

**Overview of Cost Factors
Associated With
Electronic Voting Machines
And
HAVA Compliance**

Presented to
Ways and Means Committee

July 26, 2006

**SUFFOLK COUNTY LEGISLATURE
Budget Review Office**

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BUDGET REVIEW OFFICE

July 31, 2006

To: Legislator Lou D'Amaro, Chairman and
All Members of the Ways and Means Committee

From: Gail Vizzini, Director *Gail Vizzini*
Budget Review Office

Subject: **Cost Analysis Electronic Voting Machines**

I received your request of July 5, 2006 for the Budget Review Office to prepare a cost analysis of the various voting machines to be certified by New York State as well as the other cost factors associated with the transition to electronic voting machines. At this time there is an absence of specific price data that impedes the preparation of a reliable cost analysis.

As you are aware, New York State has not completed the voting machine certification process. Despite requests for information, vendors are reluctant to provide us with unit prices until the certification process is completed and others cited concerns such as the proprietary nature of a fair bidding process. In addition, certain policy decisions will be required to determine which technology is preferable or more cost effective and what will be the replacement ratio of electronic machines to lever machines. The Budget Review Office will follow up with more specific cost analysis and comparisons when the price data is made public. It is anticipated that the actual purchase of the voting machines will be at least 50% Federally aided. The Suffolk County Charter provides that if a project is 50% or more aided it can be added to the capital program without an offset.

The operating costs associated with the transition to electronic voting machines will be addressed in our review of the 2007 operating budget in October. The Board of Elections has already asked for additional resources in their 2007

operating budget request for costs related to training, public education and overtime.

To provide you with information that will augment the presentation of material at the July 27th Ways and Means Public Hearing the Budget Review Office has prepared a report that provides an overview of the electronic voting system and includes the following:

HAVA Background and Implementation
Electronic Voting System Technology: DRE versus Optical Scanner
Costs Associated with Electronic Voting Systems
Electronic Voting System Security

The report is not a specific price comparison because of the absence of price data, nor does it make recommendations in terms of technology. However, our research determined that the unit cost for a Direct Recording Electronic (DRE) machine ranged from \$4,000 to \$12,000 depending upon the extent to which the machine is outfitted for full face ballot and handicapped accessibility. Similarly, depending upon how the machine is outfitted, the unit cost for an optical scanner varies from \$5,000 to \$8,000 and the unit cost for the ballot marker from \$5,000 to \$7,000. The literature indicates that the replacement ratio for lever to DRE is 1:1 or 2:3 because of the time associated with voting on a DRE. One optical scanner will replace more than one lever machine and some sources indicate the ratio may be as high as 1:4. However, ballot marking devices are necessary to make the optical scanning voting process handicapped accessible.

Our research indicates that cost factors associated with electronic voting include and are not limited to: software products, service rates, optional accessories to outfit machines, training fees, ballot printing fees, audio preparation fees, cartage, storage, maintenance, technical support, voter education and security. We continue to research the conversion to electronic voting in other states in an effort to learn from their experiences. The timeframe did not provide us with the opportunity to include a summary of that information in this report. If the committee is interested we will continue this research and summarize it with our future cost analyses.

My staff is available should the committee have questions or require additional research on this subject.

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HAVA Background and Implementation

The Help America Vote Act (HAVA) was signed into law on October 29, 2002 by President George W. Bush in an effort to improve the administration of Federal Elections in the United States. The legislation created a new federal agency (U.S. Election Assistance Commission (EAC) to administer the Election Assistance and HAVA programs, provided federal funding to states to improve election administration and replace outdated voting systems, and established minimum standards for states to follow. HAVA provided for the EAC to issue payments to states that complied with the federal mandates and each state had to certify that they had filed a “state plan”, established a complaint procedure, and provided a 5% match of the funds they were set to receive. The 2005-2006 New York State Budget allocated a \$7.7 million match but the funds were never appropriated. HAVA requires the matching funds to be appropriated prior to the state taking title to the funds they were set to receive. This issue has not been settled as of this writing. New York State was allocated nearly \$220,000,000 for election reform measures mandated by HAVA. This includes the creation of new voting system standards to increase accessibility for disabled voters, the allowance of provisional voting and post sample ballots, and statewide voter registration lists.

