assemble pole structure.)

10.4.4 The design must:

10.4.4.1 Protect the ability for the voter to vote a secret ballot;

10.4.4.2 Be composed of equipment and mountings that are compact enough to, when necessary, accommodate as many voters as possible in sometimes small and unusually shaped polling locations;

10.4.4.3 Be flexible in its use so as to promote efficient and intuitive workflows for election workers and voters;

10.4.4.4 Be adaptable and easily accept adjustments in equipment size so that new models of computers and printers do not necessitate the purchase of new voting booth structures.

10.4.4.5 Accommodate persons with physical limitations and meet any accessibility guidelines applicable to the polling location; and

10.4.4.6 Have visual appeal that is inviting for voters versus intimidating or confusing.

10.4.4.7 Provide a means for sealing and securing the BCS and Voting Stations for storage and transport before and after the polls are closed (for example, tamper-resistant evidence bags).

10.4.4.8 Provide a means for sealing and securing the Ballot Box/Scanner for storage and transport before and after the polls are closed.

10.5 **Hardware Requirements: Voting Station Computers**

These devices must have:

10.5.1 A structure that is similar to a tablet in that it is lightweight, portable, and has a long battery life;

10.5.2 A minimum 5-point multi-touch touchscreen;

10.5.3 An audio jack, including the ability to detect whether a device is plugged into that jack;

10.5.4 The ability to run on battery power for long periods of time – all batteries must be rechargeable;

10.5.5 A battery internal to the device or connected via cable;

10.5.6 Ethernet network connectivity, including the ability to detect connection status changes;

- 10.5.7 Support standards-compliant accessibility devices via industry-standard technologies;
- 10.5.8 Printer support;
- 10.5.9 A method for securely blocking ports from unauthorized use;
- 10.5.10 Ports securely mounted to minimize damage from frequent connection and disconnection of cables; and
- 10.5.11 The ability to be used in a parallel distribution of software and System Images, backup, data retrieval and clearing the memory; type and brand of touch screen display;
- 10.5.12 Dimensions overall, screen size and aspect ratio, and weight;
- 10.5.13 Screen resolution;
- 10.5.14 Time of operation if power goes out and recommendations for backup power supply;
- 10.5.15 Electrical requirements and energy consumption levels;
- 10.5.16 Screens or other methods available to protect voter privacy;
- 10.5.17 Activation information (exposed finger, fingernails, pointers, gloves, etc.);
- 10.5.18 Calibration requirements, procedures to perform this function and recommended frequency;
- 10.5.19 Top five most common repair or failure issues for this type and brand of device;
- 10.5.20 Estimated life span of device;
- 10.5.21 Requirements for storage;
- 10.5.22 Requirements for transport;
- 10.5.23 Requirements for environmental control (temperature, moisture, etc.);
- 10.5.24 Available methods for mounting to and removing from poles or stands that could be used by voters and voters in wheel chairs;
- 10.5.25 Use in a curbside voting situation;
- 10.5.26 Any special transportation cases or devices that are recommended or required to prevent damage of equipment;
- 10.5.27 Recommended procedures for equipment preparation for use;
- 10.5.28 Recommended procedures for equipment preparation for storage; and
- 10.5.29 Maintenance and support levels;

10.6 Hardware Requirements: Printer for PVR and Voter Receipt

The requirements listed below are based on the use of thermal printers, however, alternative technologies may be proposed.

The printers must:

- 10.6.1 Be able to accept 8 ½" x 11" and 8 ½" x 14" paper;
- 10.6.2 Print paper in sheets (roll paper will be considered, if there is a way to ensure a means for cutting or perforating the receipt and if there is a way for the PVR to lay and stay flat after it is cut from roll, will be considered);
- 10.6.3 Detect low or out of paper conditions;
- 10.6.4 Paper replacement procedure;
- 10.6.5 Detection of jams or other physical malfunctions or error states;
- 10.6.6 Service maintenance requirements; and
- 10.6.7 Provide a cost justification for the initial purchase and ongoing operation;
Justification as to why this type of device and brand are recommended must include information on:
 - 10.6.8 Type and brand of printer;
 - 10.6.9 Dimensions and weight;
 - 10.6.10 Quality of printed image;
 - 10.6.11 Time of operation if power goes out and recommendations for backup power supply;
 - 10.6.12 Options for types of paper (including thickness, temperature, handling, and archive length tolerances);
 - 10.6.13 Number of sheets of paper that can be held at one time and options for increasing tray depths;
 - 10.6.14 Electrical requirements and energy consumption levels;
 - 10.6.15 Methods for ensuring voter privacy while printing is occurring;
 - 10.6.16 Calibration requirements, procedures to perform this function and recommended frequency;;
 - 10.6.17 Top five most common repair or failure issues for this type and brand of device;
 - 10.6.18 Estimated life span of device;
 - 10.6.19 Requirements for storage;
 - 10.6.20 Requirements for transport;
 - 10.6.21 Requirements for environmental control (temperature, moisture, etc.);
 - 10.6.22 Available methods for mounting to and removing from poles or stands that could be used by voters and voters in wheel chairs;
 - 10.6.23 Use in a curbside voting situation;