The provisions of HAVA mandated full compliance with the new voting standards by the first Federal Elections of 2004. New York State failed to comply and was one of several states issued a waiver by the federal government extending the deadline to the first Federal Elections of 2006. The New York State Legislature created a bipartisan Joint Conference Committee on HAVA Implementation to develop new standards and protocols which would mold the future of voting in New York. This bipartisan committee created a package of bills amenable to both houses and subsequently the bills were passed but not until late in June 2005. This timeframe was problematic since HAVA and NYS law required standards for voting equipment to serve disabled voters and a statewide voter registration database to be in place no later than January 1, 2006. The New York State Board of Elections (NYS BOE) was constrained as they had only six months to create the database and determine what voting system standards would be adopted to best serve the voters in New York. The formidable task assigned to the NYS BOE proved insurmountable in the six month timeframe.

On March 8, 2006 the State Board of Elections issued a memorandum to all county boards of elections stating they would be HAVA compliant by September 2007. This action prompted the United States Department of Justice to sue New York for non-compliance with HAVA. The NYS BOE has since abandoned full compliance implementation of HAVA for the 2006 elections and has instead focused on an interim plan which will address the concerns of the Department of Justice. The plan is known as “Plan B” and provides for counties to purchase “HAVA compliant” handicap accessible ballot marking devices solely for use in the 2006 Primary and General Elections. The Suffolk County Board of Election’s

(SC BOE) planned implementation action with respect to “Plan B” involves the use of 11 machines countywide (1 per town, 2 in the Town of Brookhaven). The cost of these machines will be deducted from the federal funding provided for HAVA implementation.

The United States Department of Justice’s approval of “Plan B” has allowed NYS more time to implement HAVA mandated voting standards and attain full compliance. Many vendors of electronic voting systems have submitted machines for certification in NYS, however to date the state has not announced the certification of any machines. The NYS BOE expects to certify these machines sometime this summer. When the state completes the certification process the SC BOE will be able to determine which and how many machines they will require and estimate the total cost of the machines. A Federal allotment of \$14.8 million is available to offset the cost of machines for Suffolk County. NYS election law sets forth the statutory obligations of the SC BOE and charges Suffolk County with the responsibility of providing ample funding to enable the board to perform its mandate. The State Board of Elections will act as the purchasing agent and bundle orders to take advantage of volume discounting if it is offered by the vendors. Upon direction from the State Board of Elections, the State Comptroller will release HAVA funds to vendors who in turn will deliver the machines directly to the counties.

According to the NYS BOE, as of July 19, 2006 six vendors have submitted bids which are currently being negotiated at the New York State Office of General Services. The vendor bids will not be made available to the public until the negotiations are complete which is expected to take about two weeks. The State’s RFP has no drop bid date instead they are using a rolling bid solicitation which will allow additional vendors to submit bids in the coming weeks. Machines will be tested for possible certification in the order in which they were received from the vendors which is as follows:

1. Diebold Election Systems
2. Election Systems & Software
3. Sequoia Voting Systems
4. Avante International Technology Inc.
5. Liberty Election Systems
6. Open Voting Solutions

The NYS BOE has been advised that Populex will be submitting a bid as well; however as of this writing they have not done so.

Electronic Voting System Technology: DRE vs. Optical Scan

There are currently two types of electronic voting machines under consideration for use in New York State. One type is the DRE (Direct Recording Electronic) and the other is the Optical Scan system. A brief overview of the two systems follows.

- **DRE**

There are two types of DRE.