- 10.6.24 Any special transportation cases or devices that are recommended or required to prevent damage of equipment;
- 10.6.25 Type, longevity, and cost of consumables required;
- 10.6.26 Recommended procedures for equipment preparation for use;
- 10.6.27 Recommended procedures for equipment preparation for storage; and
- 10.6.28 Maintenance and support levels.

10.7 Hardware Requirements: Ballot Controller Station Devices

The device must have:

- 10.7.1 A minimum 5-point multi-touch;
- 10.7.2 Audio jack, including the ability to detect whether a device is plugged into that jack;
- 10.7.3 One or more rechargeable batteries for supporting hardware (routers, etc.) connected via cable;
- 10.7.4 Ethernet network connectivity, including the ability to detect connection status changes;
- 10.7.5 Printer support;
- 10.7.6 Ports securely mounted to minimize damage from frequent connection and disconnection of cables; and
- 10.7.7 Ability to be used in a parallel distribution of System Images, backup, data retrieval and clearing the memory;
- 10.7.8 Type and brand of touch screen display;
- 10.7.9 Dimensions overall, screen size and aspect ratio, and weight;
- 10.7.10 Screen resolution;
- 10.7.11 Time of operation if power goes out and recommendations for backup power supply;
- 10.7.12 Electrical requirements and energy consumption levels;
- 10.7.13 Activation information (exposed finger, fingernails, pointers, gloves, etc.);
- 10.7.14 Calibration requirements, procedures to perform this function and recommended frequency;;
- 10.7.15 Top five most common repair or failure issues for this type and brand of device;
- 10.7.16 Estimated life span of device;
- 10.7.17 Requirements for storage;
- 10.7.18 Requirements for transport;
- 10.7.19 Requirements for environmental control (temperature, moisture, etc.);

- 10.7.20 Available methods for mounting to and removing from poles or stands;
- 10.7.21 Any special transportation cases or devices that are recommended or required to prevent damage of equipment;
- 10.7.22 Ease of connecting device versus ease of malicious individual disconnecting device;
- 10.7.23 Recommended procedures for equipment preparation for use;
- 10.7.24 Recommended procedures for equipment preparation for storage;
- 10.7.25 Maintenance and support levels;

10.8 Printer for Voting Tickets

The device must have the ability to:

10.8.1

10.8.2 Feed and cut roll paper;

10.8.3 Detect low or out of paper conditions;

10.8.4 Paper replacement procedure;

10.8.5 Detect jams or other physical malfunctions or error states;

10.8.6 Service and maintenance requirements; and

10.8.7 Provide a cost justification for

Justification as to why this type of device and brand are recommended must include information on:

10.8.8 Type and brand of printer;

10.8.9 Dimensions and weight;

10.8.10 Quality of printed image;

10.8.11 Time of operation if power goes out and recommendations for backup power supply;

10.8.12 Options for types of paper (including thickness, temperature, and handling tolerances);

10.8.13 Number of receipts that can be printed before roll has to be changed;

10.8.14 Electrical requirements and energy consumption levels;

10.8.15 Calibration requirements, procedures to perform this function and recommended frequency;

10.8.16 Top five most common repair or failure issues this type and brand of device has;

10.8.17 Estimated life span of device;

10.8.18 Requirements for storage;

- 10.8.19 Requirements for transport;
- 10.8.20 Requirements for environmental control (temperature, moisture, etc.);
- 10.8.21 Available methods for mounting to and removing from poles or stands, if applicable;
- 10.8.22 Use in a curbside voting situation;
- 10.8.23 Any special transportation cases or devices that are recommended or required to prevent damage of equipment;
- 10.8.24 Ease of connecting device versus ease of malicious individual disconnecting device;
- 10.8.25 Type, longevity, and cost of consumables required;
- 10.8.26 Recommended procedures for equipment preparation for use;
- 10.8.27 Recommended procedures for equipment preparation for storage; and
- 10.8.28 Maintenance and support levels.

10.9 Hardware Requirements: Ballot Box/Scanner

The Ballot Box/Scanner is composed of two parts – the scanner that receives/scans the PVR pages and the physical ballot box where the received paper is securely stored. As there is no known COTS products that satisfy the requirements listed below, the Ballot Box/Scanner will need to be a custom developed hardware component. In the interest of flexibility and cost management, Travis County will accept two different responses to satisfy the functional and operational requirements for the Ballot Box/Scanner. The following defines the two response categories:

Ballot Box/Scanner Option 1: This response is for the complete development of the Ballot Box/Scanner according to the Ballot Box/Scanner requirements contained in this RFP. The response for this option is to be a standalone proposal that provides the proposed development, testing and certification of the hardware including development cost and production pricing. Also included in the Option 1 proposals is a proposed interim solution using a COTS computing device with a barcode scanner connected to it for reading the PVR barcode and communicating it to the other components for the system. The interim solution should also include a receptacle for the PVRs. Development and production cost should be separately provided for the interim solution as part of the Option 1 proposal.

Ballot Box/Scanner Option 2: Any proposer that possesses certified ballot box/scanner hardware may propose their hardware to satisfy the STAR-Vote™ Ballot Box/Scanner requirements. This proposed solution must include the cost associated with the development of new software that meets the Ballot Box/Scanner functional and operational requirements contained in this RFP. In the event there are limitations imposed by the hardware for meeting all the Ballot Box/Scanner features and functions, these limitations should be noted in the response. Option 2 proposals must include the development, testing and certification costs and the production cost on per unit basis. Please note, the software developed as part of this option becomes property of Travis County and will be managed as “open source code” as defined in this RFP.

10.9.1 The scanner portion of the Ballot Box/Scanner:

- 10.9.1.1 Have Ethernet network connectivity, including the ability to detect connection status changes;
- 10.9.1.2 Participate in the shared network and logging layer;
- 10.9.1.3 Have sufficient memory to store/cache its own messages in the event it is disconnected from the network until it is reconnected and can broadcast them. Note that the device could lose power during this period, requiring that these messages be stored in non-volatile memory;
- 10.9.1.4 Accept an election-specific certificate, device role, polling location, etc.;
- 10.9.1.5 Have the capability for reading the barcode on PVRs and that is positioned such that it automatically reads the barcode of the current PVR page. This may optionally happen either when placed in the tray, or after the page has been partially fed into the scanner; and
- 10.9.1.6 Have the ability to “accept” or “reject” each page physically via the feed mechanism once a Ballot Control Station has indicated over the network that the page should be accepted or rejected.
- 10.9.1.7 Be able to accept 8 ½” x 11” and 8 ½” x 14” paper;
- 10.9.1.8 Have a feed speed that accepts voter ballot pages without delay;
- 10.9.1.9 Be able to accurately and consistently read barcodes printed off of thermal printers;
- 10.9.1.10 Be able to read barcodes that have been printed off of thermal printers that are nearing their time for consumable replacement;
- 10.9.1.11 Calibration requirements, procedures to perform this function and recommended frequency;
- 10.9.1.12 Have a means of signaling when equipment is not working or if a misfeed has occurred;
- 10.9.1.13 Feed one PVR page at a time;
- 10.9.1.14 Accept multi-page ballots;
- 10.9.1.15 Include an internal, rechargeable battery with a specified time of operation if power goes out and the capability to operate using additional, external backup power supply
- 10.9.1.16 Have a method for securely blocking ports from unauthorized use;
- 10.9.1.17 Have ports securely mounted to minimize damage from frequent connection and disconnection of cables; and
- 10.9.1.18 Accept software upgrades.
- 10.9.1.19. Be capable of reading the ballot regardless of the orientation in which it is placed into the scanner (right side up, upside down frontwards, backwards)

10.9.1.20 Provides auditory and visual feedback to the voter when the ballot has been correctly cast

10.9.1.21 Provides auditory and visual feedback to the voter when a ballot or other inserted document has been rejected and provide the voter with corrective action messages