1. **Full Face Printed Ballot:** The ballot on the face of the machine is made of paper and mounted to the machine. The ballot has all information needed for the election district. The voter depresses a spot on the face of the ballot next to their candidate of choice which triggers a light indicating the vote. To change a choice the voter presses another spot and the light changes to indicate the new choice. This technology prevents over-voting and a light indicates contests that were missed in case of voter oversight. The voters' elections are displayed on a paper printout which is inaccessible behind a glass window allowing the voter to verify their elections prior to casting their final ballot. Ballot information is stored via electronic storage medium. The data is collected and results are accumulated in the machine vendors' proprietary computer system until transferred to the Boards' election computer system. Each machine is limited in use to one ballot.
2. **Electronically Displayed Ballot Face:** The ballot on the face of the machine is displayed electronically on the screen. The voter touches a spot on the screen/ballot face and the selected candidate box is highlighted. To change a choice the voter presses another spot which highlights the candidate box for the new choice. The voter's elections are displayed on paper behind glass and the ballot information and election results are stored and retrieved in the same manor as with a printed ballot face DRE. This technology also prevents over voting and under voting using lights to alert voters of any oversights or potential problems. The electronically displayed ballot face offers some flexibility unavailable with a printed ballot face such as the ability to change ballot information as needed, display multiple election districts ballots on one machine, and display each political parties' primary ballot separately. An electronically displayed ballot face allows all election districts ballots to be available on all machines, which can change the logistics of any given poll site helping to minimize the wait time to vote.

- **Optical Scan**

The Optical Scan technology has been in use for many years. This technology is often used in institutes of higher education for grading examinations. The voter is given a ballot in which they fill in ovals with a marking device which corresponds to their elections in any particular contest. Upon completion, the ballot is placed in a privacy sleeve which covers all of the voters' selections allowing them confidentiality while moving from a privacy booth to the optical scan machine. The voter then places the ballot into the optical scan machine which reads and records the voters' elections. Ballot information is recorded via electronic medium where it is stored until removed to transfer the information. The Optical Scan system will also alert voters to any irregularities in their ballots such as under votes or over votes. The scanned ballot serves as the paper audit trail with this system. This type of machine is typically used in conjunction with a ballot marker to facilitate handicapped and disabled voter use.

On April 27, 2006 the New York State Board of Elections announced the final adoption of Voting Systems Standards which needed to be met to be certified as a New York State compliant voting system. The standards adopted by New York are more stringent than HAVA requirements as per Subtitle V Part 6209 of Title 9 of the Official Compilation of Codes, Rules, and Regulations of the State of New York.

Costs Associated with Electronic Voting Systems

There are substantial costs associated with the transition from the AVM lever machine to an electronic voting system whether it is a DRE or Optical Scan system. BRO has made numerous inquiries to vendors whom were likely to submit machines for certification in New York State. However most vendors would not provide price estimates for their machines which were awaiting certification in New York. Some vendors expressed concerns about releasing price information prior to certification. Some vendors cited the need for flexibility to make changes without being locked into a price, while others expressed concerns about the proprietary aspects of the bidding process and insuring a fair process. Two vendors gave vague estimates for base hardware and software costs but did not address any other costs associated with the procurement or operation of their machinery. One vendor did provide detailed pricing grids for the costs of two machines it was submitting for certification (one DRE and one Optical Scan). However as of this writing, this pricing information was proprietary in nature and inappropriate for us to release.

Based upon extensive internet research and information gathered through correspondence with electronic voting machine system vendors, BRO has developed the following estimates for hardware costs per machine for each type of electronic voting system.

- DRE (Direct Recording Electronic) \$4,000-\$12,000
- Optical Scan \$5,000-\$8,000
- Ballot Marker \$5,000-\$7,000

One factor contributing to the wide variance in cost is the different options available with the machines and how the independent vendors price their product. We have determined some vendors' prices are stated as baseline and do not include many options required to comply with the standards as established by New York State. Other vendors' prices are inclusive of all necessary equipment to meet the standards for a New York State compliant machine. In addition, we have included estimated costs for ballot marking devices as they may be required in conjunction with the Optical Scan system for handicapped/disabled use. The cost of either type of electronic voting system is susceptible to change if a volume discount is attainable and realized.

There exists a myriad of additional components which would need to be considered when addressing the cost of adopting an electronic voting system, including but not limited to software products, service rates, optional accessories, training fees, ballot printing fees, audio preparation fees, cartage, storage, maintenance, technical support, and voter education. The Budget Review Office acknowledges that these cost factors need to be considered to conduct a thorough cost analysis. However prior to NYS certification and selection of a machine by the County Board of Elections, these costs remain unquantifiable.