10.9.2 The Physical Ballot Box part of the Ballot Box/Scanner

This is the part of the Ballot Box/Scanner where the PVRs automatically fall after they have been read by the Scanner portion of the device. The box must:

10.9.2.1 Comply with the Texas Election Code Section 51.034 for Ballot Box number One:

10.9.2.2 The box must be designed to accept any of the previously discussed PVR sizes and be connected to the device in such a way as to allow the PVRs to stack as neatly as possible when they fall within the box;

10.9.2.3 The box must be designed in such a way as to easily connect and disconnect to the scanner portion of the Ballot Box/ Scanner while also having a way to protect any unauthorized separation to occur during voting;

10.9.2.4 The box must be lightweight and easy to lift, hold, and load in an election worker or law enforcement official's automobile;

10.9.2.5 The proposal must give consideration to the shape, material, and labeling methods that are used for the box to ensure it can be efficiently stored, stacked, and tracked in a warehouse and handled in less than ideal circumstances in the field;

10.9.2.6 It must prevent unauthorized access during the voting period either by the Ballot Box being opened for foreign material being inserted into it;

10.9.2.7 Numbered tamper-resistant seals, locks, and/or other methods must be utilized to ensure the box has not been opened between the time it is officially sealed as empty to the time it is used for voting;

10.9.2.8 Numbered tamper-resistant seals, locks, and/or other methods must be utilized to seal the ballot box following its official use in a polling location. Particular attention must be given to protect the box during transport and storage;

10.9.2.9 If unauthorized tampering does occur, the box, the numbered tamper-resistant seals, locks, and/or other methods used for security should show that an attempt was made or that the security of the box breached; and

10.9.2.10 A documented chain of custody system must be provided to demonstrate how the box is protected during its custody by the Administrator, Election Judge, Law Enforcement Transportation Official, Early Voting Ballot Board, and Risk Limiting Auditors.

10.9.2.11 The ballot box shall be conspicuously labeled "Ballot Box"

10.10 Hardware Requirements: Audio Ballot Reader

The Audio Ballot Reader is an independent device that can aid visually-impaired voters in verifying their printed selections by scanning or imaging the Printed Vote Record (PVR) and providing an audible readout through an attached headset. Proposals may be based on a COTS product or a COTS product that requires modification. If modifications are required, additional design detail must be provided as given below.

An Audio Ballot Reader must:

- 10.10.1 Be easily accessible to voters and be small enough and inexpensive enough to be placed at each voting station without creating a need for expanded booth space and/or set up as a separate station within the polling location;
- 10.10.2 Standalone and have no network connection to the Voting Stations or BCS;
- 10.10.3 Protect voter privacy during its use;
- 10.10.4 Have an audio jack for a set of headphones;
- 10.10.5 Have good fidelity so that selections heard through attached headphones are clearly audible in a space with significant crowd noise (vendor may recommend high quality affordable headphones that pair well with the Audio Ballot Reader);
- 10.10.6 Have a means to conveniently activate the Reader when a ballot is set in place for reading;
- 10.10.7 Have the ability to fully capture a PVR image (maximum legal-sized paper) from a distance of no more than 12”;
- 10.10.8 Include an internal, rechargeable battery with a specified time of operation if power goes out and the capability to operate using additional, external backup power supply
- 10.10.9 Have the means for securely blocking ports from unauthorized use; and
- 10.10.10 Have ports securely mounted to minimize damage from frequent connection and disconnection of cables.
- 10.10.11 If proposing a COTS device, type and brand of Reader as well as type of image capture device used to capture PVR images;
- 10.10.12 Dimensions overall, including full description, and weight;
- 10.10.13 Decibel range and maximum volume level;
- 10.10.14 Time of operation if power goes out. Recommendations for power back up;
- 10.10.15 Electrical requirements and energy consumption levels;
- 10.10.16 Activation information (voice, touch, etc.);
- 10.10.17 Calibration requirements, procedures to perform this function and recommended frequency;
- 10.10.18 Top five most common repair or failure issues for this type and brand of COTS device;
- 10.10.19 Estimated life span of device;

- 10.10.20 Requirements for storage;
- 10.10.21 Requirements for transport;
- 10.10.22 Requirements for environmental control (temperature, moisture, etc.);
- 10.10.23 Recommended methods for incorporating into the Voting Station set up;
- 10.10.24 Use in a curbside voting situation;
- 10.10.25 Any special transportation cases or devices that are recommended or required to prevent damage of equipment;
- 10.10.26 Ease of connecting device versus ease of malicious individual disconnecting device;
- 10.10.27 Recommended procedures for equipment preparation for use;
- 10.10.28 Recommended procedures for equipment preparation for storage; and
- 10.10.29 Maintenance and support levels.