Suffolk County owns approximately 1,800 lever automated voting machines and used 1,468 of these machines in the last general election. The SC BOE has determined it needs to purchase approximately 1,800 replacement machines. The decision as to which technology will be employed here in Suffolk County may have an impact on the actual number of replacement machines that will be needed. BRO research indicates that one optical scanner could possibly be used to replace more than one lever voting machine, whereas the replacement ratio for lever machines with DREs is generally accepted to be 1:1. There has been speculation that 2 DREs could replace 3 lever machines, however this hypothesis has not been proven. In addition most optical scan systems may require the use of a ballot marker machine to make them handicapped/disabled friendly, which needs to be considered when comparing the two technologies and the costs associated with their implementation. Additionally the capacity of votes each machine is able to process will effect the number of machines required.

The following tables are for illustrative purposes only. They represent estimated costs for replacement of the lever voting machines utilized in the last general election in Suffolk County with electronic voting systems and are based upon the following assumptions.

- Suffolk County has 351 polling stations.
- 1,468 lever machines were used in the last general election.
- DRE machines replace lever machines at a 1:1 ratio.

- The voter capacity of either electronic voting machine is equal to or greater than that of the lever machine.
- One Optical Scan machine can replace up to 4 lever machines per polling station.
- DRE machines come equipped with privacy apparatus as standard equipment.
- All cost estimates are subject to change based upon unit cost plus optional equipment and volume discounting if applicable.

Estimated Electronic Voting Machine Costs for Suffolk County

DRE Machine			
ITEM	QUANTITY	ESTIMATED UNIT COST	TOTAL
Full Handicap Accessibility Machine	351	\$12,000	\$4,212,000
Standard Machine	1,117	\$8,000	\$8,936,000
Grand Total			\$13,148,000
Optical Scan Machine			
ITEM	QUANTITY	ESTIMATED UNIT COST	TOTAL
Optical Scan Machine	514	\$6,000	\$3,084,000
Ballot Marker	351	\$6,000	\$2,106,000
Privacy Booth	1,468	\$200	\$293,600
Grand Total			\$5,483,600

Electronic Voting System Security

The security aspects of electronic voting systems are paramount in protecting the integrity of our democratic elections. Every voter must be confident that regardless of the type of voting system implemented their vote will be accurately recorded. A great deal of research has been conducted and many reports have been generated which address the security of electronic voting systems. The findings of these reports all share one common finding: all technology, no matter how advanced, is susceptible to attack in some degree.

We believe that diligent threat analysis plays a substantial role in allowing us to identify and implement the very best security precautions. There is abundant information available detailing potential threats to security as a result of utilizing an electronic voting system. The NYS BOE has been proactive in educating themselves with respect to the potential threats and vulnerabilities associated

with an electronic voting system and have taken the following precautions to hinder any attacks to the systems implemented in New York.

- Requiring any NYS compliant voting system to provide a device which produces and retains a permanent voter verifiable paper audit trail (VVPAT), which may be reviewed or corrected by the voter prior to casting their ballot.
- Requiring that a random manual audit of the voter verifiable audit record is conducted from 3% of voting machines or systems. NYS is one of only twelve states in the country which requires both a VVPAT and a random audit of voting machines' paper trails after an election.
- Banning the use of any voting machines with wireless components in an effort to thwart any attempts to remotely access and corrupt the machine and its records.
- New York has addressed one of the greatest security concerns, which is software attacks, by requiring the vendor or manufacturer of any voting machine or system to be used in this state to deposit its programming, source coding, and software for the machine in escrow where it can be policed for corruption.

The Budget Review Office conducted extensive research and reviewed many reports which focused on electronic voting systems and security. Our findings indicate that all electronic voting systems have significant security and reliability vulnerabilities. Fortunately it appears that most security and reliability vulnerabilities can be significantly reduced through education and the implementation of internal controls and sound procedures.