The Audio Ballot Reader must be equipped with software that must:

- 10.10.30 Have the ability to be programmed to capture and read PVRs whose content and format changes from election to election;
- 10.10.31 Have the ability to fully capture any designated contents of a PVR in any required language and read it back in a clear, easy-to-understand voice;
- 10.10.32 Have the ability to be programmed to read designated PVR content;
- 10.10.33 Have the ability to be programmed to read PVR content in a specified order;
- 10.10.34 Have the ability to be programmed to easily correct mispronunciations of specific words and names;
- 10.10.35 Have the ability to be programmed to associate specific pronunciations to specific words on the PVR;
- 10.10.36 Give the voter the ability to activate the Reader through an accessible touch and/or voice method;
- 10.10.37 Give the voter the ability to indicate completion of the use of the Reader through touch and/or voice;
- 10.10.38 Give the voter the ability to easily have specific PVR selections reread; and
- 10.10.39 Have the ability to be programmed so that a voter's PVR is completely deleted from the memory of the Reader upon completion of the reading process. Have the ability to be programmed so that a voter's PVR is completely deleted from the memory of the Reader upon completion of the reading process.
- 10.10.40 Modified COTS proposals
 - 10.10.41 Provide design details of any required modification required for a proposed COTS product to meet the Audio Ballot Reader requirement. Design details must

include mechanical or electrical modification and additional production costs for these modifications.

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APPENDIX G

PROCEDURES, MANUALS, INSTRUCTION MATERIALS, AND TRAINING

11.0 REQUIREMENTS FOR PROCEDURES, MANUALS, INSTRUCTION MATERIALS, AND TRAINING

- 11.1 The vendor is responsible for producing procedures and manuals describing the proper use and maintenance of the System;
- 11.2 Manuals must be produced explaining the proper use of all user- or administrator-facing aspects of the System. These must include, where appropriate, screen captures, diagrams, or other visual aids;
- 11.3 Each process required to be performed by Elections personnel or poll workers that is related to, or dictated by, the System must have a written procedure;
 - 11.3.1 Each procedure must specify the purpose and expected result(s) of the procedure;
 - 11.3.2 Each procedure must be broken out into a checklist-style list tasks of sufficient granularity and description that there is a reasonable expectation that a person familiar with election management, but unfamiliar with the System, could successfully complete the procedure with limited or no training;
 - 11.3.2.1 Each task in a procedure should be a logical step in the process, not a specific action in the software;
 - 11.3.2.2 Each task in a procedure whose proper execution would not be expected to be self-evident to a person familiar with election management, but unfamiliar with the System, must have a textual explanation in one of the manuals with step-by-step instructions that is referenced by the procedure;
 - 11.3.2.3 Where the vendor, in consultation with the Administrative personnel, believes it appropriate, high-level procedures must be written, for which one or more ‘tasks’ refer to separate procedures with their own list of tasks;
 - 11.3.3 This should be accomplished in part by referencing written instructions elsewhere in the manuals regarding the specifics of using particular components or interface elements of the various software systems;
- 11.4 The vendor must provide materials to support the training of Elections personnel and poll workers in the proper use of the system;
- 11.5 Election officials need thorough training and clear guidelines for the implementation and operation of the voting system. This includes a level of detail that enables the County to independently run all aspects of the voting system. For example, the hardware details necessary for STAR-Vote™ to function correctly must be written for a non-technical audience. These instructions also require best practices. For example, “network cables purchased for use with STAR-Vote™ machines should be of a uniform color (at least within a given polling location) and clearly distinct from any other colored network cables used for any equipment outside of the STAR Vote™ system. A sticker with the same color should be placed next to the network port on each device so that it is obvious which network cables to use”. Such simple best practices can substantially improve the security, reliability, and ease of use of a STAR-Vote™ deployment later on.

- 11.6 The vendor must provide procedures for best practices for ensuring the security of the System and election data;
- 11.7 The vendor must commit to work with the County's personnel during the System development process, once the details of System use become clearer, to determine the appropriate scope, range, and granularity of procedures, manuals, and training materials.

